

2x660 MW KHURJA STPP

VOLUME – II B CIVIL, STRUCTURAL & ARCHITECTURAL WORKS

SPECIFICATION NO. PE-TS-475-600-C001

SECTION - C SPECIFIC TECHNICAL REQUIREMENTS

Customer



THDC INDIA LIMITED

Consultant






NTPC LIMITED






BHARAT HEAVY ELECTRICALS LIMITED

NEW DELHI



CLAUSE NO.	<div><div></div><div>TECHNICAL REQUIREMENTS</div><div></div></div>			
1.00.00	GENERAL			
1.01.00	<p>This specification is to cover, survey works , site leveling works, design, preparation of general arrangement drawings, construction and fabrication drawings, supply of labour& materials and construction of all civil, structural and architectural works by the Bidder.</p> <p>Description of various items of work under this specification and nature of work in detail are given hereinafter. The complete work under this scope is referred to as civil works. Various buildings, structures, plant and systems, facilities, etc., covered under the scope is given in Part-A and herein.</p> <p>The work to be performed under this specification consists of design, engineering, construction, erection and providing all labour, materials, consumables, equipment, temporary works, temporary storage sheds, temporary colony for labour and staff, temporary site offices, constructional plants, fuel supply, transportation and all incidental items not shown or specified but reasonably implied or necessary for the completion and proper functioning of the plant, all in strict accordance with the specifications including revisions and amendments thereto as may be required during the execution of work.</p> <p>All construction materials including cement, reinforcement steel, coarse & fine aggregate, structural steel and construction water etc., shall be arranged by the Bidder.</p> <p>The scope shall also include setting up by the Bidder a complete testing laboratory in the field to carry out all relevant tests for structural steel, reinforcement steel & reinforced concrete (RCC) works.</p> <p>Preliminary geotechnical investigation in the proposed area has been carried out by theOwner and the bore-log data is furnished in Annexure 'C'. Detailed GeotechnicalInvestigation shall be carried out by the bidder.</p> <p>The work shall be carried out according to the design/drawings to be developed by the Bidder and approved by the Employer. For all buildings, facilities, systems, structures, etc., necessary layout and details are to be developed by the Bidder keeping in view the statutory and functional requirements and providing enough space and access for operation, use and maintenance. The Bidder's work shall cover the complete requirements as per IS codes, fire safety norms, requirements of various statutory bodies, International Standards, best prevailing practices and to the complete satisfaction of the Employer.</p> <p>The Bidder shall make the layout and levels of all structures from the general grid of the plot and the nearest GSI benchmark or other acceptable benchmark of Government department. As per the directions of the Engineer. The Bidder shall be solely responsible for the correctness of the layout and levels and shall also provide necessary instruments, materials, access to works, etc., to the Engineer for general checking of the correctness of the civil works.</p> <p>All the quality standards, tolerances, welding standards and other technical requirements shall be strictly adhered to.</p> <p>The Bidder shall fully apprise himself of the prevailing conditions at the proposed site, climatic conditions including monsoon pattern, soil conditions, local conditions and site specific parameters and shall include for all such conditions and contingent measures in the</p>			
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	<p>bid, including those which may not have been specifically brought out in the specifications.</p> <p>In case of any conflict between stipulations in various portions of the specification, most stringent stipulation would be applicable for implementation by the Bidder without any extra cost to the Employer.</p> <p>Wherever there is an anomaly in the design concept between the data furnished in the General Design Criteria & Design Concept of Buildings, the data furnished in the design concept of buildings shall be treated as final.</p> <p>Bidder or his agencies engaged as detailer for fabrication drawings should have the experience of detailing for powerhouse structures or steel plant or Industrial structures like Petro/Chemical/Refinery/Cement etc.</p> <p>Bidder shall obtain the approval of detailing agency for making fabrication drawings before engaging them.</p>		
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<div>2.00.00</div> <div>2.01.01</div> <div>2.02.00</div> <div>2.03.00</div>	<div><div>SCOPE OF WORK</div><div>The scope of work for the EPC contractor shall include the analysis, design, construction, erection of all civil, structural & architectural works and all other items mentioned in Part-A of this Specification.</div><div><div>Construction Facilities</div><div>For details of construction facilities refer to Part-A of this specification.</div></div><div><div>Exclusions:</div><div>The details of exclusions and terminal points, refer to Part-A of this specification.</div></div></div>		
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3.00.00 3.01.00	<div>SUBMISSIONS</div> <div>The following documents and drawing shall be submitted and got approved before commencement of detailed engineering. The list given below is not exhaustive but indicative only.</div> <div><div>a) Project design intent, design criteria which shall cover all design aspects, design parameters, material of construction and its specifications, structural idealization including framing system for gravity loads and lateral loads(wind and seismic), load cases, load combinations, assumptions, references, basis of analysis & design of all buildings, machine foundations, facilities, systems and structures etc.</div><div>b) Survey drawings indicating spot levels for the area under the scope of work.</div><div>c) Plants 'General Layout Plan' drawing with coordinates of roads, boundary wall, buildings and facilities, pipe/cable corridors, railway lines, Green Belt etc..</div><div>d) Geotechnical investigation scheme</div><div>e) Geotechnical Investigation report including foundation system recommendations.</div><div>f) Typical design of pile, if applicable, in terms of type, rated capacity, length, diameter and the termination criteria to locate the founding level.</div><div>g) Scheme for initial and routine load test of Pile foundation high strain dynamic load test and pile integrity test methodology.</div><div>h) Details of corrosion protection measures for all structures, foundations etc.</div><div>i) Architectural concept designs which shall cover all concept plans and elevations, finishes and area statements of all buildings and facilities</div><div>j) The following sequence of submission of drawings/ documents is to be followed:<div>- Architectural drawings, wherever applicable</div><div>- Relevant GA drawings & loading document</div><div>- Analysis & design of structures/ buildings/ facilities with drawings.</div><div>- Analysis & design of foundations with drawings.</div></div></div>			
3.02.00	<div>The following documents and drawings shall be submitted and got approved before commencementof construction at site:</div> <div><div>a) Structural analysis including load calculations and structural analysis models, design calculations of foundations, substructure and superstructure for all buildings, structures, machine foundations (TG, BFPsetc.), facilities and systems.</div><div>b) Civil, structural and architectural drawings for all foundations, sub-structures and facilities super structures.</div><div>c) Civil, structural drawings for roads, culverts, bridges, road and rail crossings, and drainage pump houses, if required.</div><div>d) Civil, structural drawings for sewer, sewage pump house, water supply, water tanks, trenches and ducts.</div><div>e) Architectural presentation drawings, detail drawings, perspective view & 3D model. All drawing and document shall be duly stamped by the registered architect.</div><div>f) All architectural drawings required for execution of construction work such as detail floor plans, detail elevations, detail sections and other miscellaneous architectural details such as finish schedule (internal & external), colour schemes (both internal and external), doors and windows, flooring details & pattern, Atrium Vault/ Dome in polycarbonate sheet in the roof, false flooring, false ceiling, etc., architectural fascia and projections, miscellaneous stair details & architectural details like, coping, flashing, khurras, water proofing, fillet, roof decking, wall cladding, surface drains, rain waterdown comers, sanitary, plumbing, etc.</div></div>			
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3.03.00	<p>g) Perspective views of main power house, Service Building and Control Room interiors shall be submitted in Hard Copy in Laminated A-1 Size (Two Numbers) and Soft copy of Autocad / Revit drafted views. A panoramic bird's eye view of Overall plant shall be submitted in laminated A-1 Size hardcopy (Two Numbers) and soft copy in AutoCAD.</p> <p>The following documents and drawings shall be submitted for Information only before commencement of construction at site:</p> <p>a) Drawings showing underground facilities with co-ordinates and invert levels of the facilities like buried pipes, buried cables, trenches, ducts, sewers, drains, sumps, pits, culverts, manholes, etc.</p> <p>b) Construction and erection procedure for all major structures such as main plant building including control tower, TG foundation and other machine foundations, etc. covered under the Bidder's scope.</p> <p>c) Material test certificates.</p> <p>d) Marking scheme identifying the equipment laydown areas, with distinctive colour scheme</p> <p>e) All statutory clearance and permits from concerned local bodies/authorities, write-up on various statutory requirements and their compliance for various buildings, facilities, structures and systems, etc.</p>		
3.04.00	Soft copy of 3D modeling (including input and output files shall be submitted.		
3.05.00	All construction drawings shall include total quantity of concrete (grade wise), reinforcement (diameter wise) and structural steel (section wise).		
3.06.00	Design drawings of steel structures shall include the connection, joint & fastener details for Main columns, Beams & Bracings.		
3.07.00	As-built drawings with quantities of various items of work system wise, building wise, structure wise, etc. duly certified by Site after execution of work for information/record.		
3.08.00	One complete set of applicable standards, references, specifications, code of practice along with soft copy (wherever required with minimum 2 years license fee) to the Engineer for use at site.		
3.09.00	Wherever applicable, scheme for dewatering, shoring, and strutting/sheet piling.		
3.10.00	Commencement of fabrication and erection and construction shall be done after approval of the relevant documents and drawings. All drawings shall be of standard sizes (Metric System) and shall be made on AutoCAD. All documents shall be made using MS office. Bidder shall submit all documents and drawings as specified in Part-C (General technical requirement) of the bidding document.		
3.11.00	All other design details/drawings or any other submission as indicated elsewhere in this specification and as required by the Employer		
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4.00.00 4.01.00	<p>GENERAL LAYOUT PLAN</p> <p>The preliminary layout plan proposed for the project is shown in the drawing no. 9915-999-POC-F-001 titled "General Layout Plan". It shall form the basis for further elaboration by the Bidder for the plant facilities, which are in his scope. Area identified for facilities remain same as indicated in GLP, however, minor modification of location of building may be done to optimize layout.</p> <p>Bidder shall prepare the detailed layout of the plant facilities which are in his scope and shall submit the same for Owner's approval.</p> <p>While preparing the detailed layout, planning his facilities and deciding upon the transportation and erection strategy he shall ensure the following aspects.</p> <div><div>a)</div><div>All Statutory requirements including safe distances between various facilities as per applicable rules/acts/laws including local bye-laws are met.</div></div> <div><div>b)</div><div>Face of the buildings and facilities are located in such a way so as to have an offset of minimum 20m with respect to centre line of double lane road and 15metre with respect to centre line of single lane road.</div></div> <div><div>c)</div><div>The entire construction activity shall take into account the commissioning of the units in phases matching with the phased commissioning of the plant.</div></div> <div><div>d)</div><div>The interface requirements with the plant construction/erection activities of other contracting agencies engaged by Owner. These agencies engaged will be working simultaneously with the Bidder within the plant premises.</div></div> <div><div>e)</div><div>The area for construction/erection facilities like lay-down, pre-assembly, offices and stores have been earmarked on the General Layout Plan.</div></div> <div><div>f)</div><div>No permanent facility shall be located within the safety zone limit around the fuel Oil storage tanks etc., except those permitted by Owner.</div></div> <div><div>g)</div><div>Transportation of all equipment and materials shall be by road as envisaged. Any other mode envisaged by the bidder may be proposed. However the same may be adopted subject to approval of the Employer.</div></div> <div><div>h)</div><div>All the buildings and facilities shall be approachable by fire tenders.</div></div>			
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5.00.00	SALIENT FEATURES & DESIGN CONCEPT		
	This section of specification covers salient features and design concepts of Civil, Structural and architectural works pertaining to main plant buildings and CPU civil Works,		
5.01.00	Architectural Concepts & Design		
	<p>a) All the Architectural Design works shall be handled by Professionally Qualified Architects having adequate experience in the design and detailing of Architectural and Interior work of Power Plant Buildings. Bidder may have in-house Architects with the required experience for the above or engage Architect Consultant having similar experience. All the Landscape Design works shall be handled by Professionally Qualified Landscape design architects having adequate experience in the Landscape design and detailing of Large Industrial Projects. Bidder shall submit adequate documentary proof in support of the qualification & experience of Architects and Landscape designers.</p> <p>b) Power plant buildings shall be architecturally treated, based on functional requirements, in such a way that they retain the desired scale, and present a pleasing composition of mass and void. The overall impact of the buildings shall be one of aesthetically unified architectural treatment having a comprehensible scale, blending colour scheme with the surroundings.</p> <p>c) All buildings and structures shall be architecturally treated in such a way so as to be in complete harmony with the main plant building, surrounding structures and environment. Due considerations shall be given to orientation, landscape design, and interior design. All finishes for floors, walls, ceiling, structural elements, partitions for offices and industrial areas shall be suitable for their aesthetics, durability and functional requirements and shall include the latest building material & technology. Consideration shall be given for achieving standardization & fast track construction.</p> <p>d) Overall colour scheme of the Main plant building and other buildings shall be designed judiciously and in a comprehensive manner taking into account the mass and void of buildings, its facade, equipment, exposed structural elements, piping, trestles, bus ducts, and other service elements.</p> <p>e) For adequate light and ventilation, National Building Code recommendations shall be followed. All buildings having height more than 4.0 m shall have fixed glazed ventilators.</p> <p>f) Architectural design of all Power Plant Building shall be suitable for installation of solar photovoltaic panels on roof tops for renewable energy purpose.</p> <p>g) All the buildings shall be architecturally designed to meet the National Building Code requirement & Fire Safety Regulations.</p> <p>h) During design stage, technical specification as prepared shall govern the finishes. Service building shall be designed as GRIHA (Green Rating for Integrated Habitat Assessment) compliant Green building with a minimum three (3) star rating. Bidder shall perform all services related to GRIHA certification including preliminary</p>		
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	<p>assessment, GRIHA facilitation, simulation& analysis leading to obtaining the final certification by GRIHA.Bidder have to procure and provide renewable energy sources. For information aboutGRIHA, bidder is requested to visit the web site www.grihaindia.org. Bidder shall obtain and submit final certificate from GRIHA to the Owner.All fees required to get GRIHA Certification shall be paid by the Bidder.</p> <p>i) All public buildings shall be designed incorporating the provision of barrier free environment for physically disabled persons.</p> <p>j) All the buildings and site development including landscaping shall be designed to take care of rain water harvesting &ground water recharging. Development of rain water harvesting scheme for the project and obtaining approval of the scheme from Central Ground Water Board is in Bidder's Scope.</p> <p>k) For Control Rooms inMPHdry wall construction technology shall be incorporated. Control room shall be designed as designer control room with ACP Cladded wall paneling for housing LVS.</p> <p>l) Full glass wall partitionwith aluminium frame to be provided between CCR, CERof Offsite Control Rooms andMPH Control room.</p> <p>m) Landscape Development</p> <p>There shall be comprehensive landscape development in entire plant area to create a pleasant and healthy environment. The scope of work for landscape and horticulture work shall include supply and planting of trees, shrubs, hedges/edges/borders, grass lawn around different areas, and plantation along Patrol roads etc.The scope shall also include supply and installation of all landscape furniture i.e. Park-Benches, &gazebos, landscape fountain & water bodies, landscape pavers/ tiles etc.and all associated electrical works/ items, mechanical works/items and civil works and all other work required for completion of landscape development. The landscape design and drawing shall be developed by competent and signed byqualified landscape architect. The landscape shall use the suitable plants and trees preferably local trees, plants, and shrubs. There shall be provision of pathways in and around the landscaped area. Around the pathways and roads, trees shall be planted. Bidder shall procure and install the necessary system for drip/sprinkler irrigation in working condition.There shall be intense landscape with water body development one each near Service building. Minimum size of water bodies shall be 6.0m diameter and 1.0m depth. Detail landscape drawings and detailed bill of quantity for all landscape items shall be submitted.</p> <p>The landscape (including water body) around Service Building shall meet the GRIHA requirement for 3 STAR rating.</p> <p>n) The development of green belt is not in bidder scope. However, bidder has to plan the facilities leaving the space for green belt as indicated in "General Layout Plan". In addition to that laydown areas and other vacant land of the plant will be used by owner for the development of green belt.</p> <p>o) All floor areas indicated in subsequent pages shall be total floor area required.</p>		
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5.02.00	<p>Main plant Buildings/ Structures shall comprise of:</p> <div><div>a)</div><div>Main Power House</div></div> <div><div>b)</div><div>Machine Foundations in STG Island</div></div> <div><div>c)</div><div>Pipe & Cable Gallery</div></div> <div><div>d)</div><div>Service Building</div></div> <p>The Main Power house, Pipe cable Galleries & trestles shall have structural steel framed super structure.</p> <p>All other buildings shallhave RCC framed superstructure.</p> <p>Brief description of the above mentioned Main Plant Buildings is furnished herein:</p>			
5.02.01	<p>Main Power House</p> <p>(i) Salient Features:</p> <p>Main Power House shall consist of the Turbine bay, adjacent Deaerator Bay, electrical bay &common control room building (CCR Building) (as stipulated elsewhere in this specification). The turbo – generator (TG) foundation, boiler feed pumps foundations andshall be located inside thepower house and their foundation system shall be as per design concept of machine foundation. All other equipment foundations (including Heaters & Deaerators) shall be supported on RCC floors with structural steel beams. The RCC floors shall comprise RCC slab over profiled metal deck sheets (to be used as permanent shuttering but not to be considered for design of RCC slab as composite slab). Shear anchor studs shall be provided through metal deck at regular interval on all top flange / flange plate of structural beams. However, steel gratings, chequered plate flooring as well as precast RCC covers shall be provided as per the functional requirements. All RCC pits & trenches below ground floor slab (including Condensate Extraction Pump (CEP) pit) shall be covered with minimum 40 mm thick MS grating supported on structural steel beams. The RCC pits shall also be provided with a sump at the corner for dewatering with submersible pumps. Staircases & ladders shall be provided for access to these pits. Electrically Operated Travelling (EOT) cranes shall be placed in the turbine bay with the gantry girders (supporting crane wheel loads) supported on structural steel brackets on A & B row columns). Walkway with chequered plate shall be provided at crane girder level at both ‘A’ row & ‘B’ row side with caged ladder access from the operating floor.</p> <p>All main columns & beams of Main Power House shall be of structural steel girder (open web or solid web) with base plate level of columns 1.20m below ground floor slab level in general except for other pit areas where structural steel column shall be extended below upto a depth lower than the pit top surface such that the column base plate & stiffeners are concealed below the pit raft level are concealed below the pit raft level.Auxiliarycolumns in main power house shall be either of structural steel or concrete (Pre-Cast) construction. Design,fabrication/manufacturing of precast structural members like column& beams,handling/erection and jointing thereof shall be done as per IS 15916.</p> <p>The roof system in turbine bay shall comprise a structural steel girder (open web or solid web) for the entire bay width. The roof slab shall consist of 40mm thick (min.) RCC slab supported on profiled metal deck sheet. The metal deck sheet shall be supported on structural steel purlins. The purlins shall be in turn be supported on turbine bay roof girder top chord at regular interval. Additional waterproofing shall be provided above the roof RCC slab as per details mentioned elsewhere in this specification. 1 in 100 slope shall be provided for the turbine bay roof sloping downwards towards the A-row (towards transformer yard). Minimum 150mm dia. galvanized mild steel pipes shall be used at A-row & C-row as Rainwater Down comers. Staircases in main power house</p>			
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	<p>shall be of structural steel. Treads of each staircase shall be 40mmthick MS grating and handrail/ hand post shall be 32mmNB circular hollow sections unless specified otherwise in architectural section of the specification. All staircases in turbine Bay and Deaerator Bay shall be enclosed with minimum 230 thickbrick masonrywall with fireproof doors at all floor landing levels. The parapet wall shall be of minimum 1m height and shall be provided all the around roof of main plant building.</p> <p>All edges of openings shall have edge protection angles (minimum ISA 75x75x6) and handrails with hand posts (Hand post spacing 1.50m maximum)(Hand post spacing 1m maximum).</p> <p>ii. Design Concept:</p> <p>Main Power House shall be designed as moment resisting sway frame in the transverse direction and braced in the longitudinal direction. However, due to functional requirement, vertical bracings to the column in CCR Buildingnot to be provided at (& above) the operating floor level and CCR Building frames shall be designed as moment resisting frames in both transverse and longitudinal directions.</p> <p>All beam column moment connections shall be designed for adequate ductility. The building shall have connectivity with walkways from Boiler & Service Building through sliding bearing only. The connectivity with cable gallery shall be as specified in Pipe &cable gallery section of this chapter. Floor level acceleration spectra shall be generated during seismic analysis for design of pipe supports / equipment located at the elevated floors. Adequate number of thermal expansion gap (minimum 2.00m) between adjacent structural frames at expansion joint and minimum 50mm between RCC slabs at expansion joint)shall be provided between the units and Common Control Building.</p> <p>In the RCC floor/ roof slabs, the spacing of shear anchor studs on structural beams shall be minimum of the spacing required for</p> <p>i) Restraining the compression flanges of beams and</p> <p>ii) Transfer of the horizontal shear at floor/roof to the supporting beams.</p> <p>The roof girder in Turbine Bay shall be provided with a camber to take care of deflection due to dead weight.</p> <p>The Main columns in A, B &C rows of Main Power House Building shall be built-up I sections. Rolled sections/ I sections with additional flange plates shall not be acceptable for main columns & auxiliary columns. The roof truss to column connection shall be bolted connection using high strength bolts (grade 8.8/ IS 1367). The roof truss of Turbine Hall shall be adequately braced in plan using Tie level and rafter level bracings. The longitudinal bracing shall comprise a pair of members connected to the column flanges and detailing shall be adequate to restrain the entire column cross- section. Minimum gusset plate thickness for bracings shall be 12mm.</p> <p>Common Control Room at operating floor shall have minimum 60% free space for movement, control room to be free of any auxiliary/stub columns other than the C-row central column with minimum depth as possible</p> <p>For all other design methodology, refer to Design Criteria specified elsewhere in this specification.</p> <p>iii. Architectural Features</p> <p>This building shall be of Structural Steel Framed structure and shall be completely coveredwith external cladding and RCC roof.The external vertical face(herein stated as 'A' row) of main power house facing (& adjacent to) the transformer yard and also the two gable ends shall be completely covered with vertical cladding comprising 3.0m high brick wall (on ground floor slab) and single skin profiled vertical metal sheet for the remaining height except for the vertical segment between operating floor &gantry girder</p>		
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	<p>bracket level where double skin vertical metal sheet shall be provided.</p> <p>In case of routing of bus-duct is done outside the A-row (part/full), there shall be a provision of continuous cladding of metal sheeting covering steel structure supporting the bus duct to match the entire A-row elevation. The metal cladding shall be designed to suit the aesthetics of the entire main plant building.</p> <p>In front of the power transformers, RCC fire barrier wall shall be provided as per functional requirement in lieu of brick wall at A-row. The above mentioned RCC wall shall be attached with single skin metal sheet on external face.</p> <p>The 'A' row & Gable End columns projecting inside the turbine hall shall be concealed with single skin profiled metal sheet from operating floor level to crane girder bracket top level.</p> <p>The external vertical face (herein stated as 'C' row) facing (& adjacent to) the Boiler area shall be completely covered upto the Deaerator floor level with vertical cladding comprising 3.0m high brick wall on ground floor followed by either single skin metal sheeting with runners or brick wall sandwiched with single skin metal sheeting on external face (for all floors requiring 4 hours of fire rating e.g. cable spreader room, ventilation/ air washer room, AHU Rooms and air conditioned areas)</p> <p>The internal vertical interface plane between Turbine bay & Deaerator bay (herein stated as 'B' row) shall have brick masonry Wall from RCC roof slab level of turbine bay (AB bay) upto specified floor level below such that Turbine bay & Part of Deaerator bay below the Deaerator supporting floor level is completely covered on all sides.</p> <p>Glazing for A Row & gable end shall be reflective 6mm thick clear toughened glass with Aluminium frame. Hermetically sealed double glazing shall be provided between air conditioned & non air conditioned areas. Internal glazed partition in side CCR/CER/Offsite Control Room and B-Row at operating floor level shall be of fire resistant glass having 2 (Two) hour fire rating and with suitable frame. Light weight aerated concrete panels with Single Skin Metal Panel cladding shall be provided in exterior of UPS Battery room area and Control Equipment Room area. All internal side of Aerated concrete panel and columns in air-conditioned areas in MPH shall be encased with Aluminium Composite panel cladding from inside.</p> <p>Inside the main power house building, brick masonry wall (and fire proof doors) shall be provided for switchgear rooms, cable spreader rooms, MCC rooms, AHU rooms, Air Washer room & Oil rooms and all other rooms where fire protection is envisaged.</p> <p>Cut-outs and opening shall be provided in floors and walls as per functional requirement.</p> <p>All door, windows in air conditioned area and all windows glazing shall be provided with Aluminium frame work Steel door and Fire Proof doors shall be provided as per requirements.</p> <p>Stairs in BC Bay and on A-Row shall be provided as per functional requirement and as per National Building Code and Factories Act.</p> <p>All stairs in BC Bay lift lobby Area shall be in RCC. Stainless steel railing shall be provided at TG floor level for all cut-outs/ openings, walkways, cut-outs at lower level that are visible from TG floor level and stairs near lift lobby. M.S. railing shall be provided for all other locations. All peripheral edges of floor cut-outs / openings at T.G floor level and covered with gratings/ chequered plates, expansion joints along T.G deck, structural expansion joints shall be covered with minimum 2mm thick stainless steel plate of grade SS 316.</p> <p>For each unit minimum one no. gent's toilet with adequate facilities including drinking water space and janitor's space shall be provided at each level of power house building,</p>		
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5.02.02	<p>in addition one no ladies toilet shall be provided in each unit at 0.00M and mezzanine floor level and CCR level. A separate ladies and gent's toilet and pantry shall be provided for CCR approachable from CCR / CER / Offsite Control Rooms.</p> <p>B Row portion in TG Hall fronting Control Room& CERand glazed partitions in CER/ CCR / Offsite Control Roomsshall be of 25 mm thick Hermetically sealed double glass of Fire resistant of min 11mm thick clear, toughened, interlayered 120 minute fire rated for both integrity & radiation control and 6 mm thick toughened tinted glass with 8 mm gap and with suitable frame of 1.6 mm thick galvanized steel sheet. Thepartitions shall be up to false ceiling level and wall above up to soffit of slab above shall be finished with Aluminuim Composite panels cladding.</p> <p>Control room/ Control Equipment Room / Offsite Control Rooms, False Ceiling shall have Cat Walk Way above for service/ maintenance.</p> <p>Main power house building shall be provided with passenger lift in BC way as specified in subsection A-8of PART-B of technical specification.</p> <p>Adequate partitioning as per functional requirement above false ceiling in control Room& CER shall be provided for Inert Gas zoning.</p> <p>Internal steel columns in Air Conditioned Area of Main Power House Building shall be encased with Aluminium Composite Paneling up to false ceiling.</p> <p>Functionally the very heart of Power House Building is its Control Rooms. Special attention shall be given for conceptualization of interior design of the Control Rooms. Control rooms design shall be both functional and argonomic for ensuring reliable and error free operation of the plant. Control room shall have Aluminium composite panel cladded video wall housing large vedio screens and a separate visitor viewing gallery. A walk through view of the control roomsshall be submitted along with bill of quantity to illustrate the design scheme.</p> <p>Metal Panel Cladding shall be composed of Different Colour shades to match with the surroundings. External finish of Masonry wall shall be premium acrylic smooth exterior paint with silicon additives finish.</p>			
	<p>Machine Foundations in STG Island Area</p> <p>i. Salient Features</p> <p>The scope of work of the Bidder shall be design and construction of all Civil & Structural Works of Machine Foundations including supply of all materials, springs & viscous dampers.</p> <p>Turbo-Generator (TG) foundation:</p> <p>Alternative-1</p> <p>The TG foundation shall comprise RCC top deck supported on steel helical springs & viscous dampers (called herein as the Vibration Isolation System – VIS) and shall be located in the Turbine bay of Main Power House. The springs-cum-viscous dampers shall be placed on a group of RCC/ Structural Steel columns. These TG columns can be interconnected to the Main Power House Building frame either rigidly or connected through PTFE bearings on corbels/ brackets of the TG Columns. The general arrangement & details of springs/ viscous dampers and supporting group of columns and beams shall be based on TG Equipment detail of the Bidder.</p> <p>Alternative-2</p> <p>The TG foundation shall be conventional machine foundations comprising of RCC top deck directly supported on substructure comprising of columns and beams without any steel helical springs and viscous dampers. The columns shall be rigidly connected to the RCC deck at top and shall rest on open / pile supported foundation at bottom. The entire</p>			
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	<p>foundation system (including deck, columns and raft) shall be isolated from the main plant building structural system and no connection between the main plant structure and TG foundation is permitted.</p> <p>Bidder has the option to choose either Alternative -1 or Alternative-2 based on his design philosophy and practice. However in case Alternative-2 is adopted by bidder, then the bidder has to furnish extended warranty of five years for satisfactory static and dynamic performance of the foundation system.</p> <p>TDBFP & MDBFP foundations:</p> <p>Alternative-1</p> <p>TDBFP&MDBFP foundations shall consist of RCC top deck supported on steel helical springs & viscous dampers inside Main Power House. In case the top deck is located at operating floor/mezzanine floor level, the springs/ viscous dampers shall be supported on a group of structural steel columns-beam grid which shall be rigidly integrated with the Main Power House Structural frame.</p> <p>Alternative-2</p> <p>TDBFP&MDBFP foundations shall consist of RCC top deck directly supported on RCC/ structural beams and columns without any steel helical springs & viscous dampers inside Main Power House. The structural columns and beams supporting the TDBFP / MDBFP shall be independent of the Main Power House Structural frame and shall also have independent foundation without any connection to other nearby foundations. Further each TDBFP / MDBFP shall have independent supporting structural arrangement without any interconnection among themselves.</p> <p>Bidder has the option to choose either Alternative-1 or Alternative-2 based on his design philosophy and practice. However in case Alternative-2 is adopted by bidder, then the bidder has to furnish extended warranty of five years for satisfactory static and dynamic performance of the foundation system.</p> <p>BFPs in ground floor</p> <p>In case the MDBFP/TDBFP foundation is envisaged to be located at ground floor of Main Power House, then these shall be designed as block foundations directly resting on soil / pile. Vertical facing of this block foundation shall be isolated from adjacent footings by providing minimum 100mm thick polystyrene board of type-1 conforming to IS: 4671 with density 20 Kg/Cum sandwiched between the vertical face of block foundation and 230 thick brick wall all round.</p> <p>ii. Design Concept:</p> <p>a) For the foundations of Turbo-generator, Boiler feed pumps, etc. detailed static and dynamic analysis shall be done.</p> <p>b) The vibration isolation system (where ever applicable) supplied shall be of proven make and shall be in successful operation supporting machines like steam turbo-generators, BFPs, etc.,</p> <p>c) Wherever alternative-2 is adopted by the bidder for TG or BFPs, suitable provisions to be ensured by the bidder in their General Arrangement and design to prevent transmission of vibration from these machine foundations to other nearby structures / foundations.</p> <p>d) The bidder or his consultant should have adequate prior experience in design of machine foundations for the respective alternative to be adopted by the bidder and the machines should be in successful operation for at least one year prior to the date of submission of bid.</p>		
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5.02.03	<p>For detailed specification of steel helical springs and viscous dampers refer General Specification Chapter.</p> <p>Pipe & Cable Galleries</p> <p>i. Salient Features</p> <p>The Pipe- Cable Gallery shall be Structural Steel Superstructure with Steel Truss (Lattice Girder) having a general span of 15.0m/20.0m. The steel truss shall be supported on 2 legged/ 4 legged trestles the arrangement of which shall be developed by the Bidder. However, trestles for pipe and cable galleries shall be either of structural steel or concrete (Pre Cast) construction. Design, fabrication/manufacturing of precast structural members like column&beams, handling/erection and jointing thereof shall be done as per IS 15916. The width of the Gallery shall vary depending on the functional requirement. A walkway of minimum width 600mm shall be provided along the Cable Trays supporting floor of the gallery. The walkway shall comprise 40mm thick MS grating and 1.0m high handrail made of 32NB MS pipes.</p> <p>Plan bracings shall be provided at all chord levels of the cable gallery truss. Minimum gusset plate thickness shall be 8mm for all connections.</p> <p>The level of the bottom chord (bottom of steel) of the gallery shall be at least 3.0m above the finished paving level in general. However, at all road/rail crossings, the level of bottom of steel of the gallery shall be at least 8.0m from the top of road surface and 8.5 m from top of rail track. Before and after the road/rail crossings, a barrier of suitable height shall be constructed so as to prevent the approach of cranes (having height more than 8 m) up to the pipe/cable racks/trestles.</p> <p>The Caged structural steel ladder shall be provided at an interval of 200m for access to the Pipe-Cable Gallery Walkway.</p> <p>At the inter-connection of Pipe/Cable gallery with Plant buildings, Pipe/Cable gallery shall be terminated at a maximum distance of 1.50m from the building. The foundation of the Pipe/Cable Trestle shall be constructed at a distance of 4.0M from center line of the plant building. Cantilever of 2.50m shall be taken from pipe-cable gallery/ trestle structure.</p> <p>The foundation for Pipe-Cable gallery trestles shall comprise RCC pedestals with footings. The footing base shall rest on virgin soil. In case virgin soil depth is high, the gap shall be filled with PCC (M10 grade). The grade of concrete for RCC footing & pedestals shall be M25. The structural trestles shall not be supported on paving RCC slab.</p> <p>ii. Design Concept</p> <p>The pipe-cable structure shall be designed as a 3-dimensional space frame for all the relevant load cases mentioned in the design criteria chapter.</p> <p>The gallery being an unclad building, wind load shall be evaluated based on the projected frontal area of the structural members and cable tray depth.</p> <p>The end portals shall be designed as rigid frames hinged (pinned support) at the base plate level (on top of the trestle column). Deflection of end portal due to wind shall be evaluated at the portal column-rafter joint. The gallery vertical truss shall be designed as simply supported girders on trestles and detailing of end portals shall be done accordingly.</p> <p>Suitable expansion gap shall be provided in the gallery structure by providing twin two-legged trestles at the expansion gap. The expansion gap shall be provided at an interval of 100 to 120m. Expansion gap shall also be provided at location where changes in plan dimensions (gallery width) take place abruptly.</p>			
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5.02.04	<div><div><div>Service Building</div><div><div>i. Salient Features</div><div><p>This building shall be an RCC structure having RCC frame with RCC floors and roof slab. For the building, floor-to-floor height shall be as per architectural features. A connecting corridor with MPH building shall be provided at operating floor level. The building walls shall comprise aerated concrete blocks from ground floor to roof level. The grade of concrete for RCC frame (including foundation) shall be M25.</p></div></div><div><div>ii. Architectural Features</div><div><p>This building shall be five storeyed (Ground +4 stories above) and shall be provided with floor area of 4500 sq.m with RCC framed structure. Autoclave Aerated Concrete Block masonry wall shall be provided for the full height of the building for both external and internal walls. Floor-to-floor height shall be minimum 4.25m. A connecting corridor with Main Power House building shall be provided at operating floor level. The floor of the connecting corridor shall have vitrified ceramic tiles flooring, stainless steel hand rail& fixed structural glazing with reflective toughened glass. The connecting corridor shall have double skin Aluminium Composite Panel (ACP) cladding & insulated metal sheet sloped roof.</p><p>Hermetically sealed double glazing with toughened glass shall be provided for external glazing.</p><p>A minimum 70 mm margin for floor finish to be kept for provision of metallic raceway.</p><p>This building shall provide offices for Operation staff, Conference room for 50 persons, C&I Laboratory, Exhibition Hall, VIP Lounge etc. This will be fully air-conditioned building with adequate provision of toilets, pantry, cabins for senior executives and separate rooms for executives, supervisors etc. Lift structure with RCC lift pits shall be located inside the service building. Separate toilet facilities shall be provided for ladies and gents in each floor. One toilet shall be provided for physically handicapped on each floor. The building shall have provision of attached toilet with the cabin for senior executives and conference rooms. 2 no's of staircases and 2 no's of lifts with adequate capacity shall be provided. One store room shall be provided.</p><p>Covered parking space for 10 nos. cars shall be provided. Covered parking shall be of RCC construction. Open parking space for 45 nos. cars & 75 nos. scooters shall be provided. Minimum 23 sq.m./car (including circulation area) and 5sq.m./Scooter (including circulation area) shall be considered for working out parking space.</p><p>The service building shall be fully IT enabled. 300x40 mm GI Raceway with standard length 2500 mm single compartment trunking raceways made from 14 gauge (minimum) pre-galvanised sheet including fasteners, floor support, connectors, bends cross-way, earthing stud for fixing etc. complete as per requirement, drawings and instructions of EIC shall be laid under floors of service building for IT enablement. 350x350x50 mm Junction boxes of pre-galvanised sheet with cover plate for raceways shall also be provided. Solar PV panel of 17% efficiency shall be provided on roof of service building.</p><p>External finishing shall be of premium acrylic smooth exterior paint with silicone additives and Coloured Aluminium Composite panel combination.</p></div><div><div>iii. Design Concept</div><div><p>This building shall be analysed & designed as RCC framed structure considering loads & load combinations mentioned in clause 6.2.0. Loads due to Solar PV panels also to be considered on roof slab of the building. Use of shear walls can</p></div></div></div></div></div>			
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	<p>be made in the building, in case peripheral road of BTG block is to be routed through the building. The design of RCC structure, foundations & slabs shall be carried out as per provisions of IS 456.</p>			
5.03.00	CPU CIVIL WORKS			
5.03.01	Design Concepts for Buildings/ Shed			
	<p>i. All Buildings shall have RCC framed structure with cast-in-situ RCC roof slabs with brick cladding.</p> <p>ii. Equipment/facilities with shed shall have structural steel superstructure with permanently colour coated metal sheeting at roof and side open. However, kerb wall shall be provided all around the plinth/ floor area above the Finished Floor Level (FFL). For other buildings brick wall cladding on exterior face shall be provided.</p> <p>iii. Unless specified, the wall cladding for buildings shall be with minimum one brick thick on exterior face. However, brick wall for buildings adjacent to transformers shall be minimum 345mm thick.</p>			
5.03.01.01	Individual members of the frame shall be designed for the worst combination of forces such as bending moment, axial force, shear force, torsion, etc.			
5.03.01.02	The load and load combinations and design criteria shall be as specified elsewhere in the specification.			
5.03.01.03	<p>All liquid retaining structures shall be designed for following load conditions.</p> <p>Underground structures:</p> <p>a. Water filled inside up to design level and no earth outside.</p> <p>b. Earth pressure with surcharge of 2.0 T/m² and ground water table up to FGL outside and no water inside.</p> <p>c. Stability against uplift shall be checked for completed structure and under construction stage with no water inside and ground water table up to FGL, with a minimum factor of safety of 1.20 against uplift. Installation of pressure relief valves shall not be permitted in the base slab of any liquid retaining / conveying structure.</p> <p>d. The structure shall also be checked for normal working condition with water filled inside up to design level and earth pressure outside with no effect of surcharge and ground water table.</p> <p>For design of over - ground liquid retaining structures appropriate load cases shall be considered.</p>			
5.03.01.04	<p>All liquid retaining and conveying structures shall be designed by working stress method as given in clause 4.5 of IS 3370(Part2).</p> <p>In the wall of liquid retaining structures with cylindrical shape such as clarifiers, vertical reinforcement shall be checked assuming the walls were fully fixed at the base, and the horizontal reinforcement shall be provided to resist horizontal (hoop) tension assuming hinged condition at the junction of the base slab & wall.</p> <p>Wherever sandwich slabs are provided in liquid retaining structures to take care of stability against uplift, only well graded sand of approved quality shall be used as fill material. The sand compaction shall be done with plate / disc compactors in such a manner that the bottom slab is not structurally damaged.</p> <p>Clear free board of at least 300 mm above design (total) water level shall be provided in all liquid retaining / conveying structures.</p>			
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	<p>Coefficient of active earth pressure shall be considered for design of free standing retaining walls and coefficient of earth pressure at rest shall be considered for design of top propped retaining walls.</p> <p>The minimum grade of concrete for all RCC structures shall be M30. The minimum concrete clear cover to reinforcement bars in all RCC structures shall be as per IS:456(2000) and IS:3370(Part II) for water retaining structures. Durability of concrete shall conform to severe exposure conditions as per Table-3 of IS 456 except noted specifically otherwise.</p>																		
5.03.01.05	<p>Factor of safety against overturning and sliding</p> <p>The structure shall be checked for minimum factor of safety of 1.5 against overturning conditions (ratio of stabilizing moment to overturning moment) and 1.4 against sliding conditions as per IS: 456.</p>																		
5.03.01.06	<p>For detailing of Reinforcement IS 5525, IS 13920, IS 4326 and SP 34 shall be followed.</p> <p>Two layers of reinforcement (on both faces) shall be provided for RCC sections having thickness of 150 mm and above.</p> <p>Minimum diameter of main and distribution Reinforcement bars in different structural elements shall be as follows:</p> <table border="1"> <thead> <tr> <th>Sl. No.</th><th>Structural Element</th><th>Main Reinforcement</th><th>Distribution Reinforcement / Stirrups/ ties/ Anchor Bars</th></tr> </thead> <tbody> <tr> <td>a)</td><td>Foundation</td><td>12 mm</td><td>12 mm</td></tr> <tr> <td>b)</td><td>Beams</td><td>12 mm</td><td>8 mm</td></tr> <tr> <td>c)</td><td>Columns</td><td>12 mm</td><td>8mm</td></tr> </tbody> </table> <p>Spacing of reinforcement bars in walls and slabs of liquid retaining / conveying structures shall not be more than 200 mm.</p> <p>Suitable shrinkage reinforcement shall be provided at top face of foundations. Minimum shrinkage reinforcement shall be 10 mm dia. @ 200mm c / c.</p> <p>Minimum Reinforcement in all elements of liquid retaining / conveying structures shall be 0.24 % of cross sectional area.</p> <p>Minimum tensile Reinforcement in each direction for all foundation slabs / rafts shall be 0.2% of cross sectional area.</p>			Sl. No.	Structural Element	Main Reinforcement	Distribution Reinforcement / Stirrups/ ties/ Anchor Bars	a)	Foundation	12 mm	12 mm	b)	Beams	12 mm	8 mm	c)	Columns	12 mm	8mm
Sl. No.	Structural Element	Main Reinforcement	Distribution Reinforcement / Stirrups/ ties/ Anchor Bars																
a)	Foundation	12 mm	12 mm																
b)	Beams	12 mm	8 mm																
c)	Columns	12 mm	8mm																
5.03.01.07	<p>Minimum thickness of foundation slab / raft and base slab of all liquid retaining tanks / pits shall not be less than 250 mm.</p> <p>Minimum thickness of all elements of RCC liquid retaining / conveying structures (except effluent drains, launders and aerator waste slab) shall be 200mm. Effluent drains (depth more than 500mm), aerator waste slab and launders shall have minimum element thickness of 150mm.</p>																		
5.03.01.08	<p>All Insert plates (except edge protection angles) provided in liquid retaining structures shall be 12 mm thick GI with lugs not less than 12 mm diameter. Edge protection angles shall be provided as specified elsewhere.</p>																		
5.03.01.09	<p>All water retaining structures shall be tested for water tightness as per provisions of IS: 3370 and IS: 6494.</p>																		
5.03.01.10	<p>2.0m wide walkway with M25 grade concrete paving over an under bed specified elsewhere shall be provided connecting all structures, buildings and facilities. The top of walkway shall</p>																		
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5.03.01.11	<p>be minimum 200mm above FGLReinforcement of the RCC paving shall consist of minimum 8mm diameter bars @ 200 mm c / c in both directions at the centre of the slab.</p> <p>Coating on RCC water retaining structures (other than drinking water)</p> <p>Epoxy phenolic coating shall be applied on (i) internal surfaces of the RCC water retaining structures and (ii) external surfaces of RCC Neutralisation-pit which is in contact with earth, as per details specified below:</p> <p>a) All concrete surfaces shall be provided with two component transparent polyamide cured epoxy sealer coating (having solid by volume minimum 40% ±2%) of minimum 50 micron DFT. Surface to be coated shall be absolutely dry, clean and dust free.</p> <p>b) Sealer coat shall be followed with the application of epoxy phenolic coating (solid by volume minimum 63%) of minimum 400 micron DFT. This coat shall be applied after an interval of minimum 24 hours (from the application of primer coat) by airless spray technique.</p>						
5.03.01.12	<p>Coating on RCC water retaining structures (drinking water)</p> <p>Internal surfaces of RCC water retaining structures shall be provided with minimum 400 micron Food grade epoxy coating complying to FDA Title 21, Part 175.300. Surface to be coated shall be absolutely dry, clean and dust free.</p>						
5.03.01.13	<p>Architectural Concepts and Finishing Schedule</p> <p>Architectural concepts and finishing schedule shall be as specified elsewhere in architectural specification.</p>						
5.03.02	<p>Acid / Alkali Resistant Treatment:</p> <p>Acid / alkali resistant lining treatment shall be provided in different areas as follows:</p> <p>Neutralization Pit: The walls shall be provided with one coat of bitumen primer, followed by 18 mm thick bitumastic layer, 115 mm thick Acid Resistant (A.R.) bricks, 6 mm thick under bed of potassium silicate mortar, pointing the joints of bricks with acid / alkali resistant epoxy / furane mortar upto a depth of 20 mm and bitumastic end sealing. Suitable pilasters shall be provided with A.R. bricks at regular intervals depending upon the height of lining, as per the specification.</p> <p>The floor of neutralization pit shall be provided with acid / alkali resistant lining treatment as given in the above para, except that the 115 mm thick A.R.bricks layer shall be replaced by 75 mm thick A.R. tile layer and pilasters shall be omitted.</p> <p>The ceiling of neutralization pit shall be provided with one coat of epoxy primer followed by 2 coats of epoxy paint (150 micron).</p> <p>Acid / Alkali storage area / projections above the floor, pedestals projecting from the floor / saddles. The floor shall be provided with one coat of bitumen primer followed by 12 mm thick bitumastic layer, 20 mm thick A.R. tiles, 6 mm thick under - bed by potassium silicate mortar, 6mm thick pointing of joints of tiles with acid / alkali resistant epoxy / furane mortar up to a depth of 20 mm and bitumastic end sealing. Dado of 1.0M high with above treatment shall also be provided if applicable in case of walls nearby.</p> <p>Alum/Lime Storage area and first floor of Chemical House : One coat of bitumen primer followed by 12mm thick bitumastic layer, 20 mm thick A.R. tiles, 6 mm thick underbed of potassium silicate mortar, 6mm thick pointing of joints of tiles with acid /alkali resistant epoxy /furane mortar up to a depth of 20 mm and bitumastic end sealing.</p> <p>Alum solution preparation tank: The wall shall be provided with one coat of bitumen primer followed by 12 mm thick bitumastic layer, 75 mm thick A.R. tiles, 6 mm thick underbed by potassium silicate mortar, pointing of joints of tiles with acid / alkali resistant epoxy / furane mortar upto a depth of 20 mm and bitumastic end sealing.</p>						
<table><tr><td>KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES</td><td>TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC. NO.: THDC/RKSH/CC-9915-371</td><td>SUB-SECTION-D-01 CIVIL WORKS</td><td>PAGE 18 OF 142</td></tr></table>				KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES	TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC. NO.: THDC/RKSH/CC-9915-371	SUB-SECTION-D-01 CIVIL WORKS	PAGE 18 OF 142
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5.03.03 5.03.03.01 5.03.03.02 5.03.03.03 5.03.03.04	<p>The floor shall be provided with acid / alkali resistant lining treatment as given in the above para except that the 75 mm thick A.R. tile layer shall be replaced by 12 mm thick A.R. tile layer.</p> <p>Basket of Alum Solution Preparation tank: 5mm thick epoxy lining over a coat of epoxy primer.</p> <p>Curved surfaces of saddles shall have minimum 12 MM thick bitumastic layer to support the vessel / tanks.</p> <p>Effluent Drains: Acid Resistant lining treatment indicated for the storage area shall be provided on the bed as well as walls of the drains with 38 MM AR tiles. The underside of the pre-cast slab cover shall be applied with one coat of epoxy primer and two coats of epoxy coating, total DFT 150 microns.</p> <p>Lime tank: Two coats of bitumen paint conforming to IS: 9862, with total DFT 150 microns.</p> <p>Guarantee</p> <p>The Contractor shall give a guarantee for satisfactory functioning of the lining for a period of 36 months from the date of completion of the work or date of handing over the site to the Engineer, whichever is later.</p> <p>The Contractor shall replace / rectify defects is any, observed in the lining to the satisfaction of the Engineer without any extra cost during this period.</p> <p>Foundation Of Over Ground Steel Circular Water Storage Tanks</p> <p>General Requirements</p> <p>The tank foundation shall be as per IS 803 and as specified in relevant clause of foundation chapter.</p> <p>Sub Grade Preparation</p> <p>The surface of natural soil shall be thoroughly compacted by rolling or other means, as directed by Engineer, to obtain 95% of max. laboratory dry density for the soil, as per IS:2720 (Part-VII).</p> <p>Anti Corrosive Layer</p> <p>Anti-corrosive layer shall consist of screened coarse sand, mixed with 80/100 bitumen or equivalent 8% to 10% by volume.</p> <p>Bitumen shall be heated to a temperature 175⁰C to 190⁰ C, with 3% kerosene, if required. Sand shall be thoroughly mixed with it in a mixing drum to obtain uniform mixture and shall be laid over the compacted surface, laid in line, grade and levels and as directed by the Engineer. Bitumen shall not be heated beyond the temperature limits given above.</p> <p>The premix carpet shall be laid in two layers of 3 cm and 2 cm respectively. After compacting and laying the first layer of 3cm, a tack coat of hot bitumen at the rate of 1 Kg. per Sq.m. shall be uniformly applied to the surface, by means of Sprayer and the Second layer of 2cm thick shall be laid, tamped and compacted to the satisfaction of the Engineer.</p> <p>Sand shall be spread on the final surface at the rate of 0.5 Cu. m per 100Sq.m.</p> <p>Premix</p> <p>Materials</p> <p>Sand</p> <p>Sand shall be clean, dry, coarse, hard angular, free from coatings of clay, dust and mix of vegetable and organic matters and shall conform to IS 383 (Grade -III).</p>		
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	<p>Open RCC rectangular section, unless required otherwise due to functioned requirement, shall be provided for all drains. The thickness of side walls and bottom slab of RCC drains shall be minimum 150mm or as per design considerations whichever is higher for drains upto depth of 1m from formation level. For depth of drain more than 1m from formation level, the thickness of side walls and bottom slab of RCC drains shall be minimum 200mm or as per design considerations whichever is higher.</p> <p>The drains shall be provided on both sides of the double lane roads and single lane roads. The drains shall be provided on one side of the patrol roads along boundary wall. These shall be designed to drain the road surface as well as all the free and covered areas, etc. Box culverts shall be provided at all rail, road and other crossings.</p> <p>All plinth drains along the periphery of all buildings other than BTG area shall have perforated precast RCC cover of minimum 100 mm thickness.</p> <p>The drains along the side of the peripheral roads of BTG areas shall be covered with cast-in situ/ precast RCC cover with minimum 200mm thickness designed for all crane /vehicular loads. Further, these drains shall also be provided with heavy duty galvanized MS gratings with opening of 1mx 1m at 7.5m center-to-center interval. The drains inside the BTG area shall be as described in Area Paving clause of technical specification.</p> <p>All drains inside the building shall have minimum 40 mm thick grating covers. In areas where heavy equipment loads would be coming, precast RCC covers shall be provided in place of steel grating.</p> <p>The invert levels of the in-plant and plant peripheral drains shall be kept such that water can be discharged by gravity to the main / trunk drains under all conditions. The invert levels of the drains shall be decided in such a way that the water can easily be discharged to the natural water bodies above the high flood level.</p> <p>5.06.00 ROADS</p> <p>All roads in STG Island package area shall be of rigid pavements unless otherwise specified. The design of rigid pavement shall be carried out as per IRC: 58. The effects of design wheel load, maximum tyre inflation pressures, tyre contact area for the vehicle, traffic loads, environmental factors such as temperature changes in the pavement, other factors, like impact, load repetitions, etc., are to be taken. Detailed plate load tests to determine the modulus of sub grade reaction “K” shall be carried out as per the procedure outlined in IS: 1888. The design traffic load shall be a minimum value of 4 million standard axles. The road shall be designed for 30 years of life and considering a minimum traffic growth rate of 1 per cent per annum. The concrete pavement for roads shall be minimum 250 mm thick slab.</p> <p>The road construction including its shoulders, base, sub base and concrete pavement shall be as per MORTH. IRC: 58 shall be followed for the pavement design and MORTH specification (latest) shall be followed for the construction of the concrete pavement road.</p> <p>The road base shall be with minimum 150 mm thick dry lean concrete over granular sub base. Dry lean concrete shall be laid by a mechanical paver and compacted by vibratory rollers. Concrete pavement of the road shall be done with fully mechanized paver fitted with electronic sensors for construction techniques. Dry lean concrete shall be minimum M10 grade and concrete pavement slab shall be minimum M35 grade concrete pavement shall be provided with 125 micron polythene sheet below it. Concrete pavement shall also be provided with contraction and expansion joint with MS dowel bars as per Ministry of Road Transport and Highways (MORTH) specification.</p>		
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5.06.01	<p>The finished top (crest) of all roads shall be 350 mm above the surrounding finished ground level.</p> <p>The sub grade under all roads and its shoulders shall be compacted to achieve 95 per cent or more of Standard Proctor's Density MDD using mechanical means.</p> <p>Cutting / extending / rerouting / remaking of existing roads including associated works to maintain continuity of road system / network shall also be carried out.</p> <p>All culverts and RCC bridges at crossings of all roads / rail tracks / facilities with drains / nallahs / channels / roads / rail tracks / pipes / other facilities, etc. are to be designed and constructed.</p> <p>Unless otherwise specified, all roads (excluding access roads to all buildings / facilities / structures, patrol road along boundary wall and road inside the switchyard) shall be double lane roads.</p>						
	<p>Double Lane Roads</p> <p>The double lane roads shall be (12 metre wide) with 7.5 metre wide concrete pavement and 2.25 metre wide raised shoulders on both sides of the roads.</p> <p>The raised shoulders (on both sides of the road) shall comprise of 75mm thick inter locking precast designer concrete blocks (M35 grade) at the top, over 20 mm thick sand layer. A 200mm diameter NP3 pipes shall carry the surface water from the road through a PCC drain trench (M20) on both sides of the roads to the drain. The pipes shall run over PCC (M 20) continuous cradle bedding. The pipes shall be laid at 10 metrecentre to centre. A layer of 100 mm (average) thick PCC (M15) shall be laid over the pipes and below the sand layer. All roads shall be provided with edge protection on both sides of the road using pre - cast kerb blocks (450 mm long x 250 mm wide x 500 mm deep) (M25) laid in 1 (cement) : 6 (coarse sand) cement mortar.</p>						
	5.06.02	<p>Single Lane Roads</p> <p>All access roads to all buildings / facilities / structures, road approaches / connections, access roads to liquid fuel storage areas and other equipment areas where access is necessary from inspection, operation and maintenance point of view and all roads inside the switchyard shall be single lane roads. These shall be single lane roads (5.75 metre wide) with 3.75 metre wide concrete pavement and 1 metre wide shoulders on both sides of the roads. The shoulders shall also have 150 mm thick dry lean concrete and 75 mm thick inter locking blocks over compacted granular sub base of two layers of 75mm thick compacted GSB. All roads shall be provided with edge protection on both sides of the road using PCC blocks (300 mm long x 250 mm wide x 150 mm deep) (M25) laid in 1 (cement) : 6 (coarse sand) cement mortar.</p>					
		5.06.03	<p>Patrol Roads</p> <p>All patrol roads along the boundary wall shall be single lane roads with 3.75 metre wide concrete pavement and 1 metre wide shoulders on one side of the road. The shoulders shall also have 150 mm thick dry lean concrete and 75 mm thick inter locking blocks over compacted granular sub base of two layers of 75mm thick compacted GSB. All roads shall be provided with edge protection on both sides of the road using PCC blocks (300 mm long x 250 mm wide x 150 mm deep) (M25) laid in 1 (cement) : 6 (coarse sand) cement mortar. The road shall slope towards the inner drain. The centre line of the black top of the road shall run at a distance not less than 2625 mm from the centre line of the boundary wall.</p>				
<table><tr><td>KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES</td><td>TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC. NO.: THDC/RKSH/CC-9915-371</td><td>SUB-SECTION-D-01 CIVIL WORKS</td><td>PAGE 22 OF 142</td></tr></table>				KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES	TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC. NO.: THDC/RKSH/CC-9915-371	SUB-SECTION-D-01 CIVIL WORKS	PAGE 22 OF 142
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5.07.00	<p>AREA PAVING</p> <p>RCC paving of minimum 150 mm thick with M25 grade concrete, over an under bed as specified herein shall be provided for areas mentioned below. RCC paving shall be designed as rigid reinforced concrete pavement for the crane/ vehicular/ equipment movement loads which the paving has to bear. The under bed for paving shall consist of preparation and consolidation of sub-grade to the required level, laying of stone soling of 200mm compacted thickness for normal duty paving and 400mm compacted thickness for heavy duty paving with 63 mm and down aggregate with interstices filled with selected moorum/ non-expansive soil followed by 75 mm thick M7.5 PCC with 40 mm nominal size aggregate. For normal duty paving, reinforcement of the RCC paving shall consist of minimum 8mm diameter bars @ 200 mm c / c in both directions at the centre of the slab. For heavy duty paving/ passage, reinforcement of the RCC paving shall consist of minimum 10mm diameter bars @ 200 mm c / c in both directions at the centre of the slab.</p> <p>Paving areas shall be provided with the metallic hardener floor finish as specified elsewhere in the specification.</p> <p>Entire area as defined in Part-A (Sub section-IID)shall be provided with RCC paving.</p> <p>Passages shall be provided inside the main plant block connecting to the outer periphery road to have access to the various facilities/buildings. These passage areas shall be provided with heavy duty paving for movement of heavy vehicles. The top surface of the passages shall be finished with 50 mm thick metallic hardener topping.</p> <p>Lightly loaded areas such as corridors below trestle and other areas in the main plant block outside buildingswhere no heavy traffic movement is envisaged shall be provided with interlocking concrete block paving with RCC concrete blocks of minimum M35 grade and minimum 80 mm thickness underlain by 200mm thick with 63 mm and down aggregate with interstices filled with selected moorum/ non-expansive soil.</p> <p>All other areas inside the Main plant block shall be provided with normal duty paving without metallic hardener topping.</p> <p>Suitable open RCC drains shall be provided to dispose off storm water drain. Separate open RCC drains shall be provided to dispose off floor wash and plant effluents into RCC sump pits. Separate RCC sump pits shall be provided for different types of effluents. The paving shall be provided with slope of 1:500 to dispose the surface water/wash water to the nearest drain. All drains/pits shall be provided with Heavy duty electro forged GI grating cover.</p> <p>Sewer lines (Cast Iron), interconnected by sewer manholes (RCC) at regular intervals (not exceeding 30 meter centre to centre) shall be provided to dispose off sewage from main plant block.</p>			
5.07.01	<p>Ground Floor Slab of Buildings</p> <p>In all buildings including main plant building, the ground floor slab shall consist of minimum 150mm thick RCC M25 grade base slab over an under bed as specified below. The under bed for ground floor slab shall consist of 75mm thick M7.5 PCC on stone soling of 200mm compacted thick with 63 mm and down aggregate with interstices filled with well graded selected sand/ moorum/ non-expansive soil on compacted and dressed sub - grade. Reinforcement for the slab shall consist of minimum 8mm diameter bars @ 200 mm c/c at top & bottom of the slab in both directions. However, at passages, unloading & maintenance bays, stone soling of minimum 400mm thick and minimum 10mm diameter bars @ 200 mm c/c at top and bottom in both directions shall be provided.</p> <p>Further, top surface of ground floor slabs shall be finished with 50mm thick metallic hardener topping.</p>			
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5.07.02	<p>Civil Works for Fire Detection & Protection System in Ground Floor/ Paving</p> <p>Fire water pipes shall be provided with either RCC trench or buried underground as per requirement in tender drawing.</p> <p>Fire water trenches shall be open RCC type trench with removable RCC cover.</p> <p>Interlocking concrete block paving shall be provided over the buried fire water pipes as specified elsewhere in the specification.</p> <p>At road/rail/ drain crossings of fire water pipes, the fire water pipes shall be provided with minimum 200mm thick PCC encasement all around the pipe.</p> <p>Each of the outdoor deluge valve and accessories shall be provided with housing comprising of Brick wall and RCC roof.</p>		
5.08.00	<p>TRANSFORMER FOUNDATIONS</p> <p>Foundations of transformers shall be designed for seismic and wind loads in addition to other applicable loads. RCC block foundations shall be provided for the main transformer.</p> <p>The oil soak pit, if provided, shall be filled with gravel of size 40mm. The volume of the soak pit shall be sufficient to store complete oil of the transformer/reactor along with 10 minutes of fire water considering only 40% of the volume as available voids between gravel filling. However, in case separate Oil-water Separation pit is provided for a group of transformers/reactors, oil soak pit of volume equivalent to one-third (1/3) the oil volume of each transformer/reactor shall be provided around respective transformer/reactor. The oil soak pit shall also be provided with a sump at the corner to allow drainage of water/oil from the soak pit. The Oil-water Separation pit, in such cases, shall be designed for an effective capacity of complete oil of one transformer having highest volume of oil along with 10 minutes of fire water. There shall be one Oil-water Separation pit for each generation unit in transformer yard area.</p> <p>Oil-water Separation pit shall be provided with five separate chambers interconnected by pipes. First chamber shall be for collecting oil-water mix from transformers' soak pits in case of fire. After entering into first chamber, oil being the lighter in density floats above the water. The water from lower elevation flows in to subsequent chambers interconnected through galvanized MS pipes. The accumulated oil in the first chamber to be pumped out for subsequent usage or disposal. Water collected in the last chamber to be pumped out for subsequent disposal after treatment. Invert level of inlet Hume pipes (of NP-3 grade and adequate capacity), carrying oil and water from transformers soak pits, shall be designed for gravity flow. Freeboard of 200 mm shall be provided below the invert level of inlet pipes. Invert levels of interconnecting pipes of subsequent chambers shall be decided accordingly. For calculating effective capacity of oil-water separation pit available to accommodate complete oil of one transformer having highest volume of oil along with 10 minutes of fire water, effective depth with 200 mm freeboard below invert level of inlet pipe shall be considered. Plan area and depth of oil-water separation pit shall be decided based on above consideration.</p> <p>Arrangement for moving the transformer into place using rail cum road, jacking pads and pulling blocks including inserts, as required, shall be provided along with the transformer/reactor foundations.</p> <p>RCC Firewall shall also be provided between the transformers wherever required.</p> <p>300 mm thick PCC M20 encasement all around the Pylon supports inside soak pit for firefighting system shall be provided up to top of gravel filling. However, the supply and erection of Pylon supports with anchor fasteners for HVW spray system are not under the</p>		
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5.09.00	<p>scope of this package. Coarse aggregate filling inside the transformer oil soak pit shall be carried out only after construction/erection of Pylon supports and PCC encasement.</p> <p>OTHER BUILDINGS</p> <p>For all other buildings mentioned in the scope of work but requirement not furnished in this chapter, the Bidder shall develop the details of such buildings based on the functional and statutory requirements.</p>		
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6.00.00	DESIGN CRITERIA			
6.01.01	General			
	The design criteria given herein is applicable for all sub-structure, super-structure works/ buildings/ facilities and various other works included in the scope of the Bidder.			
6.01.02	Structures shall be designed for the most critical combinations of dead loads, imposed loads, equipment loads, crane loads, piping loads (static, friction and dynamic), earth pressure & surcharge loads, hydrostatic & hydrodynamic loads, wind loads, seismic loads and temperature loads. In addition, Erection loads, loads and forces developed due to differential settlement shall also be considered.			
6.01.03	<div>i)</div> <div>All the buildings shall have framed super structure. If the superstructure of building is a steel structure, the framed superstructure shall be moment resisting sway frame in the lateral direction and axially braced in the orthogonal direction. For columns having depth of 1000mm & above, the longitudinal bracings shall comprise a pair of members (spaced) with spacing equal to the column depth. Columns having depth less than 1000mm may have bracing in single plane and at the centerline of column. In both the cases (single bracing or pair of bracing) detailing shall be adequate to restrain the entire column cross-section including both the flanges. Only where axial bracing to one vertical plane is to be waived due to functional requirement, columns in that vertical plane may be allowed to undergo biaxial bending. Beam column joints shall be detailed as per seismic resistant joint with adequate ductility.</div> <div>All 2-legged structural steel trestles shall be completely braced in the vertical plane. All 4-legged structural steel trestles shall be completely braced in all four vertical planes. In addition, specified horizontal planes shall be completely braced to provide stiffness against torsional sway.</div> <div>If the superstructure is RCC structure, the superstructure shall be moment resisting sway frame in both orthogonal direction and all the members shall be designed for biaxial bending. Design of RCC structures shall be done as per IS 456 Detailing for ductility shall be followed as per guidelines of IS13920 to be effective against seismic load. Design of liquid retaining structures shall be done as per IS 3370</div> <div>ii)</div> <div>The Main Plant building, Pipe cable Gallery shall have structural steel framed super structure.</div> <div>iii)</div> <div>All other buildings may have either RCC or structural steel framework.</div> <div>iv)</div> <div>All buildings having RCC framing shall have masonry cladding of minimum one masonry unit thickness (not less than 225 mm.) on exterior face.</div> <div>v)</div> <div>Cladding detail for specific building shall be provided by the bidder as per final recommendation for type of buildings furnished to the bidder.</div>			
6.02.00	Loading			
6.02.01	Dead loads			
	Dead loads shall include the weight of structure complete with finishes, fixtures and partitions and shall be taken as per IS: 875 (Part-I)			
6.02.02	Imposed loads			
	Imposed loads in different areas shall include live loads, erection, operation and maintenance loads. Equipment loads (which constitute all loads of equipment to be supported on the building frame) are not included in the imposed loads furnished below and shall be considered in addition to imposed loads.			
	For consideration of imposed loads on structures, IS:875 (Part-2) "Code of practice for design loads (other than earthquake) for buildings and structures" shall be followed. The			
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	<p>following minimum imposed loads as indicated for some of the important areas shall however be considered for the design. If actual expected load is more than the specified minimum load, then actual load is to be considered.</p> <table><thead><tr><th>Sl.No.</th><th>Location</th><th>Imposed Loads (T/Sq.m.)</th></tr></thead><tbody><tr><td>A)</td><td>Turbine Building</td><td></td></tr><tr><td>i)</td><td>Ground floor (general)</td><td>2.50</td></tr><tr><td>ii)</td><td>Ground floor (heavy equipment storage area)</td><td>5.00</td></tr><tr><td>iii)</td><td>Mezzanine floor</td><td>1.00</td></tr><tr><td>iv)</td><td>Operating floor</td><td></td></tr><tr><td></td><td>a) Rotor Removal area</td><td>5.00</td></tr><tr><td></td><td>b) Equipment lay-down area</td><td>3.50</td></tr><tr><td></td><td>c) Other areas (corridors, etc.)</td><td>1.50</td></tr><tr><td>v)</td><td>Gratings, chequered floors, walkways, platforms, stairs, etc.,</td><td>0.50</td></tr><tr><td>vi)</td><td>Roof (Where no equipment is located)</td><td>0.15</td></tr><tr><td>vii)</td><td>Roof (where equipment are located)</td><td>0.50</td></tr><tr><td>B)</td><td>Deaerator and Heater Bay</td><td></td></tr><tr><td>i)</td><td>H.P/L.P. heater floor</td><td>1.00</td></tr><tr><td>ii)</td><td>Deaerator floor</td><td>1.00</td></tr><tr><td>iii)</td><td>Cable gallery (In addition to this, actual cable load shall be considered)</td><td>0.50</td></tr><tr><td>iv)</td><td>MCC, switchgear and Control building floors</td><td>1.00</td></tr><tr><td>v)</td><td>Roof (Where no equipment are located)</td><td>0.15</td></tr><tr><td></td><td>(Where equipment are located)</td><td>0.5</td></tr><tr><td>vi)</td><td>A.H.U Room, Battery Room, Air Washer Room</td><td>1.0</td></tr></tbody></table>		Sl.No.	Location	Imposed Loads (T/Sq.m.)	A)	Turbine Building		i)	Ground floor (general)	2.50	ii)	Ground floor (heavy equipment storage area)	5.00	iii)	Mezzanine floor	1.00	iv)	Operating floor			a) Rotor Removal area	5.00		b) Equipment lay-down area	3.50		c) Other areas (corridors, etc.)	1.50	v)	Gratings, chequered floors, walkways, platforms, stairs, etc.,	0.50	vi)	Roof (Where no equipment is located)	0.15	vii)	Roof (where equipment are located)	0.50	B)	Deaerator and Heater Bay		i)	H.P/L.P. heater floor	1.00	ii)	Deaerator floor	1.00	iii)	Cable gallery (In addition to this, actual cable load shall be considered)	0.50	iv)	MCC, switchgear and Control building floors	1.00	v)	Roof (Where no equipment are located)	0.15		(Where equipment are located)	0.5	vi)	A.H.U Room, Battery Room, Air Washer Room	1.0
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	<div><div><div>F)</div><div>Underground Structures such as Channels, Sumps, Tanks, Trenches etc.</div><div>In addition to earth pressure and ground water pressure, the surcharge load of 2T/sq.m. shall also be considered for design of all underground structures.</div></div><div><div>G)</div><div>Road Culverts/Bridges and its allied structures including RCC Pipe Crossings and Road Crossing of Trenches.</div><div>Design for class ‘AA’ loading (wheeled and tracked both) and checked for class ‘A’ loading as per IRC Standard.</div></div><div><div>H)</div><div>Covers for Channels/trenches</div><div>0.40 (General) or central point load of 75 kg whichever is higher As per IRC Standard (at road crossings for vehicular traffic)</div></div><div><div>I)</div><div>Railway Supporting Structures, Rail Culverts</div><div>As per Railway ‘Bridge Rules’</div></div><div><div>L)</div><div>General (Unless Specified Otherwise)</div><div><div><div>i)</div><div>Stairs, Landings and Balconies</div><div>0.50</div></div><div><div>ii)</div><div>Toilets</div><div>0.20</div></div><div><div>iii)</div><div>Chequered plates, grating floors, etc.,</div><div>0.50</div></div><div><div>iv)</div><div>RCC floors (General)</div><div>0.50</div></div><div><div>v)</div><div><div>a)</div><div>Flat Roofs (where no equipment are located)</div><div>0.15</div></div><div><div>b)</div><div>Flat Roofs (where equipment are located)</div><div>0.50</div></div><div><div>c)</div><div>Inaccessible roof</div><div>0.075</div></div><div><div>vi)</div><div>Inclined Roofs</div><div>As per IS : 875 (Part-II)</div></div><div><div>vii)</div><div>Dust load on roof</div><div>0.050</div></div><div><div>viii)</div><div>Walkways (General)</div><div>0.50</div></div><div><div>xi)</div><div>Cable and pipe trestles addition, friction loads</div><div>0.40 for walkway and in as applicable</div></div><div><div>xii)</div><div>Grating covers/ Precast RCC covers for drain, trench, sump pit in Ground floor/ paving of BTG area</div><div>2.50 As per IRC standard (at road crossings for vehicular traffic)</div></div></div></div></div><div><div>Notes:</div><div><div>a)</div><div>If erection load is higher than the specified imposed loads on any floor or part thereof, then the erection loads are to be considered for the design.</div></div></div></div>			
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6.02.03	<p>b) Additional load for cable, piping/ducting, shall be considered as applicable. For any other structures, the loads specified for those structures elsewhere in the specification shall be followed.</p> <p>Equipment, piping and associated loads</p> <p>Equipment loads shall be considered over and above the imposed loads. Equipment loads shall be considered as given by equipment supplier.</p>			
6.02.04	<p>Crane load</p> <p>For crane loads, an impact factor of 25% and lateral crane surge of 10% (of lifted weight + trolley weight) shall be considered in the analysis of frame according to the provisions of IS:875. The longitudinal crane surge shall be 5% of the static wheel load. Longitudinal surge and lateral surge shall not be considered to act simultaneously.</p>			
6.02.05	<p>Seismic load</p> <p>For design of all structures, the site specific seismic spectrum as attached in Annexure-(e) shall be followed.</p>			
6.02.06	<p>Wind load</p> <p>For design of all structures, the wind loads shall be taken as per the site specific wind data specified in Annexure–(D) of this specification.</p>			
6.02.07	<p>Temperature Load</p> <p>For temperature loading, the total temperature variation shall be considered as 2/3 of the average maximum annual variation in temperature. The average maximum annual variation in temperature for this purpose shall be taken as the difference between the mean of the daily minimum ambient temperature during the coldest month of the year and mean of daily maximum ambient temperature during the hottest month of the year. The structure shall be designed to withstand stresses due to 50% of the total temperature variation.</p> <p>Suitable expansion joints shall be provided in the longitudinal direction wherever necessary with provision of twin columns. The maximum distance of the expansion joint shall be as per the provisions of IS 800 and IS 456 for steel and concrete structures respectively.</p>			
6.02.08	<p>Differential Settlement Loads</p> <p>Structures shall be designed considering an additional load on account of differential settlement of 1 in 1000 between any two adjacent columns, subject to a maximum differential settlement of 8 mm in case of foundations resting on soils & 4mm in case of foundations resting on rock/ pile.</p> <p>These differential settlement loads shall be taken into consideration for design of footings & structures of Main Power House & Control Toweronly.</p> <p>Further, in the analysis of differential settlement loads, adjacent columns interconnected with bracings are preferably to be provided with combined footing. In such cases, where rigid combined foundations are provided below braced columns, differential settlement between those columns needs not be considered.</p> <p>Moreover, when rigid raft is provided, the differential settlement amongst the columns supported on the rigid raft need not be considered. However, the differential settlement between the raft and the adjacent column footing of the same structure are to be considered.</p> <p>In the structural analysis for differential loads, following approach may be considered: All the alternate columns in structure shall be applied downward displacement as described above and analyzed at a time. The resultant forces/ reactions shall be considered with reversible effects for design of structures and footings.</p>			
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6.03.00	Civil Design Concepts					
6.03.01	Individual members of the frame shall be designed for the worst combination of forces such as bending moment, axial force, shear force, torsion, etc.,					
6.03.02	<p>The different load combinations shall be taken as per IS: 875 (Part-5) and other relevant IS Codes.</p> <p>a) Wind and seismic forces shall not be considered to act simultaneously.</p> <p>b) For the design of main plant structures during seismic condition, the deaerator feed water tank shall be considered full upto operating level. However, for other load combinations, deaerator feed water tank in flooded condition shall be considered.</p> <p>c) 'Lifted load' of crane shall not be considered during seismic condition.</p> <p>d) In case two cranes are provided and tandem operation is not envisaged, the load shall be taken as one crane fully loaded and second crane without lifted load but standing idle adjacent to first crane.</p> <p>e) In case two cranes are provided and tandem operation is envisaged then the crane wheel loads shall be taken as both the cranes fully loaded to capacity and travelling side by side although the main power house building length.</p> <p>f) Permissible stresses for different load combinations shall be taken as per relevant IS and IRS codes.</p> <p>g) For the design of pipe/cable supporting structure, the soil weight shall be considered as backfilled up to grade level for the condition of pipe running full/cables in position.</p> <p>h) Frictional forces between the pipes and supporting structure in longitudinal direction need not be considered along with seismic or wind forces.</p> <p>i) Paving in crane corridor shall be designed for the maximum load due to movement of crane.</p> <p>j) In TG bay at crane rail level, chequered plate walkway with handrails shall be provided for entire column sectional depth for full length of the building. Walkway width clearance from the face of the column to the edge of the crane shall be as specified elsewhere in the specification.</p> <p>k) For checking against uplift / tension case, 90% of Dead Loads with no Imposed Loads shall be considered along with other Loads.</p> <p>l) The Structures shall be Designed for most unfavorable Combination of Dead Loads, Imposed Loads, Equipment Loads, Piping / Cables / Ducts Loads, Wind / Seismic Loads, Temperature Loads, Ash Loads, and other applicable Loadswithout exceeding the permissible stresses.</p> <p>m) In all Loading Combinations, the Loads that have reduction effect on design condition shall not be taken into account in the Combination concerned.</p> <p>n) Where wind load is the main load acting on the structure, no increase in stresses is to be considered for Design of Structures and Foundation Bolts</p> <p>o) In all Load Combinations, differential settlement loads (with reversible effects) are to be considered.</p>					
6.03.03	Design of steel structures shall be done by the Working Stress Methodas per provisions of IS:800:1984 and other relevant IS standards.					
6.03.04	Shop connections will be welded type and all field connections will be bolted. Field permanent bolts wherever provided will be high tensile bolts of property class 8.8(min) as per 1367 for all major connections. However, nominal connections in the field like purlins, stairs, wall beams					
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	<p>will be done by means of M.S. black bolts of grade 4.6 conforming to IS-1367. The bolted joints will be designed for friction grip or bearing type. For friction grip type connections, bolts will be tightened to develop the required pretension during their installation.</p> <p>For bolted Connection, IS 4000, IS: 3757, IS: 6623 and IS: 6649 shall be followed. IS 814, IS 816, IS: 1024, IS 4353 and IS: 9595 shall be followed for welding of structures.</p>											
6.03.05	All structures close to railway line shall have clearances conforming to Railway norms.											
6.03.06	<p>Horizontal Deflection criteria</p> <p>The maximum Horizontal Deflection for various structures shall not exceed and be limited to the following:</p> <table><tr><th>Sl. No.</th><th>Description</th><th>Maximum value of</th></tr><tr><td>1.</td><td>For Main Power House (Turbine Bldg), Service Building, and all other buildings envisaged in this specification</td><td>Height /325</td></tr><tr><td>2.</td><td>Vertical Metal Sheetting in Cladding</td><td>Span/250</td></tr></table> <p>However, the maximum deflection of Grating / Chequered Plate Shall be limited to 6mm.</p> <p>Note: Along wind forces on slender and wind sensitive structures and structural elements shall also be computed, for dynamic effects, using the Gust Factor or Gust Effectiveness Factor Method as defined in the standard. The structures shall be designed for the higher of the forces obtained from Gust Factor method and the Peak Wind Speed method.</p> <p>Analysis for dynamic effects of wind must be undertaken for any structure which has a height to minimum lateral dimension ratio greater than “5” and/or if the fundamental frequency of the structure is less than 1 Hz.</p>			Sl. No.	Description	Maximum value of	1.	For Main Power House (Turbine Bldg), Service Building, and all other buildings envisaged in this specification	Height /325	2.	Vertical Metal Sheetting in Cladding	Span/250
Sl. No.	Description	Maximum value of										
1.	For Main Power House (Turbine Bldg), Service Building, and all other buildings envisaged in this specification	Height /325										
2.	Vertical Metal Sheetting in Cladding	Span/250										
6.03.07	<p>a) Dispersion of load in any direction through soil shall be as per IS 8009 (relevant part).</p> <p>b) Dispersion of load through concrete shall be considered at an angle of 45 degrees with horizontal from the edge of contact area.</p>											
6.03.08	<p>a) Permissible deflection (unless specified otherwise in this specification) for latticed framework and beams of floors other than drive floor shall be span/325.</p> <p>b) The allowable deflection for beams directly supporting drive machinery and equipment shall be restricted to span/500 unless specified otherwise in this specification.</p> <p>c) The deflection for manually operated cranes & monorail supporting beams shall not exceed span/500.</p> <p>For electric overhead cranes :</p> <p>1) upto 50 Tonne capacity : span/750</p> <p>2) over 50 Tonne capacity : span/1000</p>											
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6.03.09	<div><div>d) The vertical deflection of beams supporting LP Heater, HP Heater and Deaerator shall be limited to Span/500.</div><div>e) The vertical deflection of metal deck sheet for floor shall be limited to span/250.</div><div>f) Permissible deflection for all purlins, cladding runners, roofing/cladding sheets and grating / chequered plates shall be span/250. However, the maximum vertical deflection of Grating/ Chequered plate shall be limited to 6 mm.</div><div>a) The design and construction of RCC structures shall be carried out as per IS: 456. Working stress method shall be adopted for the design wherever specifically mentioned in this specification.</div><div>b) For design and construction of steel-concrete composite members, IS: 11384 shall be followed.</div><div>c) For reinforcement detailing, IS 5525 and SP 34 shall be followed.</div><div>d) Two layers of reinforcement (on both inner and outer faces) shall be provided for RCC wall sections having thickness 150 mm or more.</div></div>		
6.03.10	<div><div>a) Design of Foundation for TG, TDBFP, MDBFP</div><div>Structural Arrangement of foundations for various machine foundations like TG, TDBFP & MDBFP shall be as specified in Chapter-5 of this specification.</div><div>Analysis for the foundation</div><div>For the foundations of the all equipment, details static and dynamic analysis shall be done. The static analysis shall include all operating condition, load cases and abnormal loads like short circuit, loss of blades & unbalance and seismic forces as per IS1893. The dynamic analysis shall consist of free vibration analysis and forced vibration analysis. A minimum fatigue factor of 2.0 shall be considered for dynamic forces.</div><div>The vibration amplitudes shall be calculated at the machine bearing locations and at any other points of interest by a forced response analysis. The unbalance forces used for this analysis shall correspond to the balance quality grade of the machine as per ISO 1940 or the unbalance forces as provided by the machine manufacturer whichever is higher. It shall be ensured that the calculated amplitudes do not exceed the limits specified by the machine manufacturer and relevant Standards such as ISO 10816.</div><div>Bidder to consider the acceleration at the top of the deck for the design of supporting / fixing arrangement of machine.</div><div>Design criteria for steel helical springs and viscous dampers</div><div>The isolation efficiency for steel helical springs and viscous dampers shall be at least 90%. The ratio of actual spring supported weight to the nominal spring capacity shall not exceed 0.80. At least 5% to 10% of critical damping shall be provided in the form of viscous dampers.</div><div>Reinforcement Design</div><div>Working stress method as per IS 456 shall be used for reinforcement design. The design shall be done for the worst load combination. Minimum reinforcement shall be provided as per IS 456 and IS2974 (Part-III), if the calculated reinforcement is less than the minimum.</div><div>For TG Raft/ Pilecap, minimum percentage of reinforcement at top and bottom faces of foundation shall be same as that stipulated for beam as per IS456.</div></div>		
<div><div><div>KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES</div><div>TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC. NO.: THDC/RKSH/CC-9915-371</div><div>SUB-SECTION-D-01 CIVIL WORKS</div><div>PAGE 32 OF 142</div></div></div>			

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	<p>b) Block Foundations:</p> <p>Block foundation resting on soil shall be analyzed using elastic half space theory. In case the foundation is supported over piles, Novak's approximation shall be used for determining the spring constant and damping ratio of pile groups. The mass of the RCC block shall be at least three times the mass of machine. Free vibration analysis of the foundation shall be carried out to evaluate the natural frequencies. The fundamental natural frequency shall be kept at least 20% away from the operating frequency (speed). Forced vibration analysis shall be carried out if the dynamic forces are made available by the machine supplier in which case the amplitude limits stipulated by the machine supplier and ISO 10816, whichever is lower, shall be satisfied.</p> <p>Reinforcement design shall be done by working stress method as per IS 456 and IS 2974 (Part-IV).</p> <p>For the foundations supporting minor rotating equipment weighing less than one ton or if the mass of the rotating parts is less than one hundredth of the mass of the foundation, no dynamic analysis is necessary. However, if such minor equipment is to be supported on building structure, floors, etc., suitable vibration isolation shall be provided by means of springs, neoprene pads, etc., and such vibration isolation system shall be designed suitably.</p>					
6.03.11	If RCC floor/roof is assumed to act as diaphragm, transmitting lateral loads to braced bays, it shall be provided with shear connectors. However, whenever large / more number of cut-outs are provided in the floor slab, horizontal floor bracings shall be provided below slab to transfer horizontal force to columns without considering diaphragm action from slab.					
6.03.12	All roads shall be rigid pavements specified elsewhere in this specification. The design traffic load shall be a minimum 4 million cumulative standard axle. The design of concrete pavement shall be carried out as per IRC-58.					
6.03.13	<p>a) No cable/pipe trench is envisaged in the plant area. However, if required, pipe/cable trench can be provided inside the buildings or some other localised areas.</p> <p>b) All pipes and cable shall generally be routed above ground.</p> <p>c) A minimum clearance (clear headroom) of 8 m shall be kept for all over-ground pipe/cable trestles for all road/rail crossings. For other areas, the requirement of trestle height is specified elsewhere in the specifications. All trestles shall be provided with continuous walkway of minimum 600mm width with hand-rails and toe-guards all along the length of the trestle along with approach ladders near roads, passageways, etc. Before and after the road/rail crossings, a barrier of suitable height shall be constructed so as to prevent the approach of cranes (having height more than 8 m) etc., upto the pipe/cable racks/trestles.</p> <p>d) Within AB bay in Main plant area, generally grating shall be provided for Mezzanine floor except for valve room area, cable spreader floor, air washer units, feed water heaters, equipment foundations, miscellaneous skids, etc. where the floor shall be of RCC. Oil equipment room shall also have RCC floor below the grating floor.</p>					
6.03.14	The maximum velocity for pipe drains and open drains shall be limited to 2.4m/sec and 1.8 m/sec. respectively. However, minimum velocity of 0.6m/sec. for self-cleansing shall be ensured. Bed slope not milder than 1 in 1000 shall be provided. The open drains shall be open rectangular drains of RCC unless required otherwise due to functional requirement. RC box culverts shall be provided at rail, road or other crossings.					
6.03.15	<p>Sewers shall be designed for a minimum self-cleansing velocity of 0.75m/sec and the maximum velocity shall not exceed 2.4m/sec.</p> <p>Manual on sewerage and sewage treatment (published by Central Public Health Environment Engineering Organisation, Government of India) shall be followed for design purpose.</p>					
6.03.16	Foundations for all tanks shall be designed for as per IS: 803.					
<table><tr><td>KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES</td><td>TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC. NO.: THDC/RKSH/CC-9915-371</td><td>SUB-SECTION-D-01 CIVIL WORKS</td><td>PAGE 33 OF 142</td></tr></table>			KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES	TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC. NO.: THDC/RKSH/CC-9915-371	SUB-SECTION-D-01 CIVIL WORKS	PAGE 33 OF 142
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6.03.17		Footings shall be so proportioned to as to minimize the differential settlement.	
6.03.18		Design Criteria for foundations and some other facilities/areas are covered separately in this specification.	
6.03.19		Plinth level of all buildings shall be kept at least 500 mm above the finished grade/formation level.	
6.03.20		Joints/Connections in steel structures: Steel structures shall be detailed and connection and joints provided as per the provisions of IS 800, IS 816, IS 9595, IS 1367, and IS 9178 and as per following requirements. a) Connection of vertical bracings with connection members and diagonals of truss members shall be designed for full tensile capacity of the bracings unless actual loads are indicated on the drawings. b) Size of fillet weld for flange to web connection for built up section shall be as follows: i) For box section weld size shall be designed for full shear capacity or actual shear whichever is more. Where fillet weld is not possible, full penetration butt weld shall be provided. ii) For built up I section, weld size shall be designed for 80% of full shear capacity or actual shear, (if indicated, in drawings) whichever is more. However, weld size shall not be less than 0.5 times the web thickness. Weld shall be double fillet. iii) All welds shall be continuous unless otherwise specifically approved. The minimum size of the fillet weld shall be 6mm. c) Shear connections shall be designed for 60% of section strength for rolled sections and 80% of section strength for built up section or rolled section with cover plates. However, if load is more than above, the connection shall be designed for actual load. d) Moment connections between beam and column shall be designed for 100% of moment capacity of the beam section. e) All butt welds shall be full penetration butt welds. f) The connection between top flange and web of crane girder shall be full penetration butt weld. Bottom flange, connection with web can be fillet weld or butt weld as directed by Engineer. g) Connection of base plate and associated stiffeners with the columns shall be designed considering the total load transferred through welds. However, minimum weld size (double fillet) shall not be less than 0.6 times the thickness of stiffeners. h) Splicing: All work shall be full strength. All field splicing shall be done with bolts and web and flange cover plates for full strength. Shop splicing for all sections other than rolled shall be carried out by full penetration butt welds with no cover plates. Splicing for all rolled sections shall be carried out using web and flange cover plate.	
6.03.21		Pipe Pedestals, pipe supports and other structures: a) The design of Pipe Pedestal and pipe supports shall be carried out considering Dead load, live load & seismic load / wind load. In addition to above, longitudinal forces equal to product of Co - efficient of friction (between contact surface of pipe and pedestal) with the load coming on each pedestal shall also be considered for the design of pedestal. In bends, suitable thrust block shall be provided to withstand the thrusts transferred from the pipelines.	
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6.03.22	<p>b) All RCC pipes carrying water under gravity shall be designed for earth pressure, water and surcharge. Minimum grade of pipe shall be of NP - 2 class or heavier required as per design / specification.</p> <p>c) The design and construction of RCC structures shall be carried out as per IS: 456. In general, limit state theory shall be followed for the design of RCC structures, however, working stress method shall be adopted for the design, wherever specifically mentioned in this specification.</p> <p>d) Two layers of reinforcement (on inner and outer face) shall be provided for RCC wall sections having thickness 150mm and above.</p> <p>Design Criteria of RCC Floors</p> <p>a) For Main Power House, and other structural steel framed buildings:</p> <p>These buildings being steel framed structure, all RCC floors shall comprise RCC slab supported on troughed, profiled metal deck sheet (to be used as permanent shuttering). The RCC slab shall be minimum 150mm thick above the top surface (crest) of the metal deck sheet. The spacing of structural steel secondary beams shall be based on the bending capacity of the metal deck sheet for self-weight of green concrete and additional construction load of 100 kg/m².</p> <p>The permanent metal deck sheets shall be fixed to the top flange of secondary beams by means of drawn arc welding of headed shear anchor studs directly through the metal sheet. The details of shear anchor studs are specified elsewhere in this specification.</p> <p>The RCC slab shall be designed without considering any composite action effect of metal deck sheet (i.e. the structural strength of metal deck sheet shall not be considered for RCC slab design).</p> <p>(b) For Service Building, & other RCC buildings.</p> <p>These buildings being complete RCC framed structures, conventional RCC slabs of minimum thickness 125mm shall be provided. The RCC slabs shall be monolithic with RCC beams and RCC columns.</p>			
6.03.23	<p>Design Criteria of RCC roofs</p> <p>a) For Main Power House and Other Steel framed Buildings:</p> <p>The roof system shall comprise minimum 40mm thick RCC slab on top of profiled permanent metal deck sheet. The permanent metal deck sheets shall be fixed to the top flange of secondary beams by means of arc welding of headed shear anchor studs to the purlins directly through the metal sheet. The details of shear anchor studs are specified elsewhere in this specification. Water proofing treatment to roof slab shall be provided as per details specified elsewhere in this specification).</p> <p>The RCC slab shall be designed without considering any composite action effect of metal deck sheet (i.e. the structural strength of metal deck sheet shall not be considered for RCC slab design).</p> <p>c) Other RCC Buildings.</p> <p>Cast-in-Situ RCC slab shall be provided using removable plywood shuttering. Water proofing treatment to roof slab shall be provided as per details specified elsewhere in this specification).</p>			
6.03.24	<p>Design Criteria for Foundation</p> <p>The founding depth / cut off level of piles shall be decided based on functional requirement.</p>			
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	<p>Where structural steel columns are envisaged, the bottom of the base plate shall be kept suitably below the paving level such that the top level of the gusset plate and foundation bolt remain at least 200 mm below the top level of paving except for Main power House Building columns for which the requirement of levels for bottom of base plates is specified elsewhere in this specification. Further the gusset plate and foundation bolts are to be encased in concrete up to the top of the paving level. For outdoor structural steel columns, about 300 mm height of steel columns above the top of paving level shall be provided with at least 125 mm thick encasement with minimum reinforcement to prevent corrosion of the steel columns from surface water</p> <p>a) OPEN Foundations</p> <p>For foundations, the minimum founding depth and the minimum size of foundation shall be as per foundation system and geotechnical data specified in the foundation chapter include hereafter in this specification.</p> <p>For open foundations, the total permissible settlement shall be as per the criteria furnished under the foundation system specified elsewhere in this specification.</p> <p>The sizing of foundation, design criteria & clear cover shall conform to IS:1904, IS:456 and other relevant Indian codes. However minimum 0.12% of reinforcement shall be provided on the top face of the foundation concrete on either direction and minimum percentage of reinforcement at bottom face of foundation shall be same as that stipulated for beam as per IS:456.</p> <p>No foundation shall rest on filled up soil. Loose soil if any below foundation is to be removed and replaced with PCC of grade M7.5.</p> <p>b) PILE Foundations</p> <p>Minimum centre to centre spacing of the piles shall be as per IS: 2911. . In case single piles are used, these piles are to be interconnected with tie beams along both orthogonal directions perpendicular to each other.</p> <p>Minimum penetration of piles into Pilecap shall be 75 mm and clear cover to the main reinforcement at the bottom face of the pile cap shall be 100 mm. Structural design of pile cap and reinforcement shall conform to IS:2911 and IS:456. However minimum 0.12% of cross section of the pile cap shall be provided on the top face of the pile cap along two orthogonal directions and minimum percentage of reinforcement at bottom face of pile cap shall be same as that stipulated for beam as per IS:456.</p> <p>Detailed requirement of pile foundation have been presented in the foundation chapter specified hereafter in this specification.</p> <p>CORROSION PROTECTION</p> <p>General</p> <p>(a) All Steel structures shall be provided with painting as given in the specification. Further, painting system shall also meet the requirements of Corrosivity category C3 (durability High) as per ISO 12944.</p> <p>Painting system for steel surfaces embedded in Concrete is given separately.</p> <p>(b) All Painting shall be done as per Technical Specification Painting scheme shall submitted by the Bidder for approval of Employer / Manufacturers, which shall be submitted by the Bidder and as approved by the Employer.</p> <p>(c) All steel structures shall be designed by following basic design criteria in ISO 12944 Part 3. However, where it is not feasible to follow the design criteria given in ISO 12944 Part 3 where the steel surface are inaccessible for application of protective coating, corrosion allowance of 1.5 mm shall be kept in thickness(over the design thickness) of structural steel members for Khurja SuperThermal Power Project.</p>		
6.04.00 6.04.01			
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6.04.02	Painting of Steel Surfaces Embedded In Concrete <div><div>a)</div><div>For the portion of Steel surfaces embedded in Concrete, the surface shall be prepared by Manual Cleaning and provided with Primer Coat of Chlorinated Rubber based Zinc Phosphate Primer of Minimum 50 Micron Dry Film Thickness (DFT).</div><div>b)</div><div>All threaded and other surfaces of foundation bolts and its materials, insulation pins, Anchor channels, sleeves, etc. shall be coated with temporary rust preventive fluid and during execution of civil works, the dried film of coating shall be removed using organic solvents.</div></div>			
6.04.03	Painting Of Steel Surfaces (Other Than Those Embedded In Concrete) <div><div>a)</div><div>All steel surfaces shall be provided with two component moisture curing zinc (ethyl) silicate primer coat (having minimum 80% of metallic Zinc content in dry film, solid by volume minimum 60% ±2%) of minimum 70 micron DFT to be applied over blast cleaned surface conforming to Sa 2 ½ finish of ISO 8501-1 with surface profile 40-60 Micron. The primer coat shall be applied in shop immediately after blast cleaning by airless spray technique. Zinc dust composition and properties shall be Type-II as per ASTM D520-00.</div><div>b)</div><div>Primer coat shall be followed with the application of Intermediate coat of two component polyamide cured epoxy with MIO Content (containing lamellar MIO minimum 30% on pigment, solid by volume minimum 80% ±2%) of minimum 100 micron DFT. This coat shall be applied in shop after an interval of minimum 24 hours (from the application of primer coat) by airless spray technique.</div><div>c)</div><div>Intermediate coat shall be followed with the application of finish coat of two-pack aliphatic Isocyanate cured acrylic finish paint (solid by volume minimum 55% ±2%) with Gloss retention (SSPC Paint Spec No 36, ASTM D 4587, D 2244, D 523) of Level 2 (after minimum 1000 hours exposure, Gloss loss less than 30 and colour change less than 2.0 ΔE) and minimum 70 micron DFT. This coat shall be applied shop after an interval of minimum 10 hours and within six (6) months (from the completion of Intermediate coat), Colour and shade of the coat shall be as approved by the Employer.</div></div> <div>Notes:<div><div>1.</div><div>For Primer, high quality surface preparation is necessary and good amount of moisture is required for proper curing. Below 70 % relative humidity, curing time may go up to 7 days or more. In such a case additional water sprinkling may be ensured for completion of curing. Additionally Inorganic zinc silicate cannot be recoated; even with itself. Typically it should be used when coating bare steel surface for first time.</div><div>2.</div><div>The most frequent problem associated when top coating Primer is bubbling/pinholing especially with non-weathered zinc silicate coatings. To a great extent, this bubbling of finish paint can be eliminated by applying a mist coat of intermediate/topcoat as the first pass of the product, allow the bubbles to subside and then apply a full coat, as required.</div><div>3.</div><div>In case topcoating of zinc silicate with epoxy/polyurethane coatings, is expected to be delayed, it is advisable to use a suitable tie coat to avoid formation of white rust. However, if white rust forms then clean the surface with high pressure water, dry and apply the subsequent coats as required.</div><div>4.</div><div>Touch up paintings on damaged areas: Surface preparation by manual tools, wire brush/ emery paper etc. Minimum 6 inches peripheral area, adjoining to damaged area to be covered. If metal surface is exposed, it is to be painted with Zinc rich epoxy (70 micron) or suitable primer with existing paint scheme. If primer is intact, intermediate & top coat to be done with specified DFT in scheme.</div></div></div>			
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6.04.04	Coating for Mild Steel parts in contact with Water. a) All mild Steel parts coming in contact with water or water vapour shall be hot dip galvanised. The Minimum Coating of Zinc shall be 610 g/ Sq.m. for galvanised Structures and shall comply with IS: 4759 and other relevant Codes. Galvanising shall be checked and tested in accordance with IS: 2629. b) The galvanising shall be followed by the application of an etching Primer and dipping in black bitumen in accordance with BS: 3416, unless otherwise specified.		
6.04.05	Gratings All gratings shall be blast cleaned to Sa 2 ½ finish or cleaned by acid pickling as per ISO 8501-1 and shall be hot dip galvanized at the rate of 610 g/Sq.m.		
6.04.06	Hand Railings and Ladders All Mild steel (MS) handrails and ladders in outdoor locations and in pump valve pits shall be galvanised at the rate of 610 g/Sq.m as per IS 4736. All other MS handrails shall be painted as specified in clause 6.04.03 above. However, Stainless steel handrails shall be provided as specified in General Architectural Specification clause 9.00.00.		
6.04.07	Sea Worthiness All Steel Sections and fabricated Structures, which are required to be transported on sea, shall be provided with anti-corrosive Paint before shipment to take care of sea worthiness.		
6.04.08	All structural steel members in switchyard (excluding fencing and gate) shall be hot dip galvanised as specified elsewhere.		
6.04.09	For reinforced concrete work. i) The protection for concrete sub-structure shall be provided based on aggressiveness of the soil, chemical analysis of soil/sub-soil water and presence of harmful chemicals/salts. ii) The protection to super structure shall depend on exposure condition and degree of atmospheric corrosion. This shall require use of dense and durable concrete, control of water cement ratio, increase in clear cover, use of special type of cement and reinforcement, etc., coating of concrete surface, etc., Bidder shall furnish the details of corrosion protection measures.		
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7.00.00	FOUNDATION SYSTEM AND GEOTECHNICAL DATA			
7.01.00	<div>Soil Data</div> <p>Owner has carried out preliminary geotechnical investigation in the proposed area. Available bore logs of the area along with laboratory test results are enclosed at Annexure-I for Bidder's reference. The geotechnical investigation report of this area will be made available for the Bidder's study at the Owner's office, if required.</p> <p>Based on the available bore logs, the soil stratum consists of sandy silt/clayey silt of low plasticity layer varying from 1.5m to 5m depth from ground level followed by silty sand/fine sand layer of thickness varying from 20m to 30m. This layer is underlain by about 5m layer of sandy silt followed by silty sand/fine sand layer up to the depth of investigation. The ground water table is encountered at about 4m depth at the time of investigation and may fluctuate with seasonal variation.</p> <p>Based upon the initial assessment, soil up to a depth of 5m to 6m (below existing ground level) is prone to liquefaction hazard. For heavily loaded structures, pile foundations may be considered and for lightly loaded structures, suitable ground improvement as per clause 7.02.04 & 7.02.05 may be considered. Minimum cut off level below NGL is 5m.</p> <p>Onus of correct assessment/ interpretation and understanding of the existing subsoil condition / data is on the Bidder. Bidder may refer topographical survey drawing for variation in existing ground level (EGL) and FGL. As per topographical survey drawing, NGL is varying from RL(+) 191.5m to RL(+) 193.5m and FGL is RL(+) 194.0 i.e. there may be filling of 0.5m to 2.5m.</p>			
7.01.01	Since the available geotechnical data is preliminary only, bidder shall carry out his own detailed geotechnical investigation for facilities under this package and shall be as per the scheme approved by Owner. The scheme for geotechnical investigation shall be as given at Clause 7.07.00 and shall be approved by Owner before execution. Geotechnical investigation work shall be got executed by the Contractor through the agencies as mentioned in Clause No. 7.07.03. However, no time extension shall be given on account of geotechnical investigation carried out by the Bidder. The geotechnical investigation report shall be prepared with detailed recommendations regarding type of foundation and allowable bearing pressure for various structures/ facilities and other soil parameters. The report shall be submitted for Owner's approval prior to commencement of design of foundation.			
7.01.02	The Bidder should note that nothing extra whatsoever on account of variation between geotechnical data collected by Owner and that found by the Bidder during geotechnical investigation by him or during execution of works, shall be payable.			
7.01.03	<div>Tank Foundations</div> <div><div>a)</div><div>The tanks shall rest on flexible tank pad foundation, resting on sand with concrete ring wall to retain sand. Base of the concrete ring wall shall not rest on the expansive soil, if any.</div></div> <div><div>b)</div><div>Entire loose/ soft soil inside the concrete ring wall shall be removed and shall be filled with sand. Sand for filling shall be clean and well graded conforming to IS 383 with grading Zone I to III.</div></div> <div><div>c)</div><div>Sand shall be spread in layers not exceeding 30cm compacted thickness over the area. Each layer shall be uniformly compacted by mechanical means like plate vibrators, small vibratory rollers, etc to achieve a relative density of not less than 80%.</div></div>			
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7.02.00	<p>d) Other requirements of tank foundations shall be as per IS 803 and as specified elsewhere in the specifications.</p> <p>Foundation System</p> <p>The requirements for the foundation system to be adopted are as given in subsequent clauses. Depending upon the depth of competent strata/stratum, type of structures, functional requirement of facility, extent of cutting / filling, suitable foundation, open or pile shall be adopted with approval of owner. For heavily loaded structures, pile foundations may be considered and for lightly loaded structures, suitable ground improvement may be considered.</p>		
7.02.01	<p>General Requirements</p> <ul style="list-style-type: none"> a) All structures/equipment shall be supported either on suitable open foundations (isolated, combined, raft) or on pile foundation depending on type of structures/facilities, sub-strata, topography etc. b) The roads, ground floor slabs, trenches, pipe pedestals except thrust blocks, channels/drainage and staircase foundation with foundation loading intensity less than $4 \text{ T} / \text{M}^2$ may be supported on open / shallow foundations resting on virgin / controlled compacted filled up soil. If the encountered sub-strata is black cotton soil, the same shall be either replaced upto the full depth or black cotton soil shall be stabilized by suitable treatment. For mitigation of liquefaction separate clause may be referred. c) No other foundation (other than as mentioned in (b) above) shall rest on the filled up ground / soil. d) All foundations shall be designed in accordance with relevant parts of the latest revisions of Indian Standards. e) Bidder shall also ensure that there is no damage to existing nearby foundations and the foundations pertaining to this package are not placed at shallower depth than the nearby foundations. If required depth of foundation is deeper than the existing foundations, proper protection shall be provided to existing foundations. f) The water table for design purpose shall be considered at Finished Ground Level. g) A combination of open and pile foundations shall not be permitted under the same equipment / structure / building. h) Foundation for miscellaneous equipment's on ground floor with sand backfilling. For equipments of static weight upto 1.5 T, the equipment may be supported on the ground floor slab by locally thickening the slab. Thickening of the ground floor slab shall be done upto an extent of about 0.6 m beyond the plan area of the equipment on all the sides. Further, the load intensity below the equipment shall be limited to $4\text{T}/\text{m}^2$. Other requirements of floor slab and compaction below the floor slab shall be adhered, as specified elsewhere in the specifications. For equipment's of static weight between 1.5 T and 20 T, the equipment may be supported on compacted sand filling with the load intensity below the equipment limited to $4\text{T}/\text{m}^2$. The minimum depth of foundation is 1.0m below FFL. Other requirements of sand compaction below the foundation shall be adhered, as specified elsewhere in the specifications. 		
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7.02.02	<p>For equipment of static weight more than 20 T, the equipment foundation shall be taken to the founding level or shall be built up with PCC from the level as mentioned in the Table 1. The pedestal of equipment foundation or the foundation Block shall be isolated from the adjoining floor slab by providing bitumen impregnated fiber board of minimum 50 mm thick, conforming to IS: 1838 all around the equipment pedestal for the full depth of the floor slab.</p>			
	<p>Open Foundations</p> <p>Following structures are to be placed on open foundation:</p> <p>Offsite buildings & structures, CPU, Transformer yard area (except transformer foundations) and all other structures which are not founded on pile foundation are to be placed on open foundation and if the depth of foundation is less than 5.0m below the EGL than the ground improvement shall be done using stone columns as per clause 7.02.04.</p> <p>In case open foundations are adopted, following shall be adhered to.</p> <div><div>a)</div><div>The minimum width of foundation shall be 1.0 m.</div></div> <div><div>b)</div><div>Minimum depth of foundation shall be 1.0m below Ground Level.</div></div> <div><div>c)</div><div>It shall be ensured that all foundations of a particular structure/ buildings/ facility shall rest on one bearing stratum.</div></div> <div><div>d)</div><div>Wherever the intended bearing sub-strata is virgin soil stratum but the actual stratum encountered during foundation excavation consists of filled up soil at founding level, under such cases either the foundation shall be lowered completely into the virgin stratum or the filled up soil upto the virgin layers shall be removed and built up through PCC (1:4:8) up to designed foundation level.</div></div> <div><div>e)</div><div>Wherever the intended bearing stratum is weathered rock, but the actual strata encountered during excavation consists of both overburden soil and weathered rock at founding level, under such cases, the overburden upto the weathered rock level including 0.5 m into the weathered rock shall be removed and built up through PCC (1:3:6) upto the designed founding level. Thus, maintaining the same founding level for all the footings of a structure. The treatment at the base of foundation before laying the PCC shall be carried out as per IS: 12070.</div></div> <div><div>f)</div><div>The last layer of about 300 mm before reaching the founding level shall be excavated carefully by such equipment so that soil / rock at the required level will be left in its natural condition.</div></div> <div><div>g)</div><div>If joints, fissures or other discontinuities in rock are encountered at founding level, then treatment of such rock defects shall be carried out as per IS: 13063-1991 in consultation with the Engineer.</div></div> <div><div>h)</div><div>No foundation shall rest in black cotton soil.</div></div> <div><div>i)</div><div>During design, the Allowable Bearing Pressure shall be adopted after approval of geotechnical investigation report. However, the maximum allowable bearing pressure shall be as per approved geotechnical report and shall be limited to the values as furnished in Table-1. The ground improvement scheme shall be approved by owner before execution.</div></div>			
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Table-1

Founding Depth/ Stratum	Net Allowable Bearing Pressure T/m ²		
	Isolated and combined footings including raft for 25mm permissible settlement in case of soil and 12mm in case of rocky strata	Isolated and combined footings for 40mm permissible settlement in case of soil and 12mm in case of rocky strata	Rafts (width > 6m) for 75mm permissible settlement in case of soil and 12mm in case of rocky strata
	Width upto 6.0m		
1.0m to 5.0m below NGL (After suitable ground improvement)	10	10	10
5.5m below NGL without Ground improvement	10	14	18
6.0m below NGL without Ground improvement	12	16	20
7.0m below NGL without Ground improvement	12	18	22



For NGL of the proposed area GLP along with topographical survey drawing & borelog data may be referred. In case any loose/soft pockets is encountered at founding level, the same shall be removed completely upto the hard strata and filled up with PCC (1:4:8).



- j) For open foundations, the total permissible settlement shall be governed by IS: 1904 / IS: 13063 and from functional requirements whichever is more stringent. However, total settlement shall be restricted to the following:



7.02.03



Pile Foundations – In case piles are adopted, following shall be adhered to :
Following structures are to be placed on pile foundation:


Main Power house including Control room, TGs, Service Building, Transformer foundations, Pipe cable gallery, any other heavily loaded structure etc.


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	<div><div><div><div><div>i)</div><div>pile foundation shall be of RCC, Cast-in-situ bored piles as per IS:2911. Pile boring shall be done using Rotary Hydraulic Rigs. Two stage flushing of pile bore shall be ensured by airlift technique duly approved by the Employer. If</div></div><div><div>ii)</div><div>required, temporary or permanent MS liner may be provided for piling The minimum diameter of pile shall be 600 mm. The allowable load capacity of the pile in different modes (vertical compression, lateral and pullout) shall be as per approved geotechnical report & shall be limited to following values:</div></div></div><table><tr><th>Pile</th><th>Dia. (mm)</th><th>Cut off Level (COL) below EGL (m)</th><th>Minimum Length of Pile below cut off level (m)</th><th>Vertical compression capacity (T)</th></tr><tr><td>Bored</td><td>600</td><td>5</td><td>25</td><td>100</td></tr><tr><td>cast-in-</td><td>600</td><td>5</td><td>35</td><td>140</td></tr><tr><td>situ</td><td>760</td><td>5</td><td>35</td><td>250</td></tr></table><div><p>The criteria for Pile Termination (founding level) shall be as given below: The termination level of the pile shall be decided based on the following criterion:</p><div><div>a)</div><div>Minimum length of the pile below COL (cut off level) shall be as specified above</div></div><div><div>b)</div><div>The minimum pile length for each group of piles shall be determined based on the nearest borelog. A minimum embedment of 4.0m into the dense to very dense sand strata with SPT 'N' value greater than 40 for 100 T vertical capacity pile and a minimum embedment of 4.0m into very dense sand strata with SPT 'N' value greater than 70 for 140 T & 250 T vertical capacity pile as observed in such borelog shall be ensured, while deciding the minimum length of pile.</div></div><div><div>c)</div><div>For pile termination, SPT shall be conducted in a separate borehole of 100mm dia as per IS 1892. In this borehole, SPT shall be conducted at 3.0m interval upto 20m below ground level and 1.0m interval beyond 20m to at least 5.0m below the pile termination level. One borehole shall be done for 50-70 piles or in a pile group and one borehole for each test pile group. The SPT N value at pile termination level shall not be less than 50 for 100 T vertical capacity pile and 100 for 140 & 250 T vertical capacity piles.</div></div><div><div>d)</div><div>However, in no case the length of pile shall be less than the minimum length determined as in (i) or (ii) above whichever is longer, for that pile group</div></div><div><p>The uplift and lateral load capacity shall be respectively restricted to 35% and 5% of the allowable load capacity in vertical compression. However, the pile capacities to be adopted shall be the least of the estimated design values and that obtained from the initial pile load tests.</p></div></div><div><div>iii)</div><div>Only straight shaft piles shall be used. Minimum cast length of pile above cutoff level shall be 1.0 m.</div></div></div></div>	Pile	Dia. (mm)	Cut off Level (COL) below EGL (m)	Minimum Length of Pile below cut off level (m)	Vertical compression capacity (T)	Bored	600	5	25	100	cast-in-	600	5	35	140	situ	760	5	35	250
Pile	Dia. (mm)	Cut off Level (COL) below EGL (m)	Minimum Length of Pile below cut off level (m)	Vertical compression capacity (T)																	
Bored	600	5	25	100																	
cast-in-	600	5	35	140																	
situ	760	5	35	250																	
<div><div><div><div><div>KHURJA SUPER THERMAL POWER PROJECT</div><div>(2X660 MW)</div><div>TURBINE GENERATOR AND ASSOCIATED PACKAGES</div></div></div><div><div>TECHNICAL SPECIFICATION</div><div>SECTION – VI, PART-B</div><div>BID DOC. NO.:</div><div>THDC/RKSH/CC-9915-371</div></div><div><div>SUB-SECTION-D-01</div><div>CIVIL WORKS</div></div><div><div>PAGE</div><div>43 OF 142</div></div></div></div>																					



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	<div><div><div><div><div>iv)</div><div>The contractor shall furnish design of piles (in terms of rated capacity, length, diameter, termination criteria to locate the founding level for construction of pile in terms of measurable parameter, reinforcement for job as well as test piles, pile load test arrangement, locations of initial test piles etc.) for Engineer's approval.</div></div><div><div>v)</div><div>The piling work shall be carried out in accordance with IS:2911 (Relevant part) and accepted construction methodology. The construction methodology shall be submitted by the Contractor for Engineer's approval.</div></div><div><div>vi)</div><div>Number of initial load tests to be performed for each diameter and rated capacity of pile shall be subject to minimum as under.</div></div><div><div>Vertical</div><div>Lateral</div><div>Uplift</div><div>Minimum of 2 Nos. in each mode.</div></div><div><div>vii)</div><div>The initial pile load test shall be conducted with test load upto three times the pile capacity mentioned in (ii) above. In case of vertical compression test (initial test) the method of loading shall be cyclic as per IS:2911 (relevant part).</div></div><div><div>viii)</div><div>Load test shall be conducted at pile Cut-off Level (COL). If the water table is above the COL the test pit shall be kept dry throughout the test period by suitable de-watering methods. Alternatively the vertical load test may be conducted at a level higher than COL. In such a case, an annular space shall be created to remove the effect of skin friction above COL by providing an outer casing of suitable diameter larger than the pile diameter.</div></div><div><div>ix)</div><div>Number of routine pile load tests to be performed for each diameter/allowable capacity of pile shall be as under :</div><div><div>i)</div><div>Vertical : 0.5% of the total number of piles provided.</div></div><div><div>ii)</div><div>Lateral : 0.5% of the total number of piles provided.</div></div><div><div>x)</div><div>The routine tests on piles shall be conducted upto test load of one and half times the allowable pile capacity. Piles for routine load tests shall be approved by the Employer.</div></div><div><div>xi)</div><div>In case, routine pile load test shows that the pile has not achieved the desired capacity or pile(s) have been rejected due to any other reason, then the Contractor shall install additional pile(s) as required and the pile cap design shall accordingly be reviewed and modified, if required.</div></div><div><div>xii)</div><div>Testing of piles and interpretation of pile load test results shall be carried out as per IS:2911 (Part-4). Contractor shall ensure that all the measuring equipment and instruments are properly calibrated at a reputed laboratory / institute prior to their use. Settlement / movement of the pile top shall be made by Linear Variable Differential Transducers (LVDT) having a least count of 0.01mm.</div></div></div></div></div></div>		
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	<div><div><div><div><div>xiii)</div><div>The test load on initial test piles shall be applied by means of reaction from anchor piles / rock anchors alone or combination of anchor piles / rock anchors and kentledge with concrete blocks.</div></div><div><div>xiv)</div><div>Low Strain Pile Integrity test shall be conducted on all test piles and job piles. This test shall be used to identify the routine load test and not intended to replace the use of static load test. This test is limited to assess the imperfection of the pile shaft and shall be undertaken by an independent specialist agency to be approved by Engineering department of Owner. The test equipment shall be of TNO or PDI make or equivalent. The process shall confirm to ASTM.</div></div><div><div>xv)</div><div>High Strain Dynamic Load Test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic load tests. The procedure to carryout the test shall be submitted to the Engineer. The test and equipment shall conform to ASTM D4945-00. The test shall be conducted by an experienced independent test agency approved by the owner. Field data shall be submitted to the site engineer and shall include force velocity curves, pile capacity, simulated static load test curve, net and total pile displacement, pile integrity. A (Case pile wave analysis) CAPWAP or equivalent software analysis shall be conducted on the field data for correct capacity estimation and to evaluate end bearing and skin friction components of the pile.</div></div><div><div>xvi)</div><div>From load considerations, single pile may be used under a column/tower. In that case, pile shall be connected with tie beams at pile cut off level in both directions.</div></div><div><div>xvii)</div><div>Contribution of frictional resistance of filled up soil if any, shall not be considered for computation of frictional resistance of piles.</div></div><div><div>xviii)</div><div>Reinforcement for job piles shall be designed as following:<div><div>(a) Compression + bending piles: For these piles, the allowable safe pile capacities in compression and bendings shall be considered.</div><div>(b) Tension + bending piles: For these piles, the actual pile forces to be considered. However, maximum 3 types of combinations for varying percentage of tension capacity + bending case may be designed & adopted by contractor for the entire scope of work under this package.</div></div></div></div></div></div></div>		
7.02.04	<div><div>Ground Improvement below structures/facilities using stone columns:</div><div><div>i)</div><div>The work broadly involves installation of stone columns for mitigation of liquefaction hazard, improvement in bearing capacity of the soil and to bring down the residual settlements so that the facilities that may be constructed over the stone column area shall stand safely and perform satisfactorily throughout their lifetime.</div></div></div>		
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	<p>The stone columns shall be installed using bottom/top feed Vibroflotation techniques without water jetting i.e. dry method (displacement method) in accordance with these specifications. Installation of stone column by rammed/driven technique without water jetting may also be permitted/used subject to conforming to the specification and meeting to the construction schedule.</p> <p>In case of vibro replacement method, the bidder shall submit the construction methodology giving information regarding details of equipment, type and energy rating of vibratory probe, details of power output, compaction criteria etc.</p> <p>In case of rammed stone column methodology, the bidder shall submit the construction methodology giving information regarding type of equipment, weight of rammer, height of fall, compaction criteria, stages of casing withdrawal etc. Use of bentonite slurry for formation of stone columns shall not be permitted. A casing pipe shall be provided by the bidder upto to full depth of stone column.</p> <p>In either of the above techniques adopted, the parameters shall be so chosen to give stone column of specified diameter and load carrying capacity.</p> <p>In either of the above techniques adopted, the quantity of stones shall be placed in such that the column is filled in stages of height not exceeding 1m. Each stage shall be compacted to ensure uniform consumption of stones throughout the depth.</p> <p>The method of placement of stone shall be such that it is possible to measure the total consumption of stones in a column.</p> <p>Stone column installation procedure submitted by the bidder shall be approved by the Engineer.</p> <p>ii) All materials and workmanship shall be in accordance with this specification and IS: 15284: Part 1: 2003.“Design and Construction for Ground Improvement – Guidelines, Part 1 Stone Columns”.</p> <p>iii) Case:1 Ground improvement without piling provision after it</p> <p style="padding-left: 40px;">Dia of column (D) = 900mm Spacing = 3D (Triangular pattern) Depth of ground improvement (d) = 6m</p> <p style="padding-left: 40px;">Case:2 Ground improvement with piling provision after it</p> <p style="padding-left: 40px;">Dia of column (D) = 900mm Spacing = 4D (Rectangular pattern) Depth of ground improvement (d) = 6m</p> <p>iv) Ground improvement with stone column shall be carried out minimum d/2 distance beyond the footprint of buildings(minimum 2 rows beyond the building footprint), where d is the depth of improvement. The ground improvement shall be carried out below the entire building/structure rather than restricting it to just below the foundations.</p> <p>v) Initial load tests shall be performed at the trial site as identified by Engineer to evaluate load settlement behaviour of the stone columns. These tests shall be conducted on a single as well as on a group of three columns. Load testing procedure, equipment and interpretation shall confirm to IS 15284 (Part-I).</p>		
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7.02.05	vi) Boreholes shall be drilled prior and after the installation of stone columns and frequency shall be minimum 1 borehole under each structure/facility or 2000 Sqm whichever is less. The performance of the stone column(s) shall be considered acceptable and approved by the Engineer based on the SPT 'N' values of the improved ground. The installation of stone column is considered acceptable if it achieve SPT 'N' value more than 20 from the natural ground level upto depth of improvement. The minimum load intensity after ground improvement shall be as mentioned in table-1 of this specification.				
	Ground Improvement below roads & drains: In order to mitigate liquefaction below roads & drains, ground improvement by dynamic compaction or any other method can be done. The improvement shall be done along the alignment & additional d/2 distance on both sides away from the road/drain footprint, where d is depth of treatment. Boreholes shall be drilled prior and after the ground improvement and frequency shall be minimum 1 borehole under each structure/facility or 2000 Sqm whichever is less. The ground improvement is considered acceptable if it achieve SPT 'N' value more than 20 from the natural ground level upto depth of improvement. The minimum load intensity after ground improvement shall be 7T/m2. In case alignment of roads/drains changes at a later stage then the ground improvement using stone columns shall be done as per clause 7.02.04.				
	7.03.00 Special Requirements				
	7.03.01 Details of treatment for foundations / underground structures required to counteract soil / water chemical environment shall be as per detailed geotechnical investigation to be carried out by contractor. Contractor shall carry out chemical analysis during detailed geotechnical investigation and required treatment shall be provided accordingly.				
	7.04.00 Excavation, Filling and Dewatering				
	7.04.01 For excavation works, comprehensive dewatering with well point or deep wells arrangement, if required, shall be adopted. Scheme for dewatering and design with all computations and back up data for dewatering shall be submitted for the owner's information. The water table shall be maintained at 0.5m below the founding depth.				
	7.04.02 Excavation for shallow foundations shall be covered with PCC immediately after reaching the founding level. In case of any local loosening of soil or any loose pockets are encountered at founding level during excavation the same shall be removed and compensated by PCC M7.5. The final layer of about 300 mm thickness above the founding level shall be excavated by suitable means, so as to avoid disturbance to founding stratum.				
7.04.03	Backfilling in Main Power House and TG This clause is applicable in the following areas: a) Main Power House Building foundations including Auxiliary column foundations, TG foundations, BFP foundations, CW pit, CEP Pit. b) Common control room building foundations (between the Main Power House Buildings) After construction of foundations for above mentioned buildings/ facilities, excavated earth between the excavation profile and the foundations, wherever backfilling is required, shall be backfilled with sand from founding level till finished ground level. In case block excavation is carried out for the above mentioned areas, after construction of foundations, whole area shall be backfilled with sand from founding level till finished ground level. Sand used for filling shall be natural sand/manufactured sand, and clean & well graded conforming to IS 383 with grading Zone I to III. Backfilling with sand shall be carried out in layers not exceeding 300 mm compacted thickness and each layer shall be compacted to minimum 80% of relative density. Backfilling in other area				
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CLAUSE NO.	<div>एनटीपीसी NTPC</div> <div>TECHNICAL REQUIREMENTS</div> <div></div>			
	<p>Backfilling around foundations, pipes, trenches, sumps, pits, plinths, etc. shall be carried out with approved material in layers not exceeding 300 mm compacted thickness (higher thickness of layers upto 500mm with heavy mechanical compacting equipment) and each layer shall be compacted to 90% of standard proctor density for cohesive soils and to 80% of relative density for non cohesive soils. In any case, black cotton soil shall not be used in back filling without providing cushion of 1m of non expansive cohesive soil/moorum around the footings. In case of roads in the area of black cotton soil, minimum 0.4m moorum shall be provided.</p> <p>Rock pieces having size less than 150 mm and interstices filled with soil may be used for backfilling around foundation, plinths etc. and shall be compacted to minimum of 85% of original stack of material after filling the interstices.</p> <p>7.04.04 Founding level for trenches/channels shall be decided as per functional requirement. The bottom of excavation shall be properly compacted prior to casting of bottom slab of trenches / channels.</p> <p>7.04.05 CBR tests for pavement/road design shall be carried out by the Contractor after earth filling (if applicable) has been completed upto the formation level.</p> <p>7.04.06 The contractor shall take all necessary measures during excavation to prevent the hazards of falling or sliding of material or article from any bank or side of such excavation which is more than one and a half meter above the footing by providing adequate piling, shoring, bracing etc. against such bank or sides.</p> <p>Adequate and suitable warning signs shall be put up at conspicuous places at the excavation work to prevent any persons or vehicles falling into the excavation trench. No worker should be allowed to work where he may be stuck or endangered by excavation machinery or collapse of excavations or trenches.</p> <p>7.05.00 Excavation in Rock- NA</p> <p>Excavation in rock shall be carried out by mechanical means and if blasting is required for founding of some of the structures under this package, control blasting only shall be carried out.</p> <p>7.06.00 Sheeting & Shoring</p> <p>The contractor shall ascertain for himself the nature of materials to be excavated and difficulties, if any, likely to be encountered in excavation while executing the work. Sheet piling, sheeting and shoring, bracing and maintaining suitable slopes, drainage, etc. shall be provided and installed by the Contractor, to the satisfaction of the Engineer.</p> <p>7.07.00 Geotechnical Investigation</p> <p>The Contractor shall carry out detailed geotechnical investigation in the areas under his scope for establishing the sub-surface conditions and to decide type of foundations for the structures envisaged, construction methods, any special requirements/treatment called for remedial measures for sub-soil/ foundations etc. in view of soft sub-soils, aggressive sub-soils and water, expansive/swelling soils etc. prior to commencement of detailed design/drawings. The Contractor shall obtain the approval for the field testing scheme proposed by him from the Owner before undertaking the geotechnical investigation work.</p> <p>7.07.01.00 Scheme of geotechnical Investigation</p> <p>7.07.02.01 Field test shall include but not be limited to the following: Boreholes, Standard Penetration Test (SPT), Dynamic Cone Penetration Test (DCPT), collection of disturbed samples (DS) and undisturbed soil samples (UDS), Trial Pits (TP), Plate Load Tests (PLT), Electrical Resistivity Test (ERT), Cross hole shear test (CHST), Pressuremeter test (PMT) In situ field permeability tests, collection of water samples, etc.</p> <p>7.07.02.02 The diameter of borehole shall be minimum 150 mm in soil and 76 mm in rock. The diameter of UDS sampler shall be 100 mm minimum. Core drilling in rock shall be done by using hydraulically feed rotary drill & double tube core barrel with diamond bit.</p> <p>7.07.02.03 The minimum tests are indicated in Clause No. 7.08.00. Adequate number of tests shall be conducted up to sufficient depth for complete determination of subsoil conditions. The depth</p>			
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7.07.02.04	<p>of boreholes shall be as specified in Appendix A. SPT shall be carried out in all types of soil deposits and in all rock formations with core recovery up to 20%, met within a borehole. This test shall be conducted at every 3.0 m interval or at change of strata, up to the final depth. SPT 'N' of 100 and above shall be referred as refusal. UDS shall be collected at every 3.0 m interval or at change of strata up to depth of borehole. UDS may be replaced by additional SPT, if SPT'N' value in the strata is above 50.</p> <p>Laboratory tests shall be done as per relevant IS codes. The laboratory tests, not be limited to the following shall be conducted on disturbed and undisturbed soil samples, rock samples & water samples collected during field investigations in sufficient numbers.</p> <p>Laboratory Tests on Soil Samples</p> <p>Laboratory tests shall be carried out on disturbed and undisturbed soil samples for Grain Size Analysis, Hydrometer Analysis, Atterberg Limits, Triaxial Shear Tests (UU), Natural Moisture Content, Specific Gravity and Bulk Unit Weight, Consolidation Tests, Unconfined Compression Test, Free swell Index, Shrinkage Limit, Swell Pressure Test, Chemical Analysis test on soil and water samples to determine the carbonates, sulphates, chlorides, nitrates, pH, organic matter and any other chemicals harmful to concrete and reinforcement/ steel.</p>																							
7.07.02.05	<p>Geotechnical investigation (field & laboratory) shall be carried out in accordance with the provisions of relevant Indian Standards.</p> <p>On completion of all field & laboratory work, geotechnical investigation report shall be submitted for Owner's review/approval. The Geotechnical investigation report shall contain geological information of the region, procedure adopted for investigation, field & laboratory observations/ data/ records, analysis of results & recommendations on type of foundation for different type of structures envisaged for all areas of work with supporting calculations. Recommendations on treatment for soil, foundation, based on subsoil characteristics, soft soils, aggressive chemicals, expansive soils, etc.</p>																							
7.07.03.00	<p>Recommendations on foundation system and the net allowable bearing pressures and pile capacity shall be based on the conservative values of geotechnical investigation data.</p> <p>Geotechnical investigation work shall be got executed by the Contractor through the following agencies.</p> <div><div>1.</div><div>C.E.TESTING COMPANY Pvt. Ltd, Kolkata</div></div> <div><div>2.</div><div>CengrsGeotechnica Pvt. Ltd, New Delhi</div></div> <div><div>3.</div><div>M.K. Soil Testing Laboratory, Ahemdabad</div></div> <div><div>4.</div><div>SECON Pvt Ltd, Bangalore</div></div> <div><div>5.</div><div>Soil Engineering Consultants, New Delhi</div></div> <div><div>6.</div><div>Orbital Infrastructure Consultancy & Research Pvt. Ltd. Cuttack</div></div> <div><div>7.</div><div>KCT Consultancy Services, Ahemdabad</div></div> <div><div>8.</div><div>ARKITECHNO Consultants (India) Pvt. Ltd. Bhubaneswar</div></div>																							
7.08.00	<p>Geotechnical Investigation Scheme</p> <p>a) Boreholes (Minimum)</p> <table><tr><th>S.No</th><th>Structure</th><th>Spacing/Number of borehole</th><th>Depth of borehole</th><th>Remarks</th></tr><tr><td>1</td><td>Main power house, Turbo-Generator (TG)</td><td>35 to 45 m along the rows of main power house columns. Minimum 2 nos. boreholes under each TG</td><td>Depth of boreholes shall be 45 to 55m.</td><td>Depth of boreholes shall be as mentioned in column "Depth of Borehole"</td></tr><tr><td>2</td><td>Service building</td><td>Minimum 3 nos. of boreholes</td><td>40 to 55 m</td><td>or 5m</td></tr><tr><td>3</td><td>Transformer yard</td><td>Minimum 8 nos.</td><td>40 to 50 m</td><td></td></tr></table>				S.No	Structure	Spacing/Number of borehole	Depth of borehole	Remarks	1	Main power house, Turbo-Generator (TG)	35 to 45 m along the rows of main power house columns. Minimum 2 nos. boreholes under each TG	Depth of boreholes shall be 45 to 55m.	Depth of boreholes shall be as mentioned in column "Depth of Borehole"	2	Service building	Minimum 3 nos. of boreholes	40 to 55 m	or 5m	3	Transformer yard	Minimum 8 nos.	40 to 50 m	
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CLAUSE NO.	<div><div><div>एन टी पी सी</div><div>NTPC</div></div><div>TECHNICAL REQUIREMENTS</div><div></div></div>																																																																										
	<table><tr><td></td><td>area</td><td>boreholes and 8 nos. of ERT</td><td></td><td rowspan="6">continuous in rock with RQD > 50% whichever is earlier.</td></tr><tr><td>4</td><td>Control room building</td><td>Minimum 3 nos. of boreholes, 3 Nos. ERT</td><td>40 to 55 m</td></tr><tr><td>5</td><td>CPU</td><td>Minimum 2 nos. boreholes</td><td>25 to 35 m</td></tr><tr><td>6</td><td>Condensate storage tank foundation.</td><td>3 Nos. boreholes, 3 Nos. ERT and 1 no PLT</td><td>25 to 35 m</td></tr><tr><td>7</td><td>Pipe cable gallery</td><td>1 borehole @ 200m c/c spacing</td><td>40 to 55 m</td></tr><tr><td>8</td><td>Other Structure/Facility</td><td>Minimum 2 Nos. boreholes under each area / facility</td><td>25 to 50 m</td></tr><tr><td colspan="5">b) Other Field Tests (Minimum)</td></tr><tr><td>1</td><td>Plate Load Test (PLT)</td><td>Minimum 4 Nos</td><td>Test Depth from 2 to 4 m</td><td></td></tr><tr><td>2</td><td>Cyclic Plate Load Test (CPLT)</td><td>1 no in each TG</td><td>Test Depth from 2 to 4 m</td><td></td></tr><tr><td>3</td><td>Trial Pit (TP)</td><td>About 10 Nos.</td><td>Depth upto 4 m</td><td></td></tr><tr><td>4</td><td>In Situ Permeability Test In Boreholes</td><td>In minimum 8 Nos. of boreholes</td><td>Tests shall be conducted at depths of 1.0m, 3.0m, 5.0m, 8.0m and 12.0m.</td><td></td></tr><tr><td>5</td><td>DCPT</td><td>About 10-20% of boreholes up to refusal depth</td><td></td><td></td></tr><tr><td>6</td><td>ERT</td><td>10 Nos other structures</td><td></td><td></td></tr><tr><td>7</td><td>CROSS HOLE</td><td>1No. in each TG</td><td>Depths covering from 1.0 m to 25.0 m</td><td></td></tr><tr><td>8</td><td>PMT</td><td>30 no of tests in main power house area</td><td>Depths covering from 1.0 m to 25.0 m</td><td></td></tr></table> <ul style="list-style-type: none">• Depth and location of Boreholes and other field tests (DCPT, PLT, CPLT, CROSS HOLE TEST, PMT, TP, ERT, field permeability tests etc.) shall be approved by Owner before execution of geotechnical investigation work.• Investigation in any other building / structure / facilities / trestles which are not mentioned above shall also be carried out, if required, by the bidder for the facilities under his scope.						area	boreholes and 8 nos. of ERT		continuous in rock with RQD > 50% whichever is earlier.	4	Control room building	Minimum 3 nos. of boreholes, 3 Nos. ERT	40 to 55 m	5	CPU	Minimum 2 nos. boreholes	25 to 35 m	6	Condensate storage tank foundation.	3 Nos. boreholes, 3 Nos. ERT and 1 no PLT	25 to 35 m	7	Pipe cable gallery	1 borehole @ 200m c/c spacing	40 to 55 m	8	Other Structure/Facility	Minimum 2 Nos. boreholes under each area / facility	25 to 50 m	b) Other Field Tests (Minimum)					1	Plate Load Test (PLT)	Minimum 4 Nos	Test Depth from 2 to 4 m		2	Cyclic Plate Load Test (CPLT)	1 no in each TG	Test Depth from 2 to 4 m		3	Trial Pit (TP)	About 10 Nos.	Depth upto 4 m		4	In Situ Permeability Test In Boreholes	In minimum 8 Nos. of boreholes	Tests shall be conducted at depths of 1.0m, 3.0m, 5.0m, 8.0m and 12.0m.		5	DCPT	About 10-20% of boreholes up to refusal depth			6	ERT	10 Nos other structures			7	CROSS HOLE	1No. in each TG	Depths covering from 1.0 m to 25.0 m		8	PMT	30 no of tests in main power house area	Depths covering from 1.0 m to 25.0 m	
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CLAUSE NO.	<div><div></div><div>TECHNICAL REQUIREMENTS</div><div></div></div>		
8.00.00	GENERAL SPECIFICATION		
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8.01.01	JOINTS IN CONCRETE STRUCTURES Construction Joints All horizontal construction joints shall be provided with a groove (shear key) for transfer of shear force. For construction joint in concrete wall, the maximum height of any lift should not exceed 2 meters. However, the time interval between the successive lifts should be as small possible and the wall should be built to its full height in the least possible time. Expansion joints for all underground structures, construction joint between rafts & walls of pits for CW valves & CEP pumps and joints between TG raft and pits for CW valves & CEP pumps shall be made water tight by using ribbed PVC water stops with central bulb or of kicker type. The thickness and width of PVC water stops shall be as per the requirement of design. However, the minimum thickness and width shall be 6mm and 225mm respectively. Expansions Joints In case of expansion joints, preformed bitumen impregnated fibre board conforming to IS 1838 shall be used as joint filler. The joints shall be sealed with bitumen sealing compound conforming to IS 1834, however in case of liquid retaining/carrying structures, two parts polysulphide sealant conforming to IS 12118 or silicon sealing compound shall be used. IS 3414 shall be followed for details of joints in buildings. 3 mm thick stainless steel strip in matt or buff finish shall be provided over building expansion joints.		
8.01.02	Miscellaneous General Requirements		
8.01.02.1	All steel sections and fabricated structures, which are required to be transported on sea, shall be provided with anti-corrosive paint before shipment to take care of sea worthiness.		
8.01.02.2	Monorails, monorail girders and fixtures shall be provided, wherever required to facilitate erection / maintenance of equipment.		
8.01.02.3	Wherever possible all floor openings shall be provided with 100 mm thick 150 mm high RCC kerb all around.		
8.01.02.4	Angles 75 x 75 x 6 mm (minimum) with 8mm diameter and 150mm long MS lugs @ 150 c/c shall be provided for edge protection all around cut outs/openings in floor slabs. Angles 50 x 50 x 6mm with effective anchor lugs shall be provided for edges of concrete drains supporting grating/covers, edges of RCC cable / pipe trenches supporting covers/chequered plates/ grating, edges of manholes supporting covers, supporting edges of precast RCC covers and any other place where breakage of corners of concrete is expected.		
8.01.02.5	Floor of switchgear room shall be provided with embedded M.S. channel suitable for easy movement of breaker panels.		
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8.01.02.6	Anti-termite constructional measures and chemical treatment measures shall be given to all vulnerable areas susceptible to termite including column pits, wall trenches, foundations of buildings, filling below the floors, etc., as per IS 6313 and other relevant Indian Standards.				
8.01.02.7	<p>All cable & pipe routing shall be done as per system requirement and as stipulated elsewhere in the specification and shall run above ground on elevated trestles or other supporting structures except in some localized area (as approved by Employer) where the same can run in trenches. In case, pipes are to be routed on RCC pedestals, the height should not be less than 500mm above formation level/paving level. All trenches shall be of RCC with removable RCC covers.</p> <p>All cable trenches located inside buildings shall have minimum 6mm thick (o/p) chequered plate covers.</p> <p>Cable trenches, where allowed, located outside the buildings shall project at least 200mm above the finished formation level unless noted otherwise elsewhere in this specification so that no storm water shall enter the trench. The bottom of the trench shall be provided with a longitudinal slope of 1:500.The downstream end of trenches shall be connected through pipe drains to the nearby RCC manholes (to convey water from trenches) of storm water drainage system, but avoiding back flow of storm water. In general, the precast covers shall not be more than 300 mm in width and shall not weigh more than 65 kg. Lifting hooks shall be provided in the precast covers.</p> <p>All cable trenches, wherever required, shall be provided with suitable insert plates for fixing support angles of cable trays.</p> <p>In Main plant area wherever fire water pipe trenches are envisaged, these trenches shall be of RCC and provided with precast RCC cover flush with finished level of paving in that area.</p> <p>R. C. C. cable slits shall be filled with sand after erection of cables, up to top level and covered with 75mm thick PCC cover of minimum M15 grade.</p>				
8.01.02.8	All steel platforms above grade shall be provided with 100 x 6 thick kick plates at edge of platform.				
8.01.02.9	Duct banks consisting of PVC conduits conforming to IS 4985 for cables shall be provided with proper sealing arrangement consisting of fire retardant sealing compound.				
8.01.02.10	Independent network of lines for sewerage and drainage shall be provided. Plant effluent shall not be mixed with either storm water or sewage.				
8.01.02.11	The sub-grade for the roads and embankment filling shall be compacted to minimum 95% of the Standard Proctor density at Optimum moisture content (OMC.)				
8.01.02.12	Detailed scheme for dewatering shall be prepared, wherever required, before starting of deep excavation work. IS 9758 shall be followed as general guidance for dewatering.				
8.01.02.13	Structural steel column base plates and bolts, gussets, etc., shall not project above the floor level unless and noted otherwise. These shall be encased by concrete cover up to floor level with concrete grade M 25.				
8.01.02.14	Non-shrink flow able grout shall be used for under-pinning work below base plate of columns. Nominal thickness of grout shall be 50 mm. Non-shrink cum plasticizer admixture shall be				
<table><tr><td>KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES</td><td>TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC. NO.: THDC/RKSH/CC-9915-371</td><td>SUB-SECTION-D-01 CIVIL WORKS</td><td>PAGE 52 OF 142</td></tr></table>		KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES	TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC. NO.: THDC/RKSH/CC-9915-371	SUB-SECTION-D-01 CIVIL WORKS	PAGE 52 OF 142
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	<p>added in the grout. Crushing strength of the grout shall generally be one grade higher than that of the base concrete. Minimum grade of grout shall be M-30.</p> <p>Grouting of all pockets, blockouts, sleeves and the openings around the embedment, inserts, bolts etc. and under pinning below the base / sole plate shall be with non - shrink flow able grout. Grade of grout shall be one grade higher than concrete. However minimum grade of grout shall be M - 30.</p> <p>However, for equipment foundations, high strength (minimum characteristic compressive strength of 60 N/sq.mm at 28 days) ready mixed non-shrink, chloride free, cement based, free flowing, non-metallic grout as recommended by equipment manufacturer shall be used.</p> <p>8.01.02.15 Rail-track from transformer yard to unloading bay of Main Power House shall be provided with rigid type RCC foundation. Rail weighing 52 kg/m shall be used.</p> <p>8.01.02.16 All building shall be design to take care of Rain Water harvesting & ground water recharging.</p> <p>8.01.02.17 As required suitable steel frames shall be provided around openings in the roof and external walls for mounting exhaust fans.</p> <p>8.01.02.18 750mm wide x 100 mm thick plinth protection in PCC (M-15) shall be provided around all buildings, pits / sumps, clarifiers, tanks, etc.</p> <p>8.01.02.19 All masonry walls shall be provided with Damp Proof Course at plinth level.</p> <p>8.01.02.20 All monorail openings in the walls shall be provided with double plate flush steel door shutters with suitable access platform and ladder as required.</p> <p>8.01.02.21 Hand rail (of minimum 1m height), size and material to be adopted shall be as per general architectural specification.</p> <p>8.01.02.22 In all buildings, suitable arrangement for draining out water collected from equipment blow downs, leakages, floor washings, firefighting etc. shall be provided for each floor with suitable floor drains.</p> <p>8.01.02.23 Unless specified all sand filling shall be compacted to minimum 80% of the relative density and backfilled earth shall be compacted to minimum 90% of the Standard proctor density at OMC.</p> <p>8.01.02.24 All buildings shall be provided with peripheral drains by the side of plinth protection for catering to the rain water from roofs and storm water from adjacent area. Plinth protection drains shall be provided all around the building and to be connected with nearest storm water drain. Minimum size of plinth protection drain will be 300mmx300mm.</p> <p>8.01.02.25 Minimum 2.0m wide walkway with plain cement concrete (nominal mix M15 grade) paving 150 mm thick laid over 75 mm thick bed of dry aggregate shall be provided connecting all buildings and facilities. The top of walkway shall be minimum 200mm above FGL, unless specified otherwise.</p> <p>8.01.02.26 For all buildings, finished floor level (FFL) shall be minimum 500mm above finished ground level (FGL).</p> <p>8.01.02.27 40mm Diameter MS rods as earthing mat, placed at a distance of 1.0m away and at depths between 0.60m and 1.00m shall be supplied and laid all around the periphery of buildings,</p>		
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8.01.03	<p>structures, and outdoor equipment, as per approved drawings. Riser of 40mm Dia. MS rods and connecting to the above Earthing mat shall also be supplied and laid in position by the Contractor, as per the approved drawings. Raiser shall be laid up to a height of 300 mm above the local Ground level, at each of the columns of the buildings on the outside of the buildings, and minimum 2 (two) numbers for each structures and equipment. The contractor shall also supply and lay necessary number of 3.0 m deep 40 mm diameter MS rods Earthing electrodes and connect electrodes to the Earthing mat, as per the approved drawings and supplying and laying of 40 mm Dia. MS rods for connecting the Contractor's earthing mat with the Employer's earthing mat separately.</p>			
	<p>Acid/ Alkali Resistant Lining</p> <p>All structures receiving acid / alkali resistant lining shall be tested for water tightness and made leak proof before lining work.</p> <p>The acid / alkali resistant lining shall be provided broadly in the areas identified. The Bidder shall give a guarantee for satisfactory functioning of the lining for a period of 36 months from the date of completion of the work or date of handing over the site to the Engineer, whichever is later. The Bidder shall replace / rectify defects is any, observed in the lining to the satisfaction of the Engineer without any extra cost during this period.</p> <p>The material for Acid/ Alkali Resistant Lining shall conform to the following:</p> <div><div>i)</div><div>Bitumen primer shall conform to IS: 158.</div></div> <div><div>ii)</div><div>Bitumastic compound shall conform to IS: 9510. Where the height of bitumastic layer on vertical surface is more than 2.0 m, the bitumastic layer shall be reinforced with diamond pattern expanded metal steel sheets conforming to IS: 412.</div></div> <div><div>iii)</div><div>A.R. Bricks/ Tiles shall conform to class II of IS: 4860 & IS: 4457 respectively.</div></div> <div><div>iv)</div><div>Mortar: Potassium silicate & resin type mortars shall conform to IS: 4832 Part-I&II respectively.</div></div>			
	8.02.00	<p>CONCRETE</p>		
	8.02.01	<p>GENERAL</p> <div><div>a)</div><div>Concrete work shall be carried out as per IS 456. Mix design concrete shall be used for all areas other than lean concrete work and plain cement concrete where nominal/volume mix can be permitted. Design mix shall be carried out as per IS10262. Specific approval of the Engineer shall be obtained regarding degree of quality control to be adopted for design mix.</div></div> <div><div>b)</div><div>Minimum grade of reinforced cement concrete for all foundations shall be M25 unless noted otherwise. Minimum grade of concrete for other structures/areas (other than machine foundations) shall be M25 for all superstructure and substructure unless noted otherwise elsewhere in this specification.</div></div> <div><div>c)</div><div>The minimum grades of concrete for different machine foundations and some of other important structural members shall be as follows:</div></div>		
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8.02.02	<table><tr><th>Sl No</th><th>Description</th><th>Minimum grade of concrete</th></tr><tr><td>i)</td><td>TG top Deck / Substructure & Raft</td><td>M35</td></tr><tr><td>ii)</td><td>BFP foundations (in case of springs supported) / (in case of block foundation)</td><td>M35 / M30</td></tr><tr><td>iii)</td><td>Rail load Bearing Structures</td><td>M35</td></tr></table>	Sl No	Description	Minimum grade of concrete	i)	TG top Deck / Substructure & Raft	M35	ii)	BFP foundations (in case of springs supported) / (in case of block foundation)	M35 / M30	iii)	Rail load Bearing Structures	M35	
	Sl No	Description	Minimum grade of concrete											
	i)	TG top Deck / Substructure & Raft	M35											
	ii)	BFP foundations (in case of springs supported) / (in case of block foundation)	M35 / M30											
	iii)	Rail load Bearing Structures	M35											
	d)	Higher grade of concrete than specified above may be used at the discretion of the Bidder.												
	e)	Unless otherwise specified, 20mm and down aggregates shall be used for all structural concrete works. However, 40mm and down aggregates may also be used under special conditions for mass concreting in foundation.												
	f)	For thin concrete sections such as roof slab over profiled metal deck sheets, 12mm and down coarse aggregates shall be used for coarse aggregates.												
	g)	Minimum 75mm thick lean concrete M-7.5 shall be provided below all other underground structures, foundations, trenches, etc., to provide a base for construction.												
	Reinforcement Couplers													
Reinforcement couplers (mechanical splicing systems with upset parallel threaded couplers) may be used in reinforced concrete works, subject to following conditions:														
a.	Couplers shall meet the performance requirements of IS 16172:2014 for class H.													
i.	It shall have minimum tensile strength corresponding to Fe550D which is 600 N/mm2 and failure shall take place outside the length of splice as per clause no 9.2.1 of IS 16174.													
ii.	Percentage elongation at maximum force in the reinforcing bar outside the length of mechanical splice shall be minimum 3 % before the failure of test piece as per clause no. 9.2.2 of IS:16174.													
iii.	Slip test value shall not exceed 0.10 mm. as per clause no 9.3 of IS 16174.													
iv.	Cyclic tensile test corresponding to Fe550D reinforcement bar as per clause no 9.4 of IS 16174.													
v.	Low cycle fatigue test as per clause no 9.5.1 of IS 16174.													
vi.	High Cycle Fatigue test as per clause no 9.5.2 of IS 16174.													
b.	The manufacturer shall mark the coupler in such a way that all finished reinforcement couplers can be traced to the original cast from which they were made along with date of manufacture.													
c.	Sampling and other requirements of IS 16172:2014 shall be complied with.													
d.	Each lot shall be supplied with manufacturer's test certificate (MTC) indicating values of tests in line with IS 16172:2014.													
e.	The minimum clear cover requirements are to be ensured for reinforcement couplers also.													



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8.02.03	<p>f. The couplers shall be used only at the locations where joint is required as per standard lapping purpose and couplers shall not be used for joining of several cut pieces of reinforcement in a single bar. As a general guideline, the length of the bars in which coupler is to be provided should not be less than 4m.</p> <p>Vendors for the reinforcement couplers shall be subject to the approval of Engineer-In-Charge</p> <p>Special requirements for concreting of major equipment foundations shall be as given below.</p> <p>a) Temperature Control of Concrete</p> <p>For top decks of TG & BFPs, the temperature of fresh concrete shall not exceed 25 deg C when placed. For maintaining the temperature of 25 deg C in the top decks of machine foundations, crushed ice shall be used in mixing water.</p> <p>b) Admixture</p> <p>Plasticizer /super plasticizer admixture shall generally be added to the concrete for promoting workability. In addition, plasticizer/super plasticizer-cum-retarder shall be added to retard the setting time for mass concreting work as required. In case of pumping, suitable pumping additive shall also be added to avoid segregation and increase flowability. The slump shall generally be in the range given below:</p> <table><tr><td>Top decks of TG & BFP</td><td>-</td><td>150 mm to 180 mm</td></tr><tr><td>Block foundations</td><td>-</td><td>100 mm to 150 mm</td></tr><tr><td>TG Column</td><td>-</td><td>100 mm to 150 mm</td></tr></table> <p>c) Form work</p> <p>Plywood with film face form work shall be used for the top decks of all machine foundations and also for columns of TG foundation.</p> <p>d) Placing of Concrete</p> <p>Base Raft and top deck of machine foundations shall be cast in a single pour.</p> <p>e) Ultrasonic Testing</p> <p>Ultrasonic pulse velocity test shall be carried out for TG top deck including TG Columns & BFP top decks (in case of Block type, UPV testing is not required) to ascertain the homogeneity and integrity of concrete. In general, grid spacing of 1.0m to 1.5m may be adopted for carrying out the UPV testing. In addition, additional cubes (at the rate of one cube per 150 Cum of concrete subject to a minimum of six cubes) shall be taken to carry out Ultrasonic Pulse velocity (UPV) testing on the cubes, to serve as reference UPV values. Testing shall be done as per IS13311 (Part-1). In case of any defect, the Bidder shall rectify the defects suitably using cement/epoxy grout, etc.</p> <p>f) Scheme for Concreting</p> <p>Weigh Batching Plants, transit mixer, concrete pump shall be mobilized.</p>			Top decks of TG & BFP	-	150 mm to 180 mm	Block foundations	-	100 mm to 150 mm	TG Column	-	100 mm to 150 mm
Top decks of TG & BFP	-	150 mm to 180 mm										
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8.02.04	<p>Arrangements for standby Plant and Equipment shall also be made.</p> <p>Anchor Fasteners</p> <p>Anchor Fasteners for use in concrete shall conform to the following:</p> <ul style="list-style-type: none">a. The safe tensile load carrying capacity of the anchors shall be arrived by providing the minimum factor of safety of 2.5 on the characteristic load of the anchor. Minimum size of the anchors shall be M8.b. All anchors shall be from established and approved makes/ manufacturers.c. Anchors shall be fixed in position as recommended by the manufacturer and as approved by the engineer.d. Anchor fastener can be of mechanical type based on working principles such as keying, friction, combined friction- keying or chemical bonding type. <ul style="list-style-type: none">1) Mechanical type: The anchors shall be cold formed stud type torque controlled mechanical expansion fasteners having 3-way expansion sleeve of SS 316 grade with nut and washer and galvanized to minimum 5 microns. For coastal/ corrosive environments, the anchors shall be of Stainless Steel (min grade SS 304) or HCR (High Corrosion Resistance). The anchors shall conform to a minimum grade of 5.8 as per IS: 1367.2) Chemical type: The anchor shall be adhesive type consisting of slow curing chemical adhesive with a proportion of resin and hardener as per manufacturer's recommendation in a soft foil pack, threaded rod of carbon steel conforming to a minimum grade of 5.8 as per IS: 1367 and minimum galvanization of 5 microns with associated nut and washer. The chemical shall be dispensed through mechanical dispenser and shall be self-curing type. <ul style="list-style-type: none">e. Capacity of the anchors shall be established after considering the effect of concrete grade, embedded depth, concrete thickness, anchor spacing and edge distance from the concrete.f. The selection for particular type of the anchors shall be made after considering the concrete grade, available embedment depth, load to be transferred, space available for installing anchors.		
8.03.00	<p>FORMWORK</p> <p>Formwork for building RCC Slabs/ Beams & Columns shall be of 2 different types.</p> <p>Type 1 Formwork: (For RCC slab of Structural Steel Framed Buildings Only)</p> <p>Troughed colour coated metal deck sheets shall be used as permanent shuttering having minimum thickness of 0.80mm. These profiled metal deck sheets shall be fixed to the structural steel secondary beams/ Purlins using Headed shear anchor studs. The detailed material property requirement of metal deck sheet is specified elsewhere in this specification.</p> <p>The shear anchor studs for fixing metal deck sheet to floor structural beams shall conform to Type-B studs specified in AWS D1.1/D1.1M or equivalent as shear connector of 19mm diameter and 100mm length manufactured from cold drawn round steel bars conforming to</p>		
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8.04.00	<p>the requirement of ASTM A 29, of grade designation 1010 through 1020, of standard quality with either semi-killed or killed, welded by Drawn Arc Stud Welding through metal deck sheet.</p> <p>The shear anchor studs for fixing metal deck sheet to roof structural purlins shall conform to Type-B studs specified in AWS D1.1/D1.1M or equivalent as shear connector of 16mm diameter and 65mm length manufactured from cold drawn round steel bars conforming to the requirement of ASTM A 29, of grade designation 1010 through 1020, of standard quality with either semi-killed or killed, welded by Drawn Arc Stud Welding through metal deck sheet.</p> <p>Type 2 Formwork: (For RCC Buildings)</p> <p>Plywood with film face formwork shall be used for floor & roof slabs, Columns & Beams of all RCC buildings.</p> <p>CULVERTS /RACKS ACROSS RAIL TRACKS</p> <p>Design of bridges/ culverts or any other structure crossing the Railway tracks shall be as per Railways/ RDSO guidelines/specifications for Dedicated Freight Corridor (DFC) 32.5 T loads. The Bidder shall obtain necessary approvals from Railways before start of construction work. Construction of these structures is to be done as per Railways guidelines. Any statutory and codal charges payable to Railways/ RDSO for approval & execution of the above crossings shall be borne by the Bidder. Engagement of approved Railway Consultant for the above work by the bidder would be at his own cost.</p> <p>The levels/clearances of the above crossings are to be finalized by the bidder as per Railway standards and shall be subject to approval of owner/owner's consultant.</p> <p>However, for design of the above crossings above rail track, the following minimum clearance from Rail track shall be maintained:</p> <p>A. Horizontal clearance: A minimum clearance of 3.5m shall be maintained between centre line of the Railway track to face of the crossing structure.</p> <p>B. Vertical clearance: A min vertical clearance of 8.5m shall be maintained between Rail top level and bottom of structure.</p> <p>Bidder has to submit to the Owner two sets of railway approved drawings and two sets of (hard & soft copies) as built drawings.</p> <p>The construction of rail network inside the plant for transportation of coal, fly ash & POL is in the scope of Owner. The bidder should plan to complete the construction work of all roads/ drainage/ pipe line/ cable crossings etc which are crossing below the rail track well in advance to facilitate owner to undertake the construction work of siding.</p>	
	8.05.00	<p>FENCING AND GATE</p>
	8.05.01	<p>FENCING</p> <p>Fencing with gate shall be provided around transformer yard and other areas wherever necessary due to security, safety, and statutory requirements as per following specifications. However for isolation between existing station/township and the project, the total height of fence may be reduced to 2.4m with 450mm barbed wire on top, while other details being same as given below.</p>
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	<p>The fencing, with gate (unless specified otherwise) shall comprise of PVC coated G.I. welded wire mesh fencing of minimum 4 mm diameter (including PVC coating) of mesh size 75mmX75mm of height 2.4m above the toe wall with a 600mm high galvanised concertina at the top, such that total fence height of 3.0m above the toe wall is achieved. The diameter of the steel wire for chain link fence (excluding PVC coating) shall not be less than 2.5 mm.</p> <p>The PVC coated chain link will be stretched by the clips at 0.5m intervals to three strands of galvanised high tensile spring steel wire (HTSSW) of 2.5 mm diameter interwoven with chain link wire mesh and kept under tension which in turn are attached to the fence post with security nuts and bolts. On every fourth post a clamping strip will be threaded through the links of chain link and bolted to the fence post with the help of security nuts and bolts.</p> <p>Above the chain link a 600mm high tensile serrated galvanised wire (HTSW) concertina made with wire diameter of 2.5mm will be stretched to 6m and attached to two strands of galvanised HTSSW of 2.5 mm diameter by means of clips at 1m intervals. These two HTSSW strands will be attached to the fence posts with 12 mm security fasteners.</p> <p>All nuts, bolts, fasteners, clamping strips, clamps, clips, etc., shall be galvanised.</p> <p>All fence posts shall be of 75 x 75 x 6 MS angles spaced at 2.5m c/c distance. All corner posts will have two stay posts and every tenth post will have transverse stay post. Suitable R.C.C. foundations for the post and stays shall be provided based on the prevailing soil conditions. All posts of fencing shall be painted with chlorinated rubber paint over a suitable primer.</p> <p>Toe walls either of brick masonry with bricks of minimum 50 kg./sq.cm. Crushing strength or of hollow concrete block masonry shall be provided between the fence posts all along the run of the fence with suitable foundation. Toe wall shall be minimum 200mm above the formation level with 50mm thick P.C.C. coping (1:2:4) and shall extend minimum 300mm below the formation level. Toe wall shall be plastered with cement sand mortar (1:6) on both sides and shall be painted with two coats of textured cement point (Sandtax Matt or equivalent) of approved colour and shade. Toe wall shall be provided with weep holes at appropriate spacing.</p>
8.05.02	<p>Gate along Fencing</p> <p>All gates shall be of structural steel of minimum 3.75 metre width for single lane access road and 8.00 m width for double lane access roads. The height of gate shall be same as that of the fence unless noted otherwise. Each gate shall have provision for wicket gate of size 1.0 m x 2.1 m.</p> <p>The gate frame and post shall be fabricated from medium class MS pipe of nominal diameter not less than 75 mm. The panel plate shall be of minimum thickness 2.5 mm conforming to IS: 513.</p> <p>The gate shall be complete with fabricated hinges, MS aldrops with locking arrangement, tempered steel pivot, guide track of MS tee, bronze aluminium ball bearing arrangement, castor wheel, etc.</p>
8.06.00	<p>GRATING</p> <p>All gratings shall be electroforged types. Minimum thickness of the grating shall be 40 mm for indoor installation and 32 mm for outdoor installation. The opening size shall not be more than 30mmx100mm. The minimum thickness of the main bearing bar shall be 5 mm or as per design requirement whichever is higher. All gratings shall be hot dip galvanised as per</p>
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8.07.00	<p>IS:4579 at the rate of 610 g. per sq.m. after surface preparation by means of shot blasting or cleaned by acid pickling.</p> <p>FABRICATION & ERECTION OF STEEL STRUCTURES</p> <p>The fabrication shall be done as per fabrication drawing which would clearly indicate various details of joints to be welded, type of weld, length and size of weld.</p> <p>All steel structures shall be fabricated in factory, transported and erected at site. All factory fabricated structures shall have bolted field connections.</p> <p>Note: Steel structures shall mean Plant and Non-Plant building structures, pipe and cable support structures.</p> <p>Site welding can be permitted in special cases where final inputs are not available before release of fabrication drawings.</p> <p>Before dispatching the fabricated structural members to site, it shall be ensured that all parts in the assembly fit accurately together by carrying out pre-assembly of fabricated structural members having bolted field joints, in the factory.</p> <p>All steelwork before and after manufacturing shall be smooth, straight and free of deformations, cracks, twists and burrs. All steelwork shall be cut and fabricated to a tolerance of ± 1.5 mm in its length and location of matching bolt holes for field connections.</p>		
8.07.01	<p>Welding</p> <p>a) Welding of Structural steel shall be done by an electric arc process and shall conform generally to relevant acceptable standards viz. IS:816, IS:9595, IS:814, IS:2014, IS:4354 and Indian Standard Hand Book for metal arc welding, and other standards, codes of practice internationally accepted. For welding of any particular type of joint, Bidder shall give appropriate tests as described in any of the Indian Standards - IS: 817, IS: 7307 and international standards as relevant.</p> <p>b) Submerged arc-welding shall be used for welding longitudinal fillet welds (connecting flange with web) and longitudinal / transverse butt joints for fabrication of columns, framing beams and crane girders and all other built-up members, unless manual arc welding is specifically approved by the Engineer. Necessary jigs and fixtures and rotation of structures shall be so arranged that vertically down-hand position of welding becomes possible. 'Open-Arc-Welding' process employing coated electrodes shall be employed for fabrication of other welded connections and field welding.</p> <p>c) Wherever welding is done for assembling the components of structures, the job shall so positioned that down hand welding is possible.</p> <p>d) Any structural joint shall be welded only by those welders who are qualified for all welding procedures and positions in such type of joint that is welded.</p> <p>e) All records for entire welding operations such as welders identification marks, the joints welded by the each welder, the welding procedures adopted, welding machine employed, pre and post heating done and any non-destructive test done and stress relieving /heat treatment performed on such joints shall be accessible to the Engineer for scrutiny.</p>		
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8.07.01.1	<p>f) In a fabrication of plated columns/beams and built up members all shop splices in each component part shall be done before such component part is welded to other parts of the member. Wherever weld reinforcement interferes with proper fitting between components to be assembled by welding, these welds shall be ground flush prior to assembly.</p> <p>g) The members to be joined by fillet welding shall be brought and held as close together as possible and in no event shall be separated locally by more than 3mm. If the local separation is 1.5mm or greater, the fillet weld size shall be increased by the amount of separation.</p> <p>Edge preparation for welding as per weld joint detail shall be prepared either by machines or by automatic gas cutting. All edges cut by flame shall be ground before they are welded.</p> <p>Electrodes</p> <p>a) The electrodes used for welding shall be of suitable type and size depending upon specification of the parent materials, the method of welding, the position of welding and quality of welds desired e.g. normal penetration welds or deep penetration welds. However, only low Hydrogen electrodes shall be used for plate thickness above 20 mm.</p> <p>b) All low hydrogen electrodes shall be baked and stored before use as per manufacturer recommendation. The electrodes shall be rebaked at 2500°C - 3000°C for one hour and later on cooled in the same oven to 1000C. It shall be transferred to an holding oven maintained at 600°C - 700°C. The electrodes shall be drawn from this oven for use.</p> <p>c) Where coated electrodes are used they shall meet the requirements of IS: 814 and relevant ASME-Sec. Covering shall be heavy to withstand normal conditions of handling and storage.</p> <p>d) Only those electrodes which give radiographic quality welds shall be used for welds which are subjected to radiographic testing</p> <p>e) Where bare electrodes are used, these shall correspond to specification of the parent material. The type of flux-wire combination for submerged arc welding shall conform to the requirements of F-60 Class of AWSA-5-17-69 and IS: 3613. The electrodes shall be stored properly and the flux shall be baked before use in an oven in accordance with the manufacturer's requirements as stipulated.</p> <p>f) 308L and 309L electrodes / fillers shall be used for welding of stainless steel to stainless steel and stainless steel to mild steel respectively.</p> <p>g) Specific approval of the Engineer shall be taken by Bidder for the various electrodes proposed to be used on the work before any welding is started.</p>			
	8.07.01.2	<p>Preheating inter-pass Temperature and Post Weld Heat Treatment.</p> <p>a) Mild steel plates conforming to IS: 2062 and thicker than 20mm, may require preheating of the parent plate prior to welding as mentioned in Table-I.</p> <p>However, higher preheat and inter-pass temperatures required due to joint restraint etc. and will be followed as per approved welding procedure. In welding materials of</p>		
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8.07.01.3	<p>unequal thickness, the thicker part shall be taken for this purpose.</p> <p>c) Base metal shall be preheated, notwithstanding provisions of IS: 9595, to the temperature given in Table-1 prior to welding or tack welding. Preheating shall bring the surface of the base metal to the specified preheat temperature and this temperature shall be maintained as minimum temperature while welding is in progress.</p> <div><div>TABLE – 1</div><div>MINIMUM PREHEAT and INTER PASS TEMPERATURE FOR WELDING</div><table><tr><th>Thickness of thicker part at point of Welding</th><th>Welding using Low hydrogen electrodes or Submerged arc welding</th></tr><tr><td>Upto and including 20mm</td><td>None</td></tr><tr><td>Over 20mm and upto and including 40m</td><td>20 °C</td></tr><tr><td>Over 40mm and upto and including 63mm</td><td>66 °C</td></tr><tr><td>Over 63mm</td><td>110 °C</td></tr></table></div> <p>c) Preheating may be applied by external flame which is non-carbonising like LPG, by electric resistance or electric induction process such that uniform heating of the surface extending up to a distance of four times the thickness of the plate on either side of the welding joint is obtained.</p> <p>d) Thermo-chalk, thermo-couple or other approved methods, shall be used for measuring the plate temperature.</p> <p>e) All butt welds with plates thicker than 50mm and all site butts weld of main framing beam shall require post weld heat treatment as per procedure given in AWS D-1.1. Post heating shall be done up to 600°C and rate of application shall be 200°C per hour. The post heat temperature shall be maintained for 60 minutes per 2.5cm. thickness. For maintaining slow and uniform cooling, asbestos pads shall be used for covering the heated areas.</p>			Thickness of thicker part at point of Welding	Welding using Low hydrogen electrodes or Submerged arc welding	Upto and including 20mm	None	Over 20mm and upto and including 40m	20 °C	Over 40mm and upto and including 63mm	66 °C	Over 63mm	110 °C
	Thickness of thicker part at point of Welding	Welding using Low hydrogen electrodes or Submerged arc welding											
	Upto and including 20mm	None											
	Over 20mm and upto and including 40m	20 °C											
	Over 40mm and upto and including 63mm	66 °C											
	Over 63mm	110 °C											
	<div><div>Sequence of Welding</div><p>a) The sequence of welding shall be carefully chosen to ensure that the components assembled by welding are free from distortion and large residual stresses are not developed. The distortion should be effectively controlled either by a counter effect or by a counter distortion. The direction of welding should be away from the point of restraint and towards the point of maximum freedom.</p><p>b) Each case shall be carefully studied before finally following a particular sequence of welding.</p><p>c) Butt weld in flange plates and/or web plates shall be completed before the flanges and webs are welded together.</p></div>												



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	<div><div><div>d)</div><div>The beam and column stiffeners shall preferably be welded to the webs before the web and flanges are assembled unless the web and flanges to the beam or column are assembled by automatic welding process.</div></div><div><div>e)</div><div>All welds shall be finished full and made with correct number of runs, the weld being kept free from slag and other inclusions, all adhering slag being removed.</div></div><div><div>f)</div><div>Current shall be appropriate for the type of electrode used. To ensure complete fusion, the weaving procedure should go proper and rate of arc advancement should not be so rapid as to leave the edges unmelted.</div></div><div><div>g)</div><div>Pudding shall be sufficient to enable the gases to escape from the molten metal before it solidifies.</div></div><div><div>h)</div><div>Non-uniform heating and cooling should be avoided to ensure that excessive stresses are not locked up resulting ultimately in cracks.</div></div><div><div>i)</div><div>The ends of butt welds shall have full throat thickness. This shall be obtained on all main butt welds by the use of run off and run on pieces adequately secured on either side of main plates. The width of these pieces shall not be less than the thickness of the thicker part joined. Additional metal remaining after the removal of extension pieces shall be removed by grinding or by other approval means and the ends and surface of the welds shall be smoothly finished. Where the abutting parts are thinner than 20mm the extension pieces may be omitted but the end be welded to provide the ends with the required reinforcement.</div></div><div><div>j)</div><div>The fusion faces shall be carefully aligned. Angle shrinkage shall be controlled by presetting. Correct gap and alignment shall be maintained during the welding operation.</div></div><div><div>k)</div><div>All main butt welds shall have complete penetration and back surface of the weld being gouged out clean before first run of the weld is given from the back. However, partial penetration butt weld shall be permitted, when specifically shown in the design drawings.</div></div><div><div>l)</div><div>Intermittent welds shall be permitted only when shown in the design drawings.</div></div><div><div>m)</div><div>The welding shrinkage shall be minimised by adopting the correct welding procedure and method. In long and slender member extra length should be provided at the time of fabrication for shrinkage.</div></div></div>			
8.07.01.4	<div><div>Testing of Welders</div><div>All the welders to be employed for the job shall have to qualify the appropriate tests laid down in IS: 817 and IS: 1181 and ASME IX/AWS D1.1. All the necessary arrangements required for the testing of welders are to be provided by the Bidder.</div></div>			
8.07.01.5	<div><div>Inspection of Welds</div><div><div>a)</div><div><div>Visual Inspection</div><div>100 percent of the welds shall be inspected visually for external defects. Dimensions of welds shall be checked. The lengths and size of weld shall be as per fabrication drawings. It may be slightly oversized but should not be undersized. The</div></div></div></div>			
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8.07.01.6	<p>profile of weld is affected by the position of the joint but it should be uniform. The welds should have regular height and width of beads. The height and spacing of ripples shall be uniform. The joints in the welds run shall as far as possible be smooth and should not show any humps or craters in the weld surface. Welds shall be free from unfilled craters on the surface, under-cuts, stages on the surface and visible cracks.</p> <p>Such inspection shall be done after cleaning the weld surface with steel wire brushes and chisel to remove the spatter metal, scales, slag, etc., If external defects mentioned above are noticed, there is every possibility of internal defects and further radiographic/ultrasonic examination shall be undertaken.</p> <p>b) Production Test Plate</p> <p>Test plates shall be incorporated on either side of at least one main butt welds of each flange plate and web plate of every main frame columns and crane girder. The weld shall be continuous over the test plate. The test plate extensions of the main plates and shall be fixed so that metal lies in the same direction as that of the main plate. Test plates shall be prepared and tested in accordance with the accepted Standards, in the presence of the Engineer or his authorised representative. Should any of these tests fail, further radiographic examination of the welds shall be done. These tests for test plates and radiographic examination are additional to those contemplated under inspection and testing.</p> <p>c) Non-destructive and special testing</p> <p>Radiographic / ultrasonic or other non-destructive examination shall be carried out. All tests of welds shall be carried out by the Bidder at his own cost. The cordoning of radiation zone, while Radiography testing is going on, shall be done.</p> <p>In case of failure of any of the tests, re-testing of the joints shall also be carried out after rectification is done.</p> <p>d) Rectification of defective welding work</p> <p>Wherever defects like improper penetration, extensive presence of blow holes, undercuts, cracking, slag inclusion, etc., are noticed by visual inspection/other tests, the welds, in such location shall be removed by gouging process. The joints shall be prepared again by cleaning the burrs and residual matters with wire brushes and grinding, if necessary, and rewelded. The gouging shall as far as possible be done using gouging electrodes.</p>		
	<p>Inspection and Testing</p> <p>a) Fillet Welds</p> <p>i) All fillet welds shall be checked for size and visual defects.</p> <p>ii) Macroetch examination on production test coupons for main fillet weld with minimum one joint per built up beam, column and crane girder, etc.</p> <p>iii) 25% weld length of tension members of crane girder shall be subjected to dye-penetration test.</p>		
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	<div><div><div>iv) On all other welds, dye-penetration test on 5% of weld length with minimum 300mm at each location shall be carried out.</div><div>b)<div><div>Butt Welds</div><div><div>i)100% visual examination.</div><div>ii)Dye penetration test on all butt welds after back gouging shall be carried out.</div><div>iii)Mechanical testing of production test coupons - minimum one joint/built up beam, column and crane girder. The engineer may reduce the frequency of the test, after getting consistently satisfactory results of initial 10 tests.</div><div>iv)100% radiography test on butt welds of tension flange (bottom flange) of crane girder and bunker supporting girders. All other butt welds shall be subjected to radiography test on 10% of weld length of each welder.</div></div></div><div>c)<div><div>Dimensional Tolerance and Acceptance Criteria of Welds</div><div><div>i)Every first and further every 10th set of identical structure shall be checked for control assembly at shop before erection.</div><div>ii)All structures, components/members shall be checked for dimensional tolerance during fabrication and erection as per IS:7215 and IS:12843 respectively.</div><div>iii)Dry film thickness after painting shall be checked by using elchometer.</div><div>iv)Acceptance criteria of NDTs on welds shall be as per AWS D-1.1 (Dynamically loaded structures - Tension welds).</div></div></div></div></div></div></div>		
8.07.01.7	<div><div><div>Correction of Defective Welds</div><div>Correction of defective welds shall be carried out without damaging the parent metal. When a crack in the weld is removed magnetic particles inspection or any other equally positive means shall be used to ensure that the whole of the crack and material up to 25mm beyond each end of the crack has been removed.</div></div></div>		
8.07.02	<div><div><div>Painting</div><div><div>a)Surface treatment and painting before and after delivery to site shall be in accordance with Clause no. 6.4.0 above. All steel structures shall be designed by following basic design criteria in ISO 12944 Part 3. However, where it is not feasible to follow the design criteria given in ISO 12944 Part 3 where the steel surface are inaccessible for application of protective coating, corrosion allowance in thickness(over the design thickness) of structural steel members shall be kept.</div><div>b)For parts to be bolted, the surfaces in contact shall be provided with ethyl Zinc silicate primer as specified in clause 6.4.3 (a) and shall be free of oil, dirt, loose rust, burrs and other defects, which would prevent proper seating of the parts. For design of friction type bolted joints slip factor for surfaces with ethyl zinc silicate primer as given in IS 4000 shall be considered.</div></div></div></div>		
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	<p>based on the design requirement and in no case it shall be less than 15% of vertical stiffness.</p> <p>The stiffness should be such that the vertical natural frequency of any spring unit at its rated load carrying capacity is between 2 Hz to 4 Hz. The damper units or spring-cum-damper units should be of viscous type offering velocity proportional damping. The damper units should be suitable for temperatures ranging from 0 to 50°C. The damping resistance of individual damper units should be such that the designed damping can be provided using reasonable number of Units.</p> <p>The Steel helical spring units and viscous damper units and their housings shall be designed for a minimum operating life of 30 years. Steel helical spring units shall conform to infinite life fatigue load calculations as per DIN EN 13906-1.</p>
8.08.04	<p>Manufacturing & Testing</p> <p>Complete manufacturing and testing of the Steel helical springs and viscous dampers shall be done at the manufacturing shop of the approved sub vendor / supplier. For this purpose the contractor / sub vendor shall submit the detailed quality plan for approval of engineer and take up the manufacturing / testing after approval of such quality plan. The quality plan shall include</p> <ul style="list-style-type: none">(a) Manufacturing schedule and quality check exercised during manufacturing.(b) Detail of test to be carried out at the manufacturing shop with their schedule.(c) Special requirements, if any, regarding concreting of top deck.(d) Complete step-by-step procedure covering the installation and commissioning of the spring system.(e) Manuals for erection, commissioning, testing and maintenance of the Steel helical springs and viscous dampers.(f) A checklist for confirming the readiness of the civil fronts for erection of Steel helical springs and viscous dampers.(g) Checklist for equipment required at each stage of erection.(h) Bill of materials and data sheet of various elements such as spring units, viscous dampers, with their rating, stiffness etc. included in the supply.(i) Bill of material and data sheet for frames for pre stressing, hydraulic jack including electric pump, high pressure tubes, hand operated pump etc., with their rating and umbers.(j) Any other details which may be necessary to facilitate design and construction of the foundations / structures.
8.08.05	<p>The springs shall conform to codes din en 13906-1 and din 2096. The quality assurance and inspection procedure shall be finalized on the basis of the above codes and the quality plans be drawn accordingly.</p>
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8.08.06	<p>Transportation</p> <p>Steel helical springs and viscous dampers shall be suitably protected, coated, covered, boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection.</p>
8.08.07	<p>Erection and Commissioning</p> <p>Complete erection and commissioning of the Steel helical springs and viscous dampers including pre-stressing of elements, placing of elements in position, checking clearances on the shuttering of the RCC top deck, releasing of pre-stress in spring elements, making final adjustments and alignments etc. shall be carried out by a specialist supervisor of vendor.</p> <p>The contractor shall guarantee the performance of the Steel helical springs and viscous dampers for 24 months from the date of commissioning of each machine which shall be termed as Guarantee Period”.</p>
8.08.08	<p>Supervision</p> <p>The supervision of installation of Steel helical springs and viscous dampers including pre-stressing, placing, releasing and alignment of spring units shall be done by a specialist supervisor of sub vendor / supplier, trained for this purpose.</p>
8.08.09	<p>Realignment of Spring System</p> <p>If any realignment of the Steel helical springs and viscous dampers is required to be done for aligning the shaft or for any other reasons during the first one year of operation from the date of commissioning of the machine, the same shall be done by the contractor.</p>
8.08.10	<p>Acceptance Criteria</p> <p>Stiffness values shall be checked. The permissible deviations shall be as per DIN 2096.</p> <p>Following acceptance criteria shall be followed:</p> <p>General workmanship is being good as recommended by the manufacturer and approved by the Engineer.</p> <p>Tolerances are within the specified limit.</p> <p>Manufacturer's test certificate (MTC) shall be in compliance with the applicable codes / standards.</p> <p>Bought out material is from the approved manufacturer / vendor.</p> <p>Bought out material is matching with the approved sample.</p>
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9.00.00	Architectural Concepts and Design			
9.01.00	For Architectural Concepts and Design refer to 5.00.01 in this specification.			
9.02.00	General Architectural Specifications			
9.02.01	<p>General</p> <p>a) Minimum 1000 mm high (from floor/ roof level) hand railing shall be provided around all floor/roof openings, projections/balconies, walkways, platforms, steel stairs, etc., wherever the height of the building is more than 12m, railing ht to be 1.2m. All handrails and ladder pipes (except at operating floors) shall be 32 mm nominal bore MS pipes (medium class) conforming to IS: 1161 and shall be galvanised as per IS: 4736 and finished with suitable paint. All rungs and ladders shall also be galvanised. Minimum weight of galvanising shall be 610 g/sqm. The spacing of vertical posts shall be maximum 1500mm. Two number of horizontal rails shall be provided including the top member. In addition, toe guard/ kick plate of min size 100x6th shall be provided above the floor level.</p> <p>In Service Building RCC stairs and passages/ corridors hand railing with posts shall be made of stainless steel and be 1200mm high.</p> <p>For RCC stairs, passages &, around all floor openings at operating floors, 1000 mm /1200mm high hand railing with 32 NB (polished) stainless steel pipe shall be provided. The spacing of vertical posts shall be 1500mm. Two number of horizontal rails shall be provided including the top member. Toe guard and kick plate shall be provided above the floor level.</p> <p>b) All stairs shall have a maximum riser height of 180mm and a minimum tread width of 275 mm. Minimum clear width of stair shall be 1200 mm unless specified otherwise. For Service Building, stairs width shall be minimum 1500 mm, with Riser 150mm and Tread 300 mm.</p> <p>c) All buildings having metal cladding shall be provided with 1M high brick wall at ground floor level. All buildings having metal cladding shall be provided with a 150 mm high RCC toe kerb (on upper floor) at the edge of the floor along the metal cladding. 1000 mm high hand railing shall be provided on this RCC kerb, wherever required from the safety point of view.</p> <p>d) In all buildings, structures, suitable arrangement for draining out water collected from equipment blowdowns, leakages, floor washings, fire fighting, etc., shall be provided for each floor. All the drains shall be suitably covered with grating or precast RCC panels.</p> <p>e) RCC staircase shall be provided for main entrance of Turbine building; control tower area and all other RCC construction buildings.</p> <p>f) Parapet, Chajjas 450mm over window and 600mm door heads, 900mm over rolling shutters, architectural fascia, projections, etc., shall be provided with drip course in cement sand mortar 1:3.</p> <p>g) All fire exits shall be painted with fire resistant paint P.O red/signal red colour shade which shall not be used anywhere except to indicate emergency or safety measure. Fire safety norms shall be followed as per National Building Codes and fire safety</p>			
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	<p>requirements for providing fire exits, escape stairs and fire fighting equipment. In detailing of all buildings, fire safety requirements conforming to IS: 1641 and IS:1642 shall be followed.</p> <p>h) Ramps & Lifts for physically challenged persons shall be provided for barrier free access to the Service buildings.</p>		
9.03.00	Water Supply and Sanitation		
9.03.01	<p>Roof water tanks of adequate capacities depending on the number of users and 8 hours requirement shall be provided for each building and pump house. Polyethylene water storage tanks conforming to IS:12701 shall be used. The tanks shall be complete with all fittings including lid, float valve, stop cock, vent pipe, etc. For service water Tank shall be of RCC construction.</p> <p>Galvanised MS pipe of medium class conforming to IS:1239 shall be used for internal piping works for service water and potable water supply. The pipes shall be concealed, and painted with anti-corrosive bituminous paint (as per IS: 158) wherever required.</p> <p>UPVC (conforming to IS:13592) shall be used for sanitary works above ground level. All Buildings shall be designed with Toilets as per NBC norms.</p> <p>Minimum one number main toilet block for Gents & ladies separately, with required facilities shall be provided on each floor of Service building. Toilets for physically handicapped shall be provided as mentioned. Attached toilets shall be provided for all senior executive rooms and conference rooms. All other buildings shall have minimum one toilet block each. The facilities provided in the toilet block shall depend on the number of users. However, minimum facilities to be provided shall be as stipulated in subsequent clause. IS:1172 shall be followed for working out the basic requirements for water supply, drainage and sanitation.</p> <p>In addition, IS:2064 and IS:2065 shall also be followed.</p>		
9.03.02	<p>Each Toilet block shall have the following minimum facilities. Unless specified all the fittings shall be of Chromium plated brass (fancy type). For GRIHA rated Buildings all fittings shall conform to GRIHA requirements, for water efficiency.</p> <p>a) One number wall mounted coloured glazed vitreous China European water closet and flushing valve system, water faucet, toilet paper holder as per IS:2556</p> <p>b) One number colour glazed ceramic oval shaped wash basin 450x 550 mm (approx.) mounted over 18mm thick granite beveled edge counter fitted with photo-voltaic control system for water controls, bottle trap as per IS:2556. For common toilets, number of washbasins shall be as per requirement. However for Pump Houses the same shall be provided without photo voltaic control system for water control.</p> <p>c) For Male Toilets Urinal as per requirements, with all fittings with photovoltaic control flushing system as per IS: 2556.</p> <p>d) One number looking mirror 600 x 900 x 6 mm, edge mounted with teak beading and minimum 12 mm thick plywood backing, one number stainless towel rail 600 x 20 mm, one number liquid soap dispenser</p>		
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CLAUSE NO.	<div><div></div><div>TECHNICAL REQUIREMENTS</div><div></div></div>		
	<div><div><div>e) One toilet with required facilities shall be provided for physically challenged persons as per National Building Code requirements</div><div>f) In addition to the facilities stipulated elsewhere Bathroom with rotating type chromium plated shower including all fitting and fixtures shall also be provided in toilet at ground and operating floor of main plant:</div><div>g) Janitor Space & space for drinking water cooler.</div><div>h) Electric operated hand dryer with photo voltaic control.</div><div>i) One (1) no. of pantry shall be provided in all buildings that have control Room and at each floor of Service Building.</div><div>j) The pantry shall consist of one number stainless steel pantry sink, as per IS : 13983, of size 610 x 510 mm, bowl depth 200 mm with drain board of at least 450 mm length with trap, hot and cold water mixer, one number geyser of 25 liters capacity, with inlet and outlet connections, one number HDPE loft type / over head water storage tank, as per IS : 12701 and of 500 liters capacity, complete with float valve, overflow drainage pipe arrangement, GI concealed water supply pipe of minimum 12 mm diameter of medium class, cast iron sanitary pipe (with lead joints) of minimum 75 mm diameter, floor trap with Stainless</div><div>Steel grating, inlet and outlet connections for supply and drainage, with all bends, tees, junctions, sockets, etc., as are necessary for the commissioning and efficient functioning of the pantry (all sanitary fittings shall be heavy duty chrome plated brass, unless noted otherwise)</div><div>k) Laboratory sink shall be of white vitreous china of size 600x400x200 mm conforming to IS: 2556 (Part-5).</div><div>l) In addition, adequate number of portable toilet units with adequate plumbing and sanitary arrangement, shall be provided during construction stage for workers.</div><div>j) Adequate number of toilet units with adequate plumbing and sanitary arrangement, shall be provided for workers (O&M workers).</div></div></div>		
9.04.00	<div><div>Flooring</div><div>Floor finishes of approved shade and colour (non - premium colours), over under bed of cement mortar / concrete, at all levels and for all kind of works, elevations, on horizontal and vertical surfaces for all types of work (like flooring, skirting, dado, wall lining & facing, tread and risers etc.), including topping, spreading white cement slurry at an average rate of 2.5 kg/Sq. M., (unless noted otherwise), jointing and joint filling with white cement (unless noted otherwise) slurry mixed with colour pigment, to match the shade of the finishing material, laying to plumb and water level in desired pattern, line and flush butt square jointing, curing, rubbing, grinding, polishing, edge moulding, finishing and cleaning, testing, providing opening of required size and shape, casting in panels wherever specified.</div></div>		
9.04.01	<div><div>The nominal total thickness of floor finish shall be 50/70 mm i.e. underbed and topping. The floor shall be laid on an already laid and matured concrete base. The underbed for floors and similar horizontal surfaces shall consist of cement concrete M20 grade. Stone chips shall be 12.5 mm down well graded & proper filling shall be done with brick bats/cinders. Flooring like Tiles/ Stones shall be laid with 1:4 cement sand mortar and Tile/ Stone Cladding on wall shall be laid with 1:3 cement sand mortar.</div></div>		
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CLAUSE NO.	 TECHNICAL REQUIREMENTS 				
9.04.02	All toilets shall have sunken slab to accommodate sanitary pipes and the finish level of floor shall match with general floor finish level. Sunken slabs shall be made watertight by suitable water proofing treatment.				
9.04.03	Metallic hardener topping -with ordinary grey cement shall be- 12 mm thick (insitu) or finishing the concrete / mortar surfaces topping shall be furnished with neat cement slurry (with ordinary grey cement)				
9.04.04	Heavy duty cement concrete tiles 300 mm x 300 mm shall be in using white cement with pigment, with hard and abrasion resistant carborundum / quartz chips for wearing course as per IS:1237. Laying of tiles shall be as per IS: 1443.				
9.04.05	Digitally glazed ceramic tiles shall be as per IS: 15622. Designer digitally glazed ceramic floor and wall tiles a) 300x300mm in white colour of Kajaria/ Nitco/ Somany/ Orient/ Johnson or equivalent b) 300x450mm in DIGITAL series of Kajaria/ Nitco/ Somany/ Orient/ Johnson or equivalent c) 300x600mm in DIGITAL series of Kajaria/ Nitco/ Somany/ Orient/ Johnson or equivalent				
9.04.06	12mm/20mm / 38mm / 75 mm/ 115mm thick acid resistant tile on horizontal and vertical surfaces, at all levels for all type of works shall include one coat of bitumen primer followed by 12 mm thick bituminastic layer, 20mm / 38mm/ 75 mm / 115mm thick A.R. tiles, 6 mm thick under-bed by potassium silicate mortar conforming to IS:4832 (Part-I), pointing of joints of tiles with acid/alkali resistant epoxy/furane mortar conforming to IS:4832 (Part-I), up to a depth of 20 mm and bituminastic end sealing. Requirements for acid/ alkali resistant flooring and lining for different areas shall be as given Table-A enclosed at the end of this specification. Battery Room in all buildings shall be provided with acid/ alkali resistant tiles on flooring & dado 1200mm high.				
9.04.07	(i) Mirror polished Digitally glazed vitrified & Matt Finish Digitally glazed Vitrified ceramic tiles (minimum 9.0mm thick) with 3mm groove joints as per approved pattern pointed neatly with 3x4mm stainless epoxy grout mix of 0.70kg of organic coated filter of desired shade (0.10kg of hardener and 0.20kg of resin per kg) with sizes of the tiles shall be as under: a) Size of tile 600x600/605x605 of Premium Series Kajaria/ Royale Series Somany/ OMA00025 Series Johnson or equivalent b) Size of tile 800x800 of Polished and Lapatto Series Kajaria/Diamond Series Somany/ Polished and Lapatto Series Johnson or equivalent ii) Anti-Skid Full Body Vitrified Tiles Antiskid, full body Vitrified Tiles of size 600X600X20 mm thick as specified below of approved make, shade, colour and pattern, over under bed of cement mortar / PCC shall be provided in TG Hall flooring at operating level. Full body Vitrified Tiles shall be laid on properly laid leveled floor, with joints 3 to5 mm wide & 8 to10 mm deep & shall be filled with approved Epoxy Grout mix of 0.70 kg of organic coated filler of desired shade (0.10 kg of hardner and 0.20 kg of resin per kg). Full body Vitrified Tiles shall have water absorption less than 0.5%, Modulus of Rupture more than 38N/mm2, Breaking strength more than 7500 N, Moh's scale more than 6, Abrasion resistance less than 144 mm3 and coefficient of friction more than 0.4. Vitrified Tiles shall generally conform to IS: 15622				
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CLAUSE NO.	 TECHNICAL REQUIREMENTS 				
9.04.08	For pathway, chequered and designed concrete tiles minimum 22 mm thick, 200x200 mm size conforming to IS: 13801 of approved shade and colour shall be used. 1000 wide pathways shall be provided for maintenance on rooftops of all buildings.				
9.04.09	Epoxy Flooring Epoxy Flooring shall be provided with surface preparation of concrete substrate with Captive Shot Blasting Machine OR Light Grinding to form the required anchor profile on the floor substrate followed by application of epoxy resin based moisture barrier underlay of 2 mm thickness including filling of saw cut joints with epoxy cementitious resin based moisture barrier underlay as per manufacturer specification. Application of self smoothing epoxy floor topping of epoxy based resin of 2 mm thickness over epoxy resin based moisture barrier underlay including application of solvent free epoxy resin based two component primer. It shall include application of PU Sealant at Expansion and Isolation Joint respectively including surface preparation of the joint, fixing of backup strip and application of sealant.				
9.04.10	Wherever required, carpet flooring shall be provided over cement concrete floor as in conference room of main control room complex. The carpet shall be of tile/roll form, machine/handmade tupled un-cut loop pile and lay with under lay of 10mm thick and shall be laid as per manufacturer's recommendations, in matching grains. It shall be treated with anti fungus and anti-termite before laying.				
9.04.11	Mirror polished (6 layers of polish) Granite stone (slab) - 18 mm thick (minimum) / Flame finish/ (making top surface rough by burning)/ honed finish granite stone (slab) - 18 mm thick (minimum) shall be provided.				
9.04.12	Decorative/designer prepolished, plain and pigmented, high wearing resistance concrete tiles of 20mm thickness (minimum) in various non-standard interlocking patterns.				
9.04.13	Skirting in general shall be 150 mm high. Dado in toilets & pantries, shall be upto false ceiling level from finished floor level. Skirting and Dado shall match with the floor finish.				
9.04.14	Interlocking concrete blocks shall be of various sizes and thickness having M 35 grade of concrete and pigmented to specified colours, in different pattern (in different textures chequered or other patterns in indentation for guiding band/s for visually impaired persons) including the preparation of sub base with 20mm thick sand and filling of joints with sand.				
9.04.15	Matt finish (with grooves) Porcelain tiles (for guiding band/s for visually impaired persons in service building) shall be with 3mm groove joints as per approved pattern pointed neatly with 3x4mm stainless epoxy grout SP- 100 of Laticrete or approved equivalent in approved colour to match colour of tile. 24 mm x 24 mm x 3.8 mm thick (minimum) glass mosaic tiles in decorative murals and pattern. Laminated wooden flooring (11mm thick) shall be provided in VIP area, conference rooms.				
9.04.16	Rubber Flooring Rubber flooring shall conform to IS 809. The minimum thickness shall be 4 mm with sheet size of 602mm x 602mm. Rubber flooring shall consist of 100% virgin elastomer reinforcing agents, resins, curing agents, anti-oxidants and pigments. It shall have excellent abrasion				
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CLAUSE NO.	<div></div> <div>TECHNICAL REQUIREMENTS</div> <div></div>
9.05.00	<p>resistance and shall have class-I fire rating. It shall be acid & alkali resistant and shall be of anti static grade. In general, BS code shall apply for their technical characteristics.</p> <p>Epoxy Resin Floor Finish</p> <p>Self-smoothing, seamless epoxy resin floor finish shall be provided on horizontal and vertical surfaces including preparation of surface, application of epoxy based primer coat, of approved colour, quality and make to give minimum thickness of 300 micron (in two coats)</p>
9.06.00	<p>Roof</p>
9.06.01	<p>Except for the roofs subjected to heavy loads, roof of all buildings having structural steel frame work shall consist of permanently colour coated (on exposed face) troughed metal sheet decking of approved profile as specified in clause 9.08.00. Silicon modified polyester paint having DFT of minimum 20 microns shall be used for permanent coating. The sheeting shall be fixed by means of concealed fixing system or any other compatible method approved by the Engineer. RCC slab of minimum 40 mm clear thickness in excess of trough depth shall be provided over the metal decking. Water proofing cum plasticiser compound shall be added to concrete over the metal decking. Bidder shall demonstrate that the roof is leak proof by carrying out the water-retaining test by maintaining the minimum water depth of 50mm over the roof surface for a period of 48 hours. Water Proofing Treatment as given below for RCC roof slabs shall be provided to ensure that the roof is watertight.</p>
9.06.02	<p>Roof of all buildings having RCC framework shall have cast-in-situ RCC slab. Such roof shall be provided with roof water proofing treatment using high solid content liquid applied elastomeric water proofing membrane with separate wearing course as per ASTM - C-836 & 898. Thickness of the membrane shall be 1.5mm (min.). This treatment shall include application of polymerised mastic over the roof to achieve smooth surface and primer coat. Wearing course on the top of membrane shall consist of 25mm thick PCC (1:2:4) cast in panels of maximum 1.2 x 1.2m size and reinforced with 0.56mm dia galvanised chicken wire mesh and sealing of joints using sealing compound/elastomeric water proofing membrane. However, chequered concrete tile flooring 22 mm (min.) thick of approved colour and shade conforming to IS: 13801 shall be provided for path way of 1 m. width for access of personnel and handling of equipment and for the entire area of the roof where equipment like AC / Ventilation plant, cooling towers, etc. are provided in place of PCC wearing course. Equipment shall be installed on raised pedestal of minimum 30 cm height from the finished roof to facilitate maintenance of roof treatment in future.</p>
9.06.03	<p>For efficient disposal of rainwater, the run off gradient for the roof shall not be less than 1:100 and the roof shall be provided with RCC water gutter, wherever required. Gutter shall be made water tight using suitable watertight treatment. This gradient can be provided either in structure or subsequently by screed concrete 1:2:4 (using 12.5 mm coarse aggregate) and/or cement mortar (1:4). However, minimum 25 mm thick cement mortar (1:4) shall be provided on top to achieve smooth surface.</p>
9.06.04	<p>Medium class galvanised mild steel pipes conforming to IS 1239/IS 3589 with welded joints shall be provided to drain off rain water from the roof. These shall be suitably concealed with masonry work, cement concrete / or sheeting work to match with the exterior finish. The number and size of down comers shall be governed by IS 1742 and IS 2527. Roof drain level of all RCC framed buildings having cast-in-situ RCC roof shall be provided with Rain water gutter and/or 45 x 45 cm size Khurras having minimum thickness of 30 mm with 1:2:4 concrete over PVC sheet of 1 m x 1 m x 400 micron and finished with 12 mm thick cement sand plaster 1:3. All the pipes shall be provided with suitable fittings and fixtures.</p>
9.06.05	<p>Roof of the specific buildings shall conform to minimum 3 star GRIHA Rating shall have Over-deck insulation of minimum 40 mm thick impervious sprayed close cell free rigid Polyurethane foam confirming to IS: 12432 –III, with density of foam 40 TO 45 KG/cum.Over-</p>
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	<p>deck insulation with 40 mm thk polyurethane foam with density of 40-45 kg/cum shall be fixed over a coat of polyurethane primer applied @ 6 to 8 sq.m/ litre, laid over cement screed, laid in slope above the cleaned roof top. 400g polythene sheet shall be laid over polyurethane spray and provided with a wearing course of 40 mm thick cement screed1:2:4(1 cement:2 coarse sand:4 stone aggregate 20 mm nominal size) in chequered rough finish, in panels of 2.5mx2.5m and embedding with 24 G wire netting and sealing the joints with polymerized mastic.Heat resistant tiles of (300mm x300mmx20 mm) with SRI (Solar Refractive Index) > 78, Solar reflection > 0.70 and initial emittance > 0.75 on sloped screed surface of terrace, laid on 20 mm thick cement sand mortar in the ratio of 1:4 (1cement : 4 coarse sand) shall be provide on terraces of GRIHA rated buildings . The joints in the tiles has to be grouted with mix of white cement and marble powder in ratio of 1:1. The surface shall be rubbed and polished upto three cuts complete. Skirting upto 150 mm along the parapet walls shall be provided in the same manner.</p>
9.06.06	<p>Roof Water Proofing</p> <p>Roof water proofing treatment shall be as follows:</p> <p>a) For roofs having structural slope:</p> <p>Top surface of sloped R.C.C. slab shall be finished with 15mm thick cement plaster (1:4). Over the finished surface elastomeric membrane shall be laid. The elastomeric shall comprise of high solid content liquid applied urethane laid over reinforcing layer of polyscrim cloth or non woven geo-textile. The top of the elastomeric membrane shall be finished with 20 mm thick cement: sand (1:4) mortar with chicken wire mesh and pressed precast concrete tiles of 20 mm thickness where applicable shall be laid over mortar at green stage. Provision for thermal expansion of roofing tiles shall be kept by providing an expansion gap in both directions filled up with polysulphide joint sealant. The expansion gap shall be provided in the cement sand mortar underbed layer also.</p> <p>b) For roofs having no structural slope:</p> <p>Screed concrete mix (1:2:4) grading having minimum 25mm thickness at the lowest point of the slope shall be laid over R.C.C. slab and shall be laid as per the slope specified elsewhere in the specification. Top surface of grading underbed shall be finished with 15mm thick cement plaster (1:4). Over the finished surface elastomeric membrane shall be laid and top of the elastomeric membrane shall be finished with 20 mm thick cement: sand (1:4) mortar with chicken wire mesh and pressed precast concrete tiles of 20 mm thickness where applicable shall be laid over mortar at green stage. Provision for thermal expansion of roofing tiles shall be kept by providing an expansion gap in both directions filled up with polysulphide joint sealant. The expansion gap shall be provided in the cement sand mortar underbed layer also</p>
9.06.07	<p>Roof of all buildings shall be provided with access/approach through staircase or ladder. Roof where equipment are mounted shall be provided with access through staircase.</p>
9.06.08	<p>RCC parapet wall of minimum 1000 mm height (above top of slab) for all accessible roofs and 600 mm height for all non-accessible roofs shall be provided. Alternatively parapet wall comprising structural steel post, runner and sheeting may be provided for buildings with metal sheet cladding.</p>
9.06.09	<p>Fillets at junction of roof and vertical walls shall be provided with cast-in-situ cement concrete (1:1.5:3) nominal mix followed by 12mm thick 1:4 cement sand plaster.</p>
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CLAUSE NO.	 TECHNICAL REQUIREMENTS 				
9.06.10	Pathways for handling of materials and movement of personals shall be provided with 22mm thick chequered cement concrete tiles as per IS:13801 for a width of 1000mm .				
9.07.00	Walls				
9.07.01	All walls shall be non-load bearing infill panel walls.				
9.07.02	For initial height up to 3 metres from ground floor in MPH building and 1 metre in other building one brick thick masonry wall shall be provided wherever metal cladding is specified.				
9.07.03	All internal walls shall be with one brick thick in cement mortar (1:6). However, internal partition walls for toilets shall be with half brick masonry thick with cement mortar (1:4).				
9.07.04	For Service Building Autoclaved Aerated Concrete blocks shall be used (except in toilet and pantry area, where brick shall be used). Autoclaved Aerated Concrete (AAC) block masonry shall be with blocks having dimensions of 625 mm x 250 Mm and having oven dry density of 550kg/m3 to 650kg/m3. thickness ranging from 100 mm to 300 mm conforming to I.S. :2185(part-III). The jointing cement sand mortar in the composition of 1: 6 (Cement: sand) shall be used with suitable plasticizer(optional). Sand having modulus of fineness 1.1 shall be used. The horizontal and vertical joint thickness shall be approximately 10 mm. In case of partition walls (100 mm /125 mm thk.) the joint reinforcement i.e. 1 number of 6-8 mm diameter bars shall be placed at every alternate course to be anchored properly with the main structure. All other structural requirements like stiffening of masonry, joint reinforcement etc. in the AAC masonry work strictly be carried out as per instructions laid down in. I.S 6041 – 1985, I.S - 1905.				
9.07.05	For control room , control equipment room, walls shall be of factory made composite modular light weight aerated concrete panels,(minimum 2 hours of fire rating) consisting of 2 fiber reinforced cement sheets (minimum 4 mm thick) on either side of light weight concrete core, having minimum compressive strength of 35 Kg / Cm2 and the density in the range of 700-900 Kg. / cu.m. of the thickness and fire rating as specified below, to provide external wall and internal partition at all levels, capable of sustaining wind pressure of 3.00 M height (H) within limiting deflection of span/250, fixed in position in tongue and groove jointing system by screwing the panels to top and bottom U channels, (channels minimum 1.25 mm thick and galvanised to grade 180 (minimum) as per IS : 277), fixing U profiled top and bottom channels to concrete / primary steel members which are placed at the maximum vertical spacing of 4.5m with the help of galvanised steel expansion fasteners, filling the joints from both faces with silicon acrylic paste and making the same water tight by covering with fibre glass tape (minimum 50 mm wide and minimum 0.5 mm thick) or by any other suitable material, so as to ensure that the entire construction done with the light weight aerated concrete panels are weather proof and panel surfaces are flush for painting, creating opening for doors / windows /ventilators / ducts / pipes/fans/AC etc. and finishing the opening face with the same U profiled galvanized steel channel which is used at the top and bottom.				
9.07.06	<p>For Main plant building, Control tower and other buildings, the type, thickness and initial height of external cladding facing the transformer yard shall be according to the requirements.</p> <p>External face of Toilets, Air-conditioned and pressurised areas shall be provided with masonry wall as per functional / aesthetic requirements. (Inside the metal cladding wherever provided).</p>				
9.07.07	50 mm thick DPC in Cement concrete (1:1.5:3) with water proofing compound followed by two layers of bitumen coating 85/25 grade as per IS: 702 @ 1.7 kg./sq.m. shall be provided at plinth level before starting the masonry work.				
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CLAUSE NO.	<div><div></div><div>TECHNICAL REQUIREMENTS</div><div></div></div>			
9.08.00	COLOUR COATED AND OTHER SHEETING WORK			
9.08.01	<p>Material</p> <p>a) Wall Cladding & Roofing Material</p> <p>Troughed permanently colour coated sheet of approved shade and colour shall be</p> <p>i) either of steel with minimum 0.6mm bare metal thickness (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G250 as per AS1397 / grade SS255 as per ASTM A653M / grade S250GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150</p> <p>ii) or of minimum 0.5mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G350 as per AS1397 / grade SS340 class 4 as per ASTM A792M / grade S350GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150.</p> <p>iii) or of steel of minimum 0.4mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G550 as per AS1397 / grade SS550 as per ASTM A792M / grade S550GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150</p> <p>Alternatively aluminium feed material of minimum bare metal thickness of 0.7 mm of aluminium alloy of Series 31000 and above as per IS 737 and IS: 1254.</p> <p>Bidder to ensure that same profile is to be used throughout the package for all facilities to maintain uniformity.</p> <p>b) Metal Deck Roof Material</p> <p>Troughed permanently colour coated metal decking sheets shall be</p> <p>i) either of steel with minimum 0.8mm bare metal thickness (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G250 as per AS1397 / grade SS255 as per ASTM A653M / grade S250GD as per EN 10326 with zinc coating to class Z275.</p> <p>ii) or of minimum 0.6mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G350 as per AS1397 / grade SS340 class 4 as per ASTM A792M / grade S350GD as per EN 10326 with zinc coating to class Z275.</p> <p>iii) or of steel of minimum 0.6mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G550 as per AS1397 / grade SS550 as per ASTM A792M / grade S550GD as per EN 10326 with zinc coating to class Z275.</p> <p>Alternatively aluminium feed material of minimum bare metal thickness of 0.9 mm of aluminium alloy of Series 31000 and above as per IS 737 and IS 1254 can also be used for metal decking.</p>			
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		<p>Thickness tolerance of (+/-) 0.04mm is permissible. However, all design calculations shall be carried out on the basis of lowest value of sheet thickness provided.</p> <p>Bidder to ensure that same profile is to be used throughout the package for all facilities to maintain uniformity. In addition, the depth of the profile shall be restricted to 60 mm (maximum) to reduce the overall thickness of floor slab and thus minimizing the dead load of the floor slab. If the bidder proposes to use two different metal deck sheets (same profile but different grades or thicknesses), the unexposed (concrete) side of the metal deck sheets shall be painted with clearly distinct colours to facilitate identification.</p>	
9.08.02	Colour Coating	Steel shall be colour coated with total coating thickness of at least 40 microns (nominal) comprising of silicon modified polyester (SMP with silicon content of 30% to 50%) paint or Super Polyester paint, of minimum 20 microns (nominal) dry film thickness (DFT) on external face over primer coat of minimum 5 microns (nominal) and minimum 10 microns (nominal) SMP or super polyester paint over primer coat of minimum 5 microns (nominal) on internal face. SMP and Super polyester paint systems shall be of industrial finish of product type 4 of AS/NZ2728.	
9.08.03	Design Criteria	<p>For wall cladding insulated / uninsulated and conveyor gallery sides and roof, permanently colour coated sheet of troughed profile shall be used. However alternative profile meeting the strength, deflection and other functional requirements such as section modulus and moment of inertia shall be provided.</p> <p>Sheet shall be of approved profile, sectional properties, colour and shade.</p> <p>For profiled metal decking sheets (to be used for RCC floor slab or roof slab) the sectional modulus and moment of inertia of troughed profile per meter width shall be so as to limit the deflection of sheets to span/250 under total super imposed loading (DL +LL) comprising the self-weight of metal deck sheet, dead weight of green concrete and an additional construction load 100kg per sq.m for two span condition. The section modulus and moment of inertia of troughed profile shall be computed as per the provisions of IS 801 for satisfying the deflection and strength requirements.</p> <p>For metal deck sheets used for roofing (with or without RCC) and side cladding, the sectional modulus and moment of inertia of troughed profile per metre width shall be such that the deflection of sheets is limited to span/250 under design wind pressure for two span condition. The sectional modulus and moment of inertia of troughed profile shall be computed as per the provisions of IS 801 for satisfying the deflection and strength requirements. No increase in allowable stress is permissible under wind load condition.</p>	
9.08.04	Fasteners	<p>Side cladding/roofing/decking sheets shall be fixed to the runner/purlins using self-drilling special coated fasteners confirming to corrosion resistant class 3 of AS3566 and tested for 1000 hours salt spray test. Spacing of Self-drilling fasteners in transverse direction (along runners/purlin) shall be equal to the pitch of trough or 250(+/-100) mm, whichever is lesser and in longitudinal direction at every runner/purlin location.</p> <p>Shear anchor studs shall also be provided through metal deck, which are to be used as permanent shuttering, at regular interval on all top flange / flange plate of structural beams as specified in Clause no. 8.03.00.</p>	
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9.08.05	<p>Alternatively, J/U type hooks shall be used in roofing which shall be provided in transverse direction (along runners/purlin) at a spacing equal to the pitch of trough or 250(+/-100) mm, whichever is lesser and in longitudinal direction at every runner/purlin location.</p> <p>Miscellaneous Details</p> <p>To minimize the number of joints, the length of the sheet shall preferably be not less than 4.5m, cut pieces shall not be used, unless specifically approved by the Engineer. However, the actual length shall be such so as to suit the purlin / runner spacing.</p> <p>Lap between the sheets shall be at least 150mm in the longitudinal direction and at least one crest wide in the transverse direction which shall be properly anchored / fixed with fasteners.</p> <p>Z spacers if required shall be made of at least 2 mm thick galvanised steel sheet of grade 350 as per IS 277</p> <p>Sealant used for cladding shall be butyl based, two parts poly sulphide or equivalent approved, non stainless material and be flexible enough not to interface with fit of the sheets</p> <p>Filler blocks as a trough filler shall be used to seal cavities formed between the profiled sheet and the support or flashing. The filler blocks shall be manufactured from black synthetic rubber or any other material approved by the Engineer.</p> <p>For insulation of cladding and other areas, mineral wool conforming to IS 8183 shall be used. The density shall be 32 or 48 kg. /cu.m for glass or rock wool respectively. The nominal thickness of insulation shall be 50mm.</p> <p>All flashings, trim closures, caps etc. required for the metal cladding system shall be made out of plain sheets having same material and any weather/moisture sealants with appropriate material and coating specification as mentioned above for the outer face of the metal cladding. Overlap shall be min. 150 mm or as specified by manufacturer.</p> <p>The contractor shall prepare working drawings of sheeting system including end and side laps, flashing, fixing details etc. before starting sheeting work at site.</p>			
	9.08.06	<p>Pre-Fabricated Insulated Metal Sandwich Panels</p> <p>For buildings where Pre-Fabricated Insulated Metal Sandwich Panels shall be used for Roofing, the sandwich panels shall comprise top sheet as troughed permanently colour coated sheet & bottom sheet as plain permanently colour coated with 50mm thick insulation sandwiched between the two sheets. Each sheet shall be</p> <div><div>i)</div><div>either of steel with minimum 0.6mm bare metal thickness (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G250 as per AS1397 / grade SS255 as per ASTM A653M / grade S250GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150</div></div> <div><div>ii)</div><div>or of minimum 0.5mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G350 as per AS1397 / grade SS340 class 4 as per ASTM A792M / grade S350GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150</div></div> <div><div>iii)</div><div>or of steel of minimum 0.4mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G550 as per AS1397 / grade SS550 as per ASTM A792M / grade S550GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150.</div></div>		
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		<p>Alternatively aluminium feed material of minimum bare metal thickness of 0.7 mm of aluminium alloy of Series 31000 and above as per IS 737 and IS 1254.</p> <p>Metal sheets (steel or aluminium) shall be colour coated with total coating thickness of at least 40 microns (nominal) dry film thickness (DFT) comprising of Silicon Modified Polyester (SMP with silicon content of 30% to 50%) paint or Polyester paint, of minimum 20 microns (nominal) SMP or polyester paint on one side (exposed face), over minimum 5 micron (nominal) primer coat and minimum 10 micron (nominal) SMP or Polyester paint over minimum 5 micron (nominal) primer coat on other side. SMP and Super Polyester paint shall conform to product type 4 of AS/NZS 2728. Troughed sheet shall be of approved profile, sectional properties, (suitable for the specified loading / deflection and purlins / runners spacing), colour and shade.</p> <p>Special coated fastener conforming to corrosion resistant Class 3 of AS3566 and tested for 1000 hours salt spray test shall be used for fixing Pre-Fabricated Insulated Metal Sandwich Panels with the structural members below.</p> <p>The contractor shall prepare working drawings of sheeting system including end and side laps, fixing details etc. before starting sheeting work at site.</p> <p>9.08.07 Polycarbonate Sheets</p> <p>The polycarbonate sheet to be used for cladding and glazing purpose in conveyor galleries, Transfer points & pump houses shall have toughed profile to match with the metal cladding profile. Minimum 3.0mm thick fire retardant and UV resistant polycarbonate clean sheet of approved make shall be used. The polycarbonate sheet shall be installed along with the metal cladding so as to have a watertight lapping arrangement. Suitable detailing shall be made to cater for the thermal expansion. IS 14434 to be referred for other details.</p> <p>9.09.00 Plastering</p> <p>9.09.01 Outer face (i.e. rough side) of all brick walls shall have 18 mm thick and inner face (i.e. smooth side) of all walls shall have 12 mm thick cement sand plaster 1:6.</p> <p>9.09.02 Acrylic wall putty in two coats shall be applied over cement plastered surfaces in interior of building. The finish surface shall be smooth and shall be of 2 mm nominal thickness.</p> <p>9.09.03 All R.C.C. walls shall have minimum 12mm thick cement sand plaster 1:6.</p> <p>9.09.04 All RCC ceilings (except areas provided with false ceiling, cable vault ceiling and metal decking) shall be provided with 6mm thick cement sand plaster 1:4.</p> <p>9.09.05 Groove of uniform size 12 x 12 mm up to 20 x 15 mm in plastered surface as per approved pattern, shall be provided as per approved drawing.</p> <p>9.09.06 All plastering work shall conform to IS: 1661.</p> <p>9.10.00 Painting & Aluminium Composite Panel Cladding</p> <p>9.10.01 All painting on masonry or concrete surface shall preferably be applied by roller. If applied by brush then same shall be finished off with roller.</p> <p>9.10.02 All paints shall be of approved make including chemical resistant paint.</p>	
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9.10.03	Minimum 2 finishing coats of paint shall be applied over a coat of primer.				
9.10.04	<p>Stone work for wall lining etc. (Veneer work) over 20 mm thick bed of cement mortar 1:3 (1 cement: 3 coarse sand) and jointed with grey cement slurry @3.3kg/sq.m, including rubbing and polishing in complete. (Black polished granite stone slab, 18 mm thick / polished Sadarhally grey granite slab 18 mm thick).</p> <p>The final, finished coating shall be fungus resistant, UV resistant, water repellant, alkali resistant, and extremely durable with colour fastness.</p>				
9.10.05	Acrylic emulsion paint shall be as per IS: 15489. Acrylic distemper shall be as per IS: 428. Cement paint shall conform to IS: 5410, white wash/colour wash shall conform to IS: 627.				
9.10.06	All fire exits shall be painted in post office red/signal red colour shade, which shall not be used anywhere else except to indicate emergency or safety measure.				
9.10.07	For painting on concrete, masonry and plastered surface IS: 2395 shall be followed. For painting on wood work IS: 2338 shall be followed.				
9.10.08	For painting on steel work and ferrous metals, BS: 5493 and IS: 1477 shall be followed. The type of surface preparation, thickness and type of primer, intermediate and finishing paint shall be according to the painting system adopted.				
9.10.09	Bitumen primer used in acid/alkali resistant treatment shall conform to IS: 158.				
9.10.10	All internal paints shall be of low VOC content conforming to GRIHA rating for reduction of VOC content.				
9.10.11	<p>Aluminium Composite Panel</p> <p>Aluminum Composite Panel cladding with open grooves shall be designed, fabricated, tested installed and fixed for linear as well as curvilinear portions of the building for all heights and levels including:</p> <p>a) Structural analysis & design and preparation of shop drawings for pressure equalization or rain screen principle as required, proper drainage of water to make it watertight including checking of all the structural and functional design.</p> <p>b) Aluminium Composite Panel cladding in pan shape in metallic/ solid colour of approved shades made out of 4mm thick aluminium composite panel. ACP consisting of 3mm thick Fire Retardant mineral filled Core comprising of around 70% Inorganic compound which is 100% non-combustible mineral and balance 30% is food grade virgin polymer sandwiched between two Aluminium sheets (each 0.5mm thick). The aluminium composite panel top and bottom skin should confirm to Aluminium Alloy 5005 (AlMg 1) marine grade series and H 22/24 temper.</p> <p>The ACP sheet shall be coil coated with Kynar 500 based (70:30 ratio) PVDF / Lumiflon based fluoropolymer resin coating of approved colour and shade on face # 1 and polymer (Service) coating on face # 2 as specified using stainless steel screws, nuts, bolts, washers, cleats, weather silicone sealant, backer rods etc.</p> <p>c) The fastening brackets of Aluminium alloy 6005 T5 / MS with Hot Dip Galvanised with serrations and serrated washers to arrest the wind load movement, fasteners, SS 316</p>				
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	<p>Pins and anchor bolts of approved make in SS 316, Nylon separators to prevent bi-metallic contacts all complete required to perform as per specification and drawing .</p> <p>Exterior Painting on Wall (Premium Acrylic Smooth Exterior Paint with Silicone Additives)</p> <p>The paint shall be (premium acrylic smooth exterior paint with silicone additives) of approved brand and manufacture. This paint shall be brought to the site of work by the contractor in its original containers in sealed condition. The material shall be brought in at a time in adequate quantities to suffice for the whole work or at least a fortnight's work. The materials shall be kept in the joint custody of the contractor and the Engineer-in-Charge. The empty containers shall not be removed from the site of work till the relevant item of work has been completed and permission obtained from the Engineer-in-Charge.</p> <p>Preparation of Surface</p> <p>For new work, the surface shall be thoroughly cleaned off all mortar dropping, dirt dust, algae, fungus or moth, grease and other foreign matter of brushing and washing, pitting in plaster shall make good, surface imperfections such as cracks, holes etc. should be repaired using white cement. The prepared surface shall have received the approval of the Engineer in charge after inspection before painting is commenced.</p> <p>Application of Base Coat</p> <p>Base coat shall be of water proofing cement paint.</p> <p>Preparation of Mix for Base Coat</p> <p>Cement Paint shall be mixed in such quantities as can be used up within an hour of its mixing as otherwise the mixture will set and thicken, affecting flow and finish. Cement Paint shall be mixed with water in two stages. The first stage shall comprise of 2 parts of cement Paint and one part of water stirred thoroughly and allowed to stand for 5 minutes. Care shall be taken to add the cement Paint gradually to the water and not vice versa. The second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain a liquid of workable and uniform consistency. In all cases the manufacturer's instructions shall be followed meticulously.</p> <p>The lids of cement Paint drums shall be kept tightly closed when not in use, as by exposure to atmosphere the cement Paint rapidly becomes air set due to its hygroscopic qualities. In case of cement Paint brought in gunny bags, once the bag is opened, the contents should be consumed in full on the day of its opening. If the same is not likely to be consumed in full, the balance quantity should be transferred and preserved in an airtight container to avoid its exposure to atmosphere.</p> <p>Application of Base Coat</p> <p>The solution shall be applied on the clean and wetted surface with brushes or spraying machine. The solution shall be kept well stirred during the period of application. It shall be applied on the surface which is on the shady side of the building so that the direct heat of the sun on the surface is avoided. The method of application of cement Paint shall be as per manufacturer's specification. The completed surface shall be watered after the day's work. The second coat shall be applied after the first coat has been set for at least 24 hours. Before application of the second or subsequent coats, the surface of the previous coat shall not be wetted.</p>		
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	<p>For new work, the surface shall be treated with three or more coats of water proof cement Paint as found necessary to get a uniform shade.</p> <p>Precaution</p> <p>Water proof cement Paint shall not be applied on surfaces already treated with white wash, colour wash, distemper dry or oil bound, varnishes, Paints etc. It shall not be applied on gypsums, wood and metal surfaces. If water proofing cement is required to be applied on existing surface, previously treated with white wash, colour wash etc., the surface shall be thoroughly cleaned by scrapping off all the white wash, colour wash etc. completely. Thereafter, a coat of cement primer shall be applied followed by two or more coat of water proof cement.</p> <p>Application of exterior paint</p> <p>Before pouring into smaller containers for use, the paint shall be stirred thoroughly in its container, when applying also the paint shall be continuously stirred in the smaller containers so that its consistency is kept uniform. Dilution ratio of paint with potable water can be altered taking into consideration the nature of surface climate and as per recommended dilution given by manufacturer. In all cases, the manufacturer's instructions & directions of the Engineer-in-charge shall be followed meticulously.</p> <p>The lids of paint drums shall be kept tightly closed when not in use as by exposure to atmosphere the paint may thicken and also be kept safe from dust. Paint shall be applied with a brush on the cleaned and smooth surface. Horizontal strokes shall be given, First and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks.</p>
9.11.00	Doors & Windows
9.11.01	Doors, windows and ventilators of air-conditioned areas, entrance lobby of all buildings (where ever provided), and all windows and ventilators of all buildings (unless otherwise mentioned) shall have aluminium framework with glazing. The aluminium section shall have minimum 2 mm thickness. The aluminium frame shall be electro colour dyed (anodised with 15 micron coating thickness) when used on outer side of the building and it shall be powder coated(50 microns coating thickness) when used in interior of the building. All doors of toilet areas shall be of steel framed solid core flush shutter.
9.11.02	Main entrance of the common control room and control equipment room of MPH shall be provided with air-locked lobby with provision of double doors. Automatic Sliding Doors with Fire Resistant glass shall be provided. Control Rooms of all other buildings shall be provided with Aluminium Glazed door.
9.11.03	Single glazed panels with aluminium framework shall be provided as partition between two air-conditioned areas wherever clear view is necessary.
9.11.04	<div><div>a)</div><div>The doors frames shall be fabricated from 1.6 mm thick MS sheets and shall meet the general requirements of IS: 4351.</div></div> <div><div>b)</div><div>All steel doors shall consist of double plate flush door shutters. The door shutter shall be 35 mm (min.) thick with two outer sheets of 1.2 mm rigidly connected with continuous vertical 1.0 mm stiffeners at the rate of 150 mm centre to centre. Side, top and bottom edges of shutters shall be reinforced by continuous pressed steel channel with minimum 1.2 mm. The door shall be sound deadened by filling the</div></div>
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	inside void with mineral wool. Doors shall be complete with all hardware and fixtures like door closer, tower bolts, handles, stoppers, aldrops, locks etc.				
9.11.05	Steel windows and ventilators shall be as per IS: 1361 and IS: 1038.				
9.11.06	Wherever functionally required Rolling shutter (fully closed/partly grilled) with suitable operating arrangement (manual/Electric) shall be provided to facilitate smooth operations Rolling shutters shall conform to IS: 6248. M.S sliding doors with suitable mechanical and electrical operations fixtures as per requirement for bigger openings shall be used.				
9.11.07	All windows and ventilators on ground floor of all buildings shall be provided with suitable Aluminium grill.				
9.11.08	Fire-Proof doors with panic devices shall be provided at all fire exit points as per requirements. These doors shall generally be as per IS 3614 (Part 2). Fire rating of the doors shall be of minimum 2 hours. These doors shall be double cover plated type with mineral wool insulation.				
9.11.09	Hollow extruded section of minimum 2 mm wall thickness as per IS: 1285 shall be used for all aluminium doors, windows and ventilators.				
9.11.10	Minimum size of door provided shall be 2.1 m high and 1.2 m wide. However for toilets minimum width shall be 0.75 m and office areas minimum width shall be 1.20m.				
9.11.11	Electrically operated, self operable/closing, aluminium framed with tinted glass, sliding doors shall be provided at the entrance of all common control rooms, entrance lobby of facility building.				
9.11.12	Fire Doors shall be provided in staircases of Service Building with Fire Resistant glass with suitable fire resistant frame.				
9.11.13	Minimum area of windows in building on each floor level shall be 10% of floor area.				
9.12.00	Glazing				
9.12.01	All windows and ventilators (not specified elsewhere) shall be provided with minimum 6 mm thick toughened glass conforming to IS: 5437.				
9.12.02	For single glazed aluminium partitions and doors, 8mm thick clear toughened glass shall be used.				
9.12.03	Toughned tinted glass of 6 mm thickness shall be used for all windows and ventilators in toilets.				
9.12.04	All glazing work shall conform to IS: 1083 and IS: 3548.				
9.12.05	For main power house building glazings, 6mm thk clear reflective toughened glass shall be provided. The glass to be used should be from the manufacturers of glass like Saint Gobain (India) or Asahi (India) or equivalent. The glass should be free from distortion and thermal stress. Solar factor 25% or less, Maximum U-value 3.3 W/ SQMK, VLT min 30%: Light reflection internal 10 to 15%, light reflection external 10 to 20 %, shading coefficient (0.25-0.28)				
9.12.06	For glazings of Air Conditioned Buildings Composite double glazing shall be 24mm thick consisting of 6mm thick clear float glass on inner side and 6mm thick reflective toughened				
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	<p>glass on outer side. The two glasses shall be separated by 12mm air-gap and hermetically sealed by beading of anodized aluminium with outer edge sealed with silicon sealant. Outer glass of 6mm thickness shall have following technical characteristics: Solar factor 25% or less, Maximum U-value 3.3 W/ SQMK, VLT min 30%: Light reflection internal 10 to 15%, light reflection external 10 to 20 %, shading coefficient (0.25- 0.28)</p> <p>The glass to be used should be from the manufacturers of glass like Saint Gobain (India) or Asahi (India) or equivalent. The glass should be free from distortion and thermal stress. For CER & Control room, Fire resistant glass partition shall be provided. The fire glass panels shall be min 11mm thick clear, toughened, interlayered 120 minute fire rated for both integrity & radiation control (EW120) with min 15 minute full insulation (EI15) , non wired toughened glass complying to BS476 Part22 or (EN-1634-1 :1999). The glass shall be complied to Class 2B2 Category of Impact Resistance to as per EN 12600 safety Glazing Material. The Glass shall have a light transmission ratio of approx. 86% according to EN410 standards and sound reduction of ≥ 37 dB.. The partition frame shall be manufactured of 1.6mm thick galvanized steel sheet (zinc coating not less than 120 gm/sqm) pressed to form a profile of section 35 mm x 60 mm on the vertical sides and 50 x 60 mm on the horizontal side suitable for mounting 120 min Fire Rated Glazed Door Shutter. The Frame shall be filled with mineral wool insulation having density min 96kg/m³. The door frame will have a provision of GI anchor fasteners 14 nos (5 each on vertical side and 4 on horizontal side of size M10x80) suitable for fixing in the opening with Factory made template for SS Ball Bearing Hinges of size 100x89x 3 mm for the fixing of fire rated glazed shutter. The frame shall be finished with a approved fire resistant primer or Powder coating of not less than 30 micron in desired shade.</p>				
9.12.07	For internal glazed partition, 8mm thick clear toughened glass shall be provided.				
9.12.08	For Automatic Sliding doors in Service Building 8 mm thick Toughened glass shall be provided.				
9.12.09	Glass to be used in Service atrium railing shall be Laminated glass with 6mm heat strengthened glass + 1.52mm PVB layer + 6 mm heat strengthened glass of approved make				
9.13.00	False ceiling				
9.13.01	False ceiling of 12.5 mm thick tapered/square edge glass fibre reinforced gypsum board conforming to IS : 2095 having fine texture finish, including providing and fixing of frame work at all levels, for all kind of work, consisting of light weight galvanised steel member (minimum 0.8 mm thick and galvanised as per IS: 277) having maximum grid size of 1200 mm x 600 mm for supporting panels of specified size, suspended from RCC structural steel or catwalkway grid above, with 4 mm (minimum) galvanised wires (rods), with special height adjustment clips, providing angle section of minimum 25 mm width along the perimeter of ceiling, supporting grid system (minimum 0.8 mm thick and galvanised as per IS: 277), expansion fasteners for suspension arrangement from RCC, providing openings for AC ducts, return air grills, light fixtures, etc., all complete. (concealed grid and finished flat seamless and curve shape (dome etc.), finished smooth(seamless) along with the galvanised light gauge steel supporting system laid in profile to suit the profile of dome).				
9.13.02	False ceiling of 15 mm thick mineral fibre board, in tile form of size 600mm x 600mm, along with galvanised light gauge rolled form supporting system in double web construction pre painted with steel capping, of approved shade and colour, to give grid of maximum size of 1200x600. as per manufacturers details including supporting grid system, expansion fasteners for suspension arrangement from RCC, providing openings for AC ducts, return air grills, light fixtures, etc., all complete.				
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9.13.03	False ceiling of 12 mm thk calcium silicate board of 'HILUX' or equivalent with suspension system as per manufacturers details including supporting grid system, expansion fasteners for suspension arrangement from RCC, providing openings for AC ducts, return air grills, light fixtures, etc., all complete. (With concealed grid and finished flat seamless).				
9.13.04	Providing and fixing GI Clip in Metal Ceiling System of 600x600 mm module (of Armstrong/ Hunter Douglas/ Durlam make) which includes providing and fixing 'C' wall angle of size 20x30x20mm made of 0.5mm thick pre painted steel along the perimeter of the room with help of nylon sleeves and wooden screws at 300mm center to centre, suspending the main C carrier of size 10x38x10mm made of G.I steel 0.7 mm thick from the soffit with help of soffit cleat 37x27x25x1.6 mm, rawl plugs of size 38x12 mm and C carrier suspension clip and main carrier bracket at 1000mm c/c. Inverted triangle shaped Spring Tee having height of 24 mm and width of 34mm made of GI steel 0.45 mm thick is then fixed to the main C carrier and in direction perpendicular to it at 600mm centers with help of suspension brackets. Wherever the main C carrier and spring T have to join, C carrier and spring T connectors have to be used. All sections to be galvanized @ 120 gms/sqm (both side inclusive) Fixing with clip in tiles into spring 'T' with GI Metal Ceiling Clip in plain Beveled edge global white color tiles of size 600x600 and 0.5mm thick with 25mm height, made of G I sheet having galvanizing of 100 gms/sqm (both sides inclusive) and 20% perforation area with 1.8mm dia holes and having NRC of 0.5, electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending and perforation and backed with a black Glass fiber acoustical fleece.				
9.13.05	Pre-Painted Coil coated Steel false ceiling system, at all level, for all kind of works, consisting of 0.5 mm thick galvanised as per IS: 277, along with galvanised supporting steel members exposed faces of galvanised member to be prepainted with regular modified polyester coating / super polyester coating minimum 20 DFT, to form panels of specified size for tile type panels and roll formed stove enamelled 0.6 mm thick steel carrier, for fixing of lineal type panels by clip on arrangement, suspended from RCC slab / structural steel or catwalk way steel channel grid above with 4 mm (minimum) galvanised wires (rods), with special height adjustment clips, providing angle section of minimum 25 mm leg width along the perimeter of ceiling, including all labour, material, supporting grid system (members minimum 0.8 mm thick and galvanised as per IS: 277) anchor fasteners for making suspension arrangement from RCC, providing openings for AC ducts, return air grills, insulation light fixtures, etc., all complete.				
9.13.06	Tile type steel false ceiling system in square pattern panels of 600 mm x 600 mm size along with galvanised light gauge rolled form. supporting system in double web 'T' construction with pre-painted steel, with Tee support.				
9.13.07	Lineal pattern (closed type) of 100 mm nominal width, with carrier support. Metal ceiling as above in lineal/tile shape in stainless steel, bright finish instead of pre-painted coil coated finish.				
9.13.08	Additional hangers and height adjustment clips shall be provided for return air grills, light fixtures, A.C. ducts etc.				
9.13.09	Suitable M.S. channel (Minimum MC75 with maximum spacing of 1.2 m C/C both ways) grid shall be provided above the false ceiling level for movement of personnel and to facilitate maintenance of lighting fixtures, AC ducts etc.				
9.13.10	Underdeck insulation shall be provided on the ceiling (underside of roof slab) and underside of floor slab of air-conditioned area depending upon the functional requirements. This underdeck insulation shall consist of 50mm thick mineral wool insulation with 0.05 mm thick aluminium foil & 0.6 mm x 25mm mesh wire netting and shall be fixed to the ceiling with 2 mm wire ties.				
9.13.11	Suitable cut-outs shall be provided in false ceiling to facilitate fixing of lighting fixtures, AC grills, smoke detectors, etc.				
<table><tr><td>KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES</td><td>TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC. NO.: THDC/RKSH/CC-9915-371</td><td>SUB-SECTION-D-01 CIVIL WORKS</td><td>PAGE 87 OF 142</td></tr></table>		KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES	TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC. NO.: THDC/RKSH/CC-9915-371	SUB-SECTION-D-01 CIVIL WORKS	PAGE 87 OF 142
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CLAUSE NO.	<div> TECHNICAL REQUIREMENTS </div>
9.14.00	<p>Interior Design</p> <p>A comprehensive interior design scheme shall be conceived with the intention of projecting a definite theme and aesthetic appearance to inside working environment. It shall take into account the multidisciplinary engineering activities involving power plant technology, and architectural & civil engineering for a smooth control hierarchy and man machine interface. All the design aspects such as flooring, false ceiling, furniture, colour scheme equipment design & layout, illumination, fire fighting, acoustics and ergonomics requirements shall be detailed out so as to present an overall unified aesthetic spatial appearance.</p> <p>The areas to be undertaken for this interior design process shall be control room complex including common control room, computer room, conference rooms and office areas in the main plant building and the following aspects shall be reviewed and evaluated for design. Furniture to be supplied by Bidder for the control room complex shall be as specified under C&I specification.</p> <div><div>a)</div><div>Layout, keeping in view the man-machine interface and suitable ergonomic practices.</div></div> <div><div>b)</div><div>Integration of civil engineering with architecture and interior design.</div></div> <div><div>c)</div><div>Illumination levels, noise levels, electromagnetic interference levels, taking into account the equipment and furniture.</div></div> <div><div>d)</div><div>Comfort and safety requirements such as air conditioning, fire fighting, fire escapes, etc.</div></div> <div><div>e)</div><div>Microprocessors based control system to control the functional requirements.</div></div> <p>The above design philosophy put into practice shall be detailed out through presentation drawings, perspective views, scale models, detail drawings, etc.</p>
9.15.00	<p>Stainless Steel Hand railing</p> <p>Providing and fixing knockdown railing system comprising of SS 304 Grade Stainless Railing of 50mm diameter handrail fixed on 50 mm SS round baluster placed at maximum 1000 c/c along with five numbers 19 mm diameter midrail connected at side of baluster by special brackets, both the end of mid rail should be bush inserted for jointing and to give extra strength (joints should not be welded and invisible). The balustrade should be fixed onto floor with casted plate of minimum 6mm thickness. Base plate shall be concealed with suitable SS 304 cover cap so that the mounting height fasteners are not visible after installation. Only high strength anchor fasteners would be used for fixing of baluster, as giving extra strength, rust proof and more durable. Onsite welding is strictly not allowed. Wherever welding is required, it should be Tig welding process with same grade 304/316 at factory only so that floor stone and other things would not be damaged and for safety purpose also. Baluster and handrail connector should be screwed tightened and not to be welded on site. Railing should be tested for appropriate load testing criteria as per international railing standard from EXOVA. Wall thickness of all pipes shall be taken as 2 mm. Along with all visible components developed in high grade SS and whenever required, joints to be filled with bushings for extra strength. Railing Height to be taken @ 1000/ 1200 mm from floor level.</p>
9.16.00	<p>Finishing Schedule</p> <p>Interior and Exterior Finishes shall be as given in Tables-B & C respectively attached at the end of these specification.</p>
<div><div><div>KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES</div><div>TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC. NO.: THDC/RKSH/CC-9915-371</div><div>SUB-SECTION-D-01 CIVIL WORKS</div><div>PAGE 88 OF 142</div></div></div>	



CLAUSE NO.		TECHNICAL REQUIREMENTS				
TABLE – A						
PROPOSED ACID /ALKALI RESISTANT TREATMENT						
S.NO. AREA PRIMER		(ONE COAT)	TYPE OF LINING AND THICKNESS EPOXY			COATING (TWO COATS)
EFFLUENT TREATMENT PLANT		A.R.	BRICKS	A.R. TILES	EPOXY MORTAR	BITUMASTIC
1	<u>CPU:</u> a) Neutralisation Pit i) Floors	Bitumen	75 mm thick			18 mm thick
	ii) Walls Bitumen 115 mm		thick	18 mm thick		
	iii) Ceiling Epoxy 150 micron					
	iv) Pillasters 115 mm		thick			
b)	Effluent Drains Bitumen 38 mm			thick	12 mm thick	
c)	Floor around equipment & dado	Bitumen 38 mm		thick	12 mm thick	
d)	Regeneration area Bitumen 38 mm	12 mm thick				
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CLAUSE NO.		TECHNICAL REQUIREMENTS							
		floor & dado			thick				
e) Acid / Alkali storage area			Bitumen 75 mm		thick		12 mm thick		
f) Degasser area floor		Bitumen 38 mm			thick		12 mm thick		
g) Pedestals for supporting equipment			Bitumen 38 mm		thick		12 mm thick		
h) M.S. Grating / Chequered plate			Epoxy 150 micron						
<p>Note :-</p> <p>1. The above table is for general guidance only, however, actual areas/ facilities to be covered shall be as per Scope of work.</p> <p>2. Suitable end sealing shall be provided.</p> <p>3. Structures shall be tested for waterproofing before application of Acid / Alkali Resistant Treatment.</p> <p>4. This treatment shall be applied on dry surface.</p>									
KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES		TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC. NO.:			SUB-SECTION-01 CIVIL WORKS			PAGE 90 OF 142	



CLAUSE NO.	<div>   </div> TECHNICAL REQUIREMENTS	
	<p>5. For laying of AR bricks / tiles, the bedding mortar shall be of potassium silicate 6 mm thickness and the pointing mortar shall be of Epoxy / furane 20 mm deep and 6 mm thickness.</p>	
TABLE	<div> -B INTERIOR FINISHING SCHEDULE </div>	
S.NO. DESCRIPTION OF AREA FLOORING WALLING CEILING		
1. Main power house Building.		
a) Unloading Bay	Cement concrete with Metallic hardener topping	Acrylic distemper (except metal deck area)
b) Cable vault Cement concrete with Metallic hardener topping	Cement concrete with Metallic hardener topping	Acrylic distemper (except metal deck area)
c) Balance area including passage	Cement concrete with Metallic hardener topping	Acrylic distemper (except metal deck area)
d) SWAS Room Vitrified ceramic tiles. Acrylic emul	Acrylic emul	sion paint. GI clip in metal false ceiling in combination with GRG plaster board border in column depth or as per approved design
e) Equipment Area, ESP SWGR/ ACP Room/ UAF Room	Cement concrete with Metallic hardener topping	Acrylic distemper (except metal deck area)
f) UPS Battery charger room Vitrified	ceramic tiles. , Aluminium panel cladding	GI clip in metal false ceiling in combination with GRG plaster board border in column depth or as per approved design
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TECHNICAL REQUIREMENTS					
CLAUSE NO.					
-B					
INTERIOR FINISHING SCHEDULE					
S.NO.	DESCRIPTION OF AREA FLOORING WALLING CEILING				
	g) Deaerator floor	Cement concrete with Metallic hardener topping.			-
	h) Operating Floor	20 mm thick heavy duty anti skid full body vitrified tile.	Colour coated Metal cladding on A-Row& Gable end, up to crane girder level.		Metal deck roofing (bottom of sheeting with RAL 9002 finish)
	i) General circulation and movement areas	18mm thk. Polished granite honed finish combination as per design stone / marble stone/ Vitrified Ceramic tiles.	Acrylic distemper (except metal deck area).		
	j) Switchgear room	Heavy duty tiles (Cement Concrete tiles 300mmx300mm)	Acrylic distemper		Acrylic distemper (except metal deck area)
	k) MCC Room	Heavy duty tiles (Cement Concrete tiles 300mmx300mm)	Acrylic distemper		Acrylic distemper (except metal deck area)
	l) Control room area including control room, computer room,	Matt Finish Vitrified ceramic tiles	Partition in fire rated glass with fire rated frames with 2 hr fire rating & Aluminium composite panel cladding for columns and walls		GI clip in tile/p lank metal false ceiling in combination with GRG plaster board border in column depth or as per approved design
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CLAUSE NO.	<div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: center;"> TECHNICAL REQUIREMENTS </div>  </div>	
TABLE	-B INTERIOR FINISHING SCHEDULE	
S.NO.	DESCRIPTION OF AREA FLOORING WALLING CEILING	
	m) Control equipment room, Matt finish Vitrified ceramic tiles (Matt Finish) Partition	Partition in fire rated glass with fire rated frames with 2 hr fire rating & Aluminium composite panel cladding for columns and walls GI plank metal false ceiling in combination with GRG plaster board border in column depth or as per approved design
n) Conference room, senior executive room.	Matt finish Vitrified ceramic tiles (Matt Finish)	Partition in fire rated glass with fire rated frames with 2 hr fire rating & Aluminium composite panel cladding for columns and walls GI clip in metal false ceiling in combination with GRG plaster board border in column depth or as per approved design
o) Record room	Ceramic Tiles	Acrylic distemper. GI clip in metal false ceiling in combination with GRG plaster board border in column depth or as per approved design
p) Locker room Ceramic Tiles		Acrylic Emulsion Paint GI clip in metal false ceiling in combination with GRG plaster board border in column depth or as per approved design
q) Toilet area Ceramic tiles Digitally glazed ceramic		wall tiles up to False Ceiling Height Calcium Silicate false ceiling.
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CLAUSE NO.	<div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: center;"> TECHNICAL REQUIREMENTS </div>  </div>	
TABLE	-B INTERIOR FINISHING SCHEDULE	
S.NO.	DESCRIPTION OF AREA FLOORING WALLING CEILING	
r) Office Room, Staff Room	Vitrified ceramic tiles. Partition in fire rated glass	with fire rated frames with 2 hr fire rating & Aluminium composite panel cladding for columns and walls GI clip in metal false ceiling in combination with GRG plaster board border in column depth or as per approved design
s) Laboratory area	Vitrified Ceramic / Acid/alkali resistant tiles.	Designer ceramic wall tiles up to False Ceiling Height/ Aluminium composite panel cladding for columns and walls in case of A.C Panel GI clip in metal false ceiling in combination with GRG plaster board border in column depth or as per approved design
t) RCC Stair case	18mm thick Granite (Polished and honed Finished) stone	Polished Granite Stone up to 1.2m. ht. & Acrylic Distemper Paint over wall putty finish for balance height. Acrylic Distemper
u) Lift and Staircase Lobby	18mm thick polished granite stone as pattern.	18mm thick polished granite & glass mosaic tile cladding up to False Ceiling Height GI clip in metal false ceiling in combination with GRG plaster board border in column depth or as per approved design
v) Passages and general circulation areas.	18mm thick polished Marble Stone/ granite stone.	Acrylic Distemper / acrylic emulsion paint. -
KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES		<div style="display: flex; justify-content: space-between;"> <div> TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC. NO.: THDC/IRKSH/CC-9915-371 </div> <div> SUB-SECTION-01 CIVIL WORKS </div> <div> PAGE 94 OF 142 </div> </div>


CLAUSE NO.		TECHNICAL REQUIREMENTS			
TABLE					
-B					
INTERIOR FINISHING SCHEDULE					
S.NO.		DESCRIPTION OF AREA		FLOORING WALL	CEILING
w) Battery Room				Acid and alkali resistant tile.	Acid and alkali resistant tile up to 1.2m height and chemical resistant paint for balance height
x) Oil canal, oil room, oil purification Tank and other area s where oil spillage is likely to occur.				Oil resistant paint (epoxy based) 150 micron over primer.	As above except oil canal Oil resistant Paint
y) Pathways including roof area.		22mm thick		concrete chequered tiles.	
2. Service Building					
a) Entrance Lobbies and Lift areas/Foyer/Exhibition space.				18mm thick polished granite stone as/ pattern.	Textured paint /18mm thick polished granite cladding/lacquered glass tile murals in lift lobby & foyer
b) Conference room, senior executive room.				11 mm thk. Laminated wooden flooring	Glazed partition with Aluminium frame/ Acrylic emulsion paint.
					Mineral fiber board false ceiling in combination with GRG plaster board border in column depth or as per approved design.
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CLAUSE NO.	<div>  <div> TECHNICAL REQUIREMENTS  </div> </div>			
TABLE	<div> -B </div> <div> INTERIOR FINISHING SCHEDULE </div>			
S.NO.	DESCRIPTION OF AREA	FLOORING WALL	ING CEILING	
c)	Office Room, Staff Room/Library/Canteen.	Digitally glazed Vitrified ceramic tiles.	Acrylic emulsion paint./ Designer Glass mosaic tile mural in combination with textured paint in Canteen	Mineral fiber board false ceiling in combination with GRG plaster board border in column depth or as per approved design
d)	Passage Digitally glazed Vitrified	ceramic tiles.	Acrylic emulsion paint. GI clip	in metal false ceiling in combination with GRG plaster board border in column depth or as per approved design
e)	RCC Stair case 18mm thick Granite (Polished	and Flame Finished) stone	Glass Mosaic Tile cladding in murals and pattern	Acrylic Distemper.
f)	Toilet/ Pantry/ Kitchen Ceramic tiles		Digitally glazed ceramic wall tiles up to False Ceiling Height	Acrylic distemper in kitchen / Calcium Silicate false ceiling in toilet and pantry
g)	AHU/A.C. Plant room/MCC Room/Store	Cement concrete with Metallic hardener topping.	Acrylic distemper	Acrylic distemper
h)	Covered parking area Pavers interlocking cement	concrete blocks.	-	-
i)	Pathways including roof area. 22mm thick concrete	chequered tiles.		
Note : 1. All wall and roof areas above false ceiling shall be plastered. 2. The colour and pattern of finish shall be as per approved details.				
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CLAUSE NO.	TECHNICAL REQUIREMENTS				
	<p>3. All materials shall be of reputed and established brand approved by Engineer-in-charge.</p> <p>4. Wherever alternative materials are specified, the final selection rests with Engineer-in-charge.</p> <p>5. This finishing schedule shall also be applicable to similar functional areas for all other buildings and facilities.</p> <p>6. All the finishing materials shall be applied/provided as per manufacturer specification and guidelines under the supervision & guidelines of manufacturer.</p> <p>7. Requirement given above are suggestive and minimum. Bidder is welcome to suggest alternative scheme conforming to design functional requirement subject to approval of the Engineer-in-charge.</p>				
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NTPC		TECHNICAL REQUIREMENTS			
TABLE –C					
EXTERIOR FINISHES SCHEDULE					
SI.No.	DESCRIPTION OF AREA WALL AND	D PROJECTIONS SOFFIT OF PROJECTIONS			
1.	Main plant building & Fire walls in Transformer yard; Other Auxiliary building in steel framed structure.	Premium Acrylic Smooth exterior paint with silicon additives over suitable primer of Water Proof Cement Paint over plastered surface Approved colour/ colour combination of colour coated metal cladding	Premium Acrylic Smooth exterior paint with silicon additives over suitable primer of Water Proof Cement Paint over plastered surface Approved colour/ colour combination of colour coated metal cladding		
2.	Building with concrete frame work, etc.	Premium Acrylic Smooth exterior paint with silicon additives over suitable primer of Water Proof Cement Paint over plastered surface For Service building composite Panel Cladding in combination with Premium Acrylic Smooth exterior paint with silicon additives over suitable primer of water proof cement	Premium Acrylic Smooth exterior paint with silicon additives over suitable primer of Water Proof Cement Paint over plastered surface		
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CLAUSE NO.		TECHNICAL REQUIREMENTS					
3.		Steel Structure, trestles, etc.	High performance Paint of approved specification and shade.				
NOTE : 1. The colour and pattern of finish shall be as finalized by Engineer.							
2. All materials shall be of reputed and established brand approved by Engineer.							
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CLAUSE NO.	TECHNICAL REQUIREMENTS		
	<p>killed), conforming to IS: 2062. Plates beyond 12mm thickness and up to 40mm thickness shall be normalized rolled. Plates beyond 40mm thickness shall be vacuum degassed & furnace normalised and shall also be 100% ultrasonically tested as per ASTM –A578 level B-S2.</p>		
10.05.00	Bricks		
	<p>Only fly ash bricks shall be used in all construction, except for elevator shafts, which can be either of burnt clay bricks or RCC construction as per functional / codal provisions. Bricks shall be table moulded/ machine made of uniform size, shape and sharp edges and shall have minimum compressive strength of 75kg/cm2. Burnt clay fly ash bricks and fly ash lime bricks shall conform to IS: 13757 and IS: 12894 respectively. Minimum fly ash content in fly ash based bricks shall be 25%.</p>		
10.06.00	Foundation Bolts		
	<p>Material and details of foundation bolts shall conform to IS: 5624. Mild steel bars used for the fabrication of bolt assembly shall conform to grade 1 of IS: 432 and/ or grade A of IS: 2062. Hexagonal nuts and lock nuts shall conform to IS: 1363 & IS: 1364 upto M36 diameter and IS: 5624 for M42 to M150 diameter.</p>		
10.07.00	Stainless steel		
	<p>The material specification for stainless steel plates are mentioned in the design concept area of Mill Bunker building.</p>		
10.08.00	Water		
	<p>Water used for cement concrete, mortar, plaster, grout, curing, washing of coarse aggregate, soaking of bricks, etc. shall be clean and free from oil, acids, alkalis, organic matters or other harmful substances in such amounts that may impair the strength or durability of the structure. Potable water shall generally be considered satisfactory for all masonry and concrete works, including curing. When water from the proposed source is used for making the concrete, the maximum permissible impurities, development of strength and initial setting time of concrete shall meet the requirements of IS: 456.</p>		
	<p>All materials brought for incorporation in works shall be of best quality as per IS unless specified otherwise.</p>		
10.08.00	Statutory Requirements		
	<p>Bidder shall comply with all the applicable statutory rules pertaining to Factories Act, Fire Safety Rules at Tariff Advisory Committee. Water Act for pollution control, Explosives Act, etc.</p>		
	<p>Provisions of safety, health and welfare according to Factories Act shall be complied with. These shall include provision of continuous walkways along the crane - girder level on both sides of building, comfortable approach to EOT crane cabin, railing, fire escape, locker room for workmen, pantry, toilets, rest room etc.</p>		
	<p>Provisions for fire proof doors, number of staircases, fire separation wall, lath plastering/encasing the structural members (in fire prone areas), type of glazing etc. shall be made according to the recommendations of Tarrif Advisory Committee.</p>		
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CLAUSE NO.	<div><div></div><div>TECHNICAL REQUIREMENTS</div><div></div></div>		
	<p>Statutory clearances and norms of State Pollution Control Board shall be followed.</p> <p>Bidder shall obtain approval of Civil/Architectural drawings from concerned authorities before taking up the construction work.</p>		
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CLAUSE NO.	TECHNICAL REQUIREMENTS		
12.00.00	<div><div></div><div></div></div> <div>ANNEXURES</div> <div>(a) List of Codes and Standards</div> <div>All applicable standards, references, specifications, codes of practice, etc., shall be the latest edition including all applicable official amendments and revisions. A complete set of all these documents shall be available at site with Bidder. List of some of the applicable Standards, in original Codes and references is as following:</div> <div>Where provisions are not covered in Indian Standards, reference shall be made to ACI, AISC, EN, CICIND and other International Standards. <u>LIST OF CODES AND STANDARDS</u></div> <div>Excavation and Filling</div> <div>IS :2720 Methods of test for soils(relevant parts)</div> <div>IS:4701 Code of practice for earth work on canals.</div> <div>IS:9759 Guide lines for dewatering during construction.</div> <div>IS:10379 Code of practice for field control of moisture and compaction of soils for embankment and sub-grade.</div> <div>Properties, Storage and Handling of Common Building Materials</div> <div>IS:269 33 grade for ordinary Portland cement.</div> <div>IS:383 Coarse and fine aggregates from natural sources for concrete.</div> <div>IS:432 Specification for mild steel and medium tensile steel bars and</div> <div>(Part 1&2) hard drawn steel wires for concrete reinforcement.</div> <div>IS:455 Portland slag cement.</div> <div>IS:702 Industrial bitumen.</div> <div>IS:712 Specification for building limes.</div> <div>IS:1077 Common burnt clay buidling bricks.</div> <div>IS:1161 Steel tubes for structural purposes.</div> <div>IS:1239 Mild steel tubes, tubulars and other wrought steel fillting - MS tubes.</div> <div>IS:1363 Hexagon head bolts, screws and nuts of productions</div> <div>(Part 1-3) grade - C.</div> <div>IS:1364 Hexagon head bolts, screws and nuts of productions</div> <div>(Part 1-5) grade-A & B.</div>		


CLAUSE NO.	<div>एनटीपीसी NTPC</div> TECHNICAL REQUIREMENTS <div></div>			
	<div>IS:1367 (Part 1-18)</div>	Technical supply condition for threaded fasteners.		
	<div>IS:1489 (Part-I)</div>	Portland-pozzolana cement. Fly ash based		
	<div>IS:1542</div>	Sand for Plaster.		
	<div>IS:1566</div>	Hard drawn steel wire fabric for concrete reinforcement.		
	<div>IS:1786</div>	High strength deformed steel bars & wires for concrete reinforcement.		
	<div>IS:2062</div>	Hot Rolled Low, Medium and High Tensile Structural Steel		
	<div>IS:2116</div>	Sand for masonry mortars.		
	<div>IS : 2185 (Part 1) (Part 2)</div>	Hollow & solid concrete blocks. Hollow & solid light weight concrete blocks.		
	<div>IS:2386 (Part I-VIII)</div>	Testing of aggregates for concrete.		
	<div>IS:3812</div>	Specification for fly ash for use as pozzolona and admixture.		
	<div>IS:4082</div>	Recommendation on stacking and storage of construction materiel and components at site		
	<div>IS:8112</div>	43 grade ordinary portland cement.		
	<div>IS:8500</div>	Structural steel-Microalloyed (Medium and high strength qualities).		
	<div>IS:12269</div>	53 grade ordinary portland cement.		
	<div>IS:12894</div>	Specification for fly ash lime bricks.		
	<div>IS:13757</div>	Burnt clay fly ash building bricks.		
	Cast in-situ Concrete and Allied Works			
	<div>IS:280</div>	Mild steel wire for general engineering purpose.		
	<div>IS:456</div>	Code of practice for plain and reinforcement concrete.		
	<div>IS:457</div>	Code of practice for general construction of plain and reinforced concrete for dams and other massive structures.		
	<div>IS:516 IS:1199</div>	Method of test for strength of concrete. Methods of sampling and analysis of concrete.		
	<div>IS:1791</div>	General requirement for batch type concrete mixers.		
KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES		TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO. THDC/RKSH/CC-9915-371	SUB-SECTION-D-01 CIVIL WORKS	PAGE 106 OF 142


CLAUSE NO.	<div> TECHNICAL REQUIREMENTS </div>			
	<div><div>IS:1834</div><div>IS:1838</div><div>IS:2438</div><div>IS:2502</div><div>IS:2505</div><div>IS:2506</div><div>IS:2722</div><div>IS:2750</div><div>IS:2751</div><div>IS:3150</div><div>IS:3366</div><div>IS:3370 (Part 1-4)</div><div>IS:3558</div><div>IS:4014 (Part-1&2)</div><div>IS:4326</div><div>IS:4656</div><div>IS:4925</div><div>IS:4990</div><div>IS:5256</div><div>IS:5525</div><div>IS:6461</div><div>IS:6494</div><div>IS:6509</div><div>IS:7861 (Part -1&2)</div></div>	<div><div>Hot applied sealing compound for joints in concrete.</div><div>Preformed fillers for expansion joints in concrete pavement and structures.</div><div>Specification for roller pan mixers.</div><div>Code of practice for bending and fixing of bars for concrete reinforcement.</div><div>Concrete vibrators - immersion type.</div><div>General requirements for screed board concrete vibrators.</div><div>Specification for Portable Swing weigh batchers for concrete (single and double bucket type).</div><div>Steel scaffoldings</div><div>Recommended practice for welding of mild steel plain and deformed bars for reinforced construction.</div><div>Hexagonal wire netting for general purposes.</div><div>Specification for pan vibrators.</div><div>Code of practice for concrete structures for the storage of liquids.</div><div>Code of practice for use of immersion vibrators for consolidating concrete.</div><div>Code of practice for steel tubular scaffolding.</div><div>Code of practice for earth quake resistant design and construction of buildings.</div><div>Form vibrators for concrete.</div><div>Concrete batching and mixing plant.</div><div>Plywood for concrete shuttering work.</div><div>Code of practice for sealing expansion joints in concrete lining on canals.</div><div>Recommendations for detailing of reinforcement in reinforced concrete works.</div><div>Glossary of terms relating to cement concrete.</div><div>Code of practice for water proofing of underground reservoir and swimming pools.</div><div>Code of practice for installation of joints in concrete pavements.</div><div>Code of practice for extreme weather concreting.</div></div>		
KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES		TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO. THDC/RKSH/CC-9915-371	SUB-SECTION-D-01 CIVIL WORKS	PAGE 107 OF 142


CLAUSE NO.	TECHNICAL REQUIREMENTS		
	IS:9012 IS:9103	Recommended practice for shotcreting. Admixtures for concrete.	
	IS:9417	Recommendations for welding cold worked bars for reinforced concrete construction.	
	IS:10262	Recommended guidelines for concrete mix design.	
	IS:11384	Code of practice for composite construction in structural steel and concrete.	
	IS:12118	Two parts polysulphide based sealants.	
	IS:12200	Code of practice for provision of water stops at transverse construction joints in masonry and concrete dams.	
	IS:13311	Non destructive testing of concrete - methods of test.	
	(Part 1)	Ultrasonic pulse velocity.	
	(Part 2)	Rebound hammer.	
	SP-16	Design codes for reinforced concrete to IS:456-1978.	
	SP-23	Hand book of concrete mixes.	
	SP-24	Explanatory handbook on Indian standards code for plain and reinforced concrete. (IS : 456)	
	SP-34	Hand book on concrete reinforcement and detailing.	
	ACI-318	American Concrete Institute code for structural concrete.	
	Precast Concrete Works		
	SP:7 (Part 6/Sec.7)	National Building Code - Structural Design Prefabrication and system building and mixed / composite construction.	
	IS:10297	Code of practice for design and construction of floors and roofs using precast reinforced/prestressed concrete ribbed or cored slab units.	
	IS:10505	Code of practice for construction of floors and roofs using pre-cast reinforced concrete waffle units.	
	IS:15658	Pre-cast concrete block for paving.	
	Masonry & Allied Works		
	IS:1905	Code of practice for structural use of unreinforced masonry.	
	IS: 2185	Part-1 Concrete Masonry Units - Specification Part 1 Hollow and Solid Concrete Blocks Part-3 Specification for concrete masonry units: Part 2 Hollow and solid light weight concrete blocks.	
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CLAUSE NO.	<div> TECHNICAL REQUIREMENTS </div>			
	<div><div>IS:2212Code of practice for brick work.</div><div>IS:2250Code of practice for preparation and use of masonry mortars.</div><div>IS:2572Code of practice for construction of hollow concrete block masonry.</div><div>SP:20Hand book on masonry design and construction.</div><div>Sheeting Works</div><div>IS:277Galvanised steel sheets (Plan & corrugated).</div><div>IS:513Cold-rolled low carbon steel sheets & strips.</div><div>IS:730Hook bolts for corrugated sheet roofing.</div><div>IS:801Code of practice for use of cold formed light gauge steel structural members in general building construction.</div><div>IS:2527Code of practice for fixing rain water gutters and down pipe for roof drainage.</div><div>IS:7178Technical supply condition for tapping screw.</div><div>IS:8183Bonded mineral wool.</div><div>IS:8869Washers for corrugated sheet roofing.</div><div>IS:12093Code of practice for laying and fixing of sloped roof covering using plain and corrugated galvanised steel sheets.</div><div>IS:12436Preformed rigid Polyurethane (PUR) and isocyanurate (PIR) foams for thermal insulation.</div><div>IS:12866Plastic translucent sheets made from thermosetting polyester resin (glass fibre reinforced).</div><div>IS:14246Continuously pre-painted galvanised steel sheets and coils.</div><div>BS:5950Code of practice for design of light gauge profiled</div><div>(Part-6)steel sheeting</div><div>Fabrication and Erection of Structural Steel Works</div><div>IS:800Code of practice for General Construction of steel.</div><div>IS:813Scheme for symbols for welding.</div><div>IS:814Covered electrodes for manual metal arc welding of carbon & carbon manganese steel.</div><div>IS:816Code of practice for use of metal arc welding for general construction in mild steel.</div></div>			
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CLAUSE NO.	TECHNICAL REQUIREMENTS		
	IS:817	Code of practice for training and testing of metal arc welders.	
	IS:1024	Welding in bridges and substructured subject to dynamic.	
	IS:1181	Qualifying tests for Metal Arc welders (engaged in welding structures other than pipes).	
	IS:1182	Recommended practice for Radiographic examination of fusion welded butt joints in steel plates	
	IS:1608	Mechanical testing of metals - tensile testing	
	IS:1852	Rolling and Cutting Tolerances for Hot rolled steel products.	
	IS:2016	Specification for Plain washers.	
	IS:2595	Code of practice for Radiographic testing	
	IS:2629	Hot dip galvanising of iron and steel	
	IS:3502	Steel chequered plate.	
	IS:3613	Acceptance tests for wire flux combination for submerged arc welding.	
	IS:3658	Code of practice for liquid penetrant flaw detection.	
	IS:3664	Code of practice for ultra sonic pulse echo testing contact and immersion method	
	IS:3757	High strength structural bolts.	
	IS:4000	High strength bolts in steel structure - code of practice.	
	IS:4353	Sub merged arc welding of mild steel and low alloy steel Recommendation	
	IS:4759	Hot dip zinc coating on structural steel and other allied products.	
	IS:5334	Code of practice for magnetic particle flaw detection of welds.	
	IS:5369	General requirements for plain washers and lock washer	
	IS : 6623	High strength structural nuts.	
	IS:6649	Hardened and tampered washers for high strength structural bolts & nuts.	
	IS:6911	Stainless steel plate, sheet and strip.	
	IS:7205	Safety code for erection of structural steel.	
	IS:7215	Tolerances for fabrication of structural steel.	
	IS:7307	Approved test for welding procedures	
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CLAUSE NO.	TECHNICAL REQUIREMENTS		
	(Part - I)	Fusion welding of steel.	
	IS:7310 (Part-I)	Approval test for welders working to approval welding procedure. Fusion welding of steel	
	IS:9178 (Part-1to 3)	Criteria for design of steel bins for storage of bulk material.	
	IS:9595	Recommendations for metal arc welding of carbon & carbon manganese steel.	
	IS:12843	Tolerances for erection of steel structures.	
	SP:6 (Part 1 to 7)	ISI Hand book for structural Engineers.	
	Plastering and Allied Works		
	IS:1661	Code of practice for application of cement and cement lime plaster finishes.	
	IS:2402	Code of practice for external rendered finishes.	
	IS:2547 (Parts 1&2)	Gypsum building plaster.	
	Acid and Alkali Resistant Lining		
	IS:158	Ready mixed paint, brushing, bituminous, black, lead free, acid, alkali & heat resisting.	
	IS:412	Expanded metal steel sheets for general purpose.	
	IS:4441	Code of practice for use of silica type chemical resistant mortars.	
	IS:4443	Code of practice for use of resin type chemical resistant mortars.	
	IS:4456 (Part I & II)	Method of Test for chemical resistant tiles.	
	IS:4457	Ceramic unglazed vitreous acid resisting tiles.	
	IS:4832	Specification for chemical resistant mortars.	
	(Part - 1)	Silicate type	
	(Part - 2)	Resin type	
	(Part - 3)	Sulfur type	
	IS:4860	Acid resistant bricks.	
	IS:9510	Bitumastic acid resisting grade.	
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CLAUSE NO.	TECHNICAL REQUIREMENTS			
	Water Supply, Drainage and Sanitation			
	IS:458	Precast concrete pipes (with & without reinforcement).		
	IS:554	Pipe threads where pressure tight joints are made on the threads – dimensions, tolerances and designation.		
	IS:651	Salt glazed stoneware pipes and fittings.		
	IS:774	Flushing cisterns for water closets and urinals.		
	IS:775	Cast iron brackets and supports for wash basins and sinks.		
	IS:778	Copper alloy gate, globe and check valves for water works purposes.		
	IS:781	Cast copper alloy screw down bib taps & stop valves for water services.		
	IS:782	Caulking lead.		
	IS:783	Code of practice for laying of concrete pipes.		
	IS:1172	Code of basic requirements of water supply, drainage and sanitation.		
	IS:1230	Cast iron rain water pipes and fittings.		
	IS:1239 (Part 1&2)	Mild Steel tubes, tubulars and other wrought steel fittings		
	IS:1536	Centrifugally cast (Spun) iron pressure pipes for water.		
	IS:1537	Vertically cast iron pressure pipes for water, gas and sewage.		
	IS:1538	Cast iron fittings for pressure pipe for water, gas and sewage.		
	IS:1703	Copper alloy float valve for water supply fitting.		
	IS:1726	Cast iron manhole covers and frames.		
	IS:1729	Cast iron / Ductile iron drainage pipes and pipe/fittings for over ground non pressure pipeline socket and spigot series.		
	IS:1742	Code of practice for building drainage.		
	IS:2064	Selection, installation and maintenance of sanitary appliances.		
	IS:2065	Code of practice for water supply in buildings.		
	IS:2326	Automatic flushing cisterns for urinals.		
	IS:2548	Plastic seats and covers for water closets.		
	IS:2556	Vitreous sanitary appliances (vitreous china).		
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CLAUSE NO.	<div>एन टी पी सी NTPC</div> <div>TECHNICAL REQUIREMENTS</div> <div></div>			
	<div>IS:3114</div> <div>IS:3311</div> <div>IS:3438</div> <div>IS:3486</div> <div>IS:3589</div> <div>IS:3989</div> <div>IS:4111 (Part 1 to 5)</div> <div>IS:4127</div> <div>IS : 4733</div> <div>IS:4764</div> <div>IS:1068</div> <div>IS:5329</div> <div>IS:5382</div> <div>IS:5822</div> <div>IS:5961</div> <div>IS:7740</div> <div>IS:8931</div> <div>IS:9762</div> <div>IS:10592</div> <div>IS:12592</div> <div>IS:12701</div> <div>IS:13983</div> <div>SP:35</div>	<div>Code of practice for laying of cast iron pipes.</div> <div>Waste plug and its accessories for sinks and wash basins.</div> <div>Silvered glass mirrors for general purposes.</div> <div>Cast iron spigot and socket drain pipes.</div> <div>steel pipe for water and sewage (168.3 to 2540mm outside diameter)</div> <div>Centrifugally cast (Spun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.</div> <div>Code of practice for ancillary structure in sewerage system.</div> <div>Code of practice for laying of glazed stone ware pipes.</div> <div>Methods of sampling and testing sewage effluents.</div> <div>Tolerance limits for sewage effluents discharged into inland surface waters.</div> <div>Electroplated coating of nickel plus chromium and copper plus nickel plus chromium.</div> <div>Code of practice for sanitary pipe work above ground for buildings.</div> <div>Rubber sealing rings for gas mains, water mains and sewers.</div> <div>Code of practice for laying of electrically welded steel pipes for water supply.</div> <div>Specification for cast iron grating for drainage purpose.</div> <div>Code of practice for construction and maintenance of road gullies.</div> <div>Copper alloy fancy single taps combination tap assembly and stop valves for water services.</div> <div>Polyethylene floats for float valves.</div> <div>Industrial emergency showers, eye and face fountains and combination units.</div> <div>Specification for precast concrete manhole covers and frames.</div> <div>Rotational moulded polyethylene water storage tanks.</div> <div>Stainless steel sinks for domestic purposes.</div> <div>Hand book on water supply and drainage with special emphasis on plumbing.</div>		
KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES		<div>TECHNICAL SPECIFICATION</div> <div>SECTION – VI, PART-B</div> <div>BID DOC NO. THDC/RKSH/CC-9915-371</div>	<div>SUB-SECTION-D-01</div> <div>CIVIL WORKS</div>	<div>PAGE</div> <div>113 OF 142</div>



CLAUSE NO.	TECHNICAL REQUIREMENTS		
	<div>CPH&EEOManual on sewage and sewage treatment</div> <div>Publication-as updated.</div> <div>Doors Windows and Allied Works</div> <div>IS:204Tower Bolts.</div> <div>(Part 1)Ferrous metals</div> <div>(Part 2)Non - ferrous metals</div> <div>IS:208Door Handles.</div> <div>IS:281Mild steel sliding door bolts for use with padlocks.</div> <div>IS:362Parliament Hinges.</div> <div>IS:419Putty, for use on window frames.</div> <div>IS:451Technical supply conditions for wood screws</div> <div>IS:733Wrought aluminium and aluminium alloy bars, rods and sections for general engineering purposes.</div> <div>IS:1003 (Part I)Timber panelled and glazed shutters (doors shutters).</div> <div>IS:1003 (Part-1)Timber panelled and glazed shutters door shutters.</div> <div>IS:1038Steel doors, windows and ventilators.</div> <div>IS:1081Code of practice for fixing and glazing of metal (steel and aluminium) doors, windows and ventilators.</div> <div>IS:1285Wrought aluminium and aluminium alloy extruded round tube & hollow section (for general engineering purposes).</div> <div>IS:1341Steel butt hinges.</div> <div>IS:1361Steel windows for Industrial buildings.</div> <div>IS:1823Floor door stoppers.</div> <div>IS:1868Anodic coatings on Aluminium and its alloys.</div> <div>IS:2202 (Part-2)Wooden flush door shutters (solid core type) particle board face panels and hard board face panels.</div> <div>IS:2209Mortice locks (vertical type)</div>		
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CLAUSE NO.	<div> TECHNICAL REQUIREMENTS </div>			
	<div><div>IS:2553</div><div>Safety glass.</div></div> <div><div>(Part-1)</div><div>General purposes</div></div> <div><div>IS:2835</div><div>Flat transparent sheet glass.</div></div> <div><div>IS:3548</div><div>Code of practice for glazing in buildings.</div></div> <div><div>IS:3564</div><div>Door closers (Hydraulically regulated)</div></div> <div><div>IS:3614</div><div>Specification for fire check doors :</div></div> <div><div>(Part-1)</div><div>plate, metal covered and rolling type.</div></div> <div><div>(Part-2)</div><div>Resistance test and performance criteria.</div></div> <div><div>IS:4351</div><div>Specification for steel door frames.</div></div> <div><div>IS:5187</div><div>Flush bolts.</div></div> <div><div>IS:5437</div><div>Figured, rolled and wired glass.</div></div> <div><div>IS:6248</div><div>Specification for metal rolling shutters and rolling grills.</div></div> <div><div>IS:6315</div><div>Specification for floor springs (Hydraulically regulated) for heavy doors.</div></div> <div><div>IS:7196</div><div>Hold fast.</div></div> <div><div>IS:7452</div><div>Hot rolled steel sections for doors, windows and ventilators.</div></div> <div><div>IS:10019</div><div>Mild steel stays and fasteners.</div></div> <div><div>IS:10451</div><div>Steel sliding shutters (top hung type)</div></div> <div><div>IS:12823</div><div>Prelaminated particle boards.</div></div> <div><div>Roof Water Proofing and Allied Works</div></div> <div><div>IS:3067</div><div>code of practice for general design details and preparatory work for damp proofing and water proofing of buildings.</div></div> <div><div>ASTM</div><div>Standard specification for high solid content cold</div></div> <div><div>C836-89a</div><div>liquid applied elastomeric water proofing membrane for use with separate wearing course.</div></div> <div><div>ASTM</div><div>Standard guide for high solid content cold</div></div> <div><div>C898-89</div><div>liquid applied elastomeric water proofing membrane for use with separate wearing course.</div></div>			
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CLAUSE NO.	<div><div></div><div>TECHNICAL REQUIREMENTS</div><div></div></div>		
	<div><div>Floor Finishes and Allied Works</div><div><div>IS:5318</div><div>Code of practice for laying of flexible PVC sheet and tile flooring.</div></div><div><div>IS:8042</div><div>White portland cement.</div></div><div><div>IS:13755</div><div>Dust pressed ceramic tiles with water absorption of 3%, E 6% (Group B11a).</div></div><div><div>IS:13801</div><div>Chequered cement concrete tiles.</div></div><div>Painting and Allied Works</div><div><div>IS:162</div><div>Ready mixed paint, brushing fire resisting, silicate type for use on wood, colour as required.</div></div><div><div>IS:428</div><div>Distemper, oil, emulsion, colour as required.</div></div><div><div>IS:1477</div><div>Code of practice for painting of ferrous metals in buildings.</div></div><div><div>(Part -1)</div><div>Pretreatment.</div></div><div><div>(Part -2)</div><div>Painting.</div></div><div><div>IS:1650</div><div>Specification for colours for building and decorative materials.</div></div><div><div>IS:2074</div><div>Ready mixed paint, air drying, red oxide-zinc chrome, priming.</div></div><div><div>IS:2338</div><div>Code of practice for finishing of wood and wood based materials.</div></div><div><div>(Part -1)</div><div>Operations and Workmanship.</div></div><div><div>(Part -2)</div><div>Schedule.</div></div><div><div>IS:2395</div><div>Code of practice for painting concrete, masonry and plaster surfaces.</div></div><div><div>(Part-1)</div><div>Operations and Workmanship.</div></div><div><div>(Part -2)</div><div>Schedule.</div></div><div><div>IS:2524</div><div>Code of practice for painting of nonferrous metals in buildings.</div></div><div><div>(Part -1)</div><div>Pretreatment</div></div><div><div>(Part -2)</div><div>Painting.</div></div><div><div>IS:2932</div><div>Enamel, synthetic, exterior, (a) under coating and (b) finishing.</div></div><div><div>IS:2933</div><div>Enamel exterior, (a) under coating, (b) finishing.</div></div><div><div>IS:4759</div><div>Hot dip zinc coatings on structural steel and other allied products.</div></div><div><div>IS:5410</div><div>Specification for cement paint.</div></div></div>		
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CLAUSE NO.	<div> TECHNICAL REQUIREMENTS </div>			
	<div><div>IS:15489</div><div>Plastic emulsion paint.</div></div> <div><div>IS:6278</div><div>Code of practice for white washing and Colour washing.</div></div> <div><div>IS:10403</div><div>Glossary of term related to building finish.</div></div> <div><div>IS:12027</div><div>Silicone based water repellent</div></div> <div><div>IS:13238</div><div>Epoxy based zinc phosphate primer (2 pack)</div></div> <div><div>IS:13239</div><div>Epoxy surfacer (2 pack)</div></div> <div><div>IS:13467</div><div>Chlorinated rubber for paints</div></div> <div><div>IS:14209</div><div>Epoxy enamel, two component glossy.</div></div> <div><div>BS:5493</div><div>Code of practice for protective coating of iron and steel structures against corrosion.</div></div> <div><div>Piling and Foundation</div></div> <div><div>IS:1080</div><div>Code of practice for design and construction of shallow foundations on soils.</div></div> <div><div>IS:1904</div><div>Code of practice for design and construction of foundation in Soils : General Requirements.</div></div> <div><div>IS:2314</div><div>Steel sheet piling sections.</div></div> <div><div>IS:2911</div><div>Code of practice for design and construction of pile foundations. (Relevant Parts)</div></div> <div><div>IS:2950</div><div>Code of practice for designs and construction of Raft foundation.</div></div> <div><div>(Part-1)</div><div>Design</div></div> <div><div>IS:2974 (Part-1 to 5)</div><div>Code of practice for design and construction of machine foundation.</div></div> <div><div>IS:4091</div><div>Code of practice for design and construction foundations for transmission line towers and poles.</div></div> <div><div>IS:6403</div><div>Code of practice for determination of Bearing capacity of Shallow foundations.</div></div> <div><div>IS:8009</div><div>Code of practice for calculation of settlement of foundation.</div></div> <div><div>(Part -1)</div><div>Shallow foundations.</div></div> <div><div>(Part -2)</div><div>Deep foundations.</div></div> <div><div>IS:12070</div><div>Code of practice for design and construction of shallow foundations on rocks.</div></div>			
<div><div><div>KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES</div></div></div>		<div><div>TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO. THDC/RKSH/CC-9915-371</div></div>	<div><div>SUB-SECTION-D-01 CIVIL WORKS</div></div>	<div><div>PAGE 117 OF 142</div></div>

CLAUSE NO.	TECHNICAL REQUIREMENTS		
	ISO 10816	Criteria for assessing mechanical vibrations of machines.	
	ISO 1940	Criteria for assessing the st of balance of rotating rigid bodies.	
	DIN : EN 13906-1	Helical compression spring made of round wire and rod : calculation and design of compression .	
	DIN:2096	Helical compression spring out of round wire and rod : Quality requirements for hot formed compression spring.	
	DIN:4024	Flexible supporting structures for machine with rotating machines.	
	Roads		
	IRC:5 (Section-1)	Standard specifications and Code of practice for road bridges, General Features of Design.	
	IRC:14	Recommended practice for 2cm thick bitumen and tar carpets.	
	IRC:15	Standard specifications and code of practice for construction of concrete roads.	
	IRC:16	Specification for priming of base course with bituminous primers.	
	IRC:19	Standard specifications and Code of practice for water bound macadam.	
	IRC:21 (Section-III)	Standard specifications and Code of practice for road bridges. Cement concrete (plain and reinforced).	
	IRC:34	Recommendations for road construction in water logged areas.	
	IRC:36	Recommended practice for the construction of earth embankments for road works.	
	IRC:37	Guidelines for the Design of flexible pavements.	
	IRC:56	Recommended practice for treatment of embankment slopes for erosion control.	
	IRC:58	Guidelines for the design of rigid pavements for highways.	
	IRC:73	Geometric Design standards for rural (non-urban) highways.	
	IRC : 86	Geometric Design standards for urban roads in plains.	
	IRC:SP:13	Guidelines for the design of small bridges & culverts.	
	IRC - Publication	Ministry of Surface Transport (Road wing), specifications for road and bridge works.	
KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES		TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO. THDC/RKSH/CC-9915-371	SUB-SECTION-D-01 CIVIL WORKS PAGE 118 OF 142

CLAUSE NO.	<div><div></div><div>TECHNICAL REQUIREMENTS</div><div></div></div>		
	<div><div><div>IS:73</div><div>Paving bitumen.</div></div><div>Loading</div><div><div>IS:875</div><div>Code of practice for design loads (other than earthquake) for (Relevant parts) buildings and structures.</div></div><div><div>IS:1893</div><div>Criteria for earthquake resistant design of structures.</div></div><div><div>IS:4091</div><div>Code of practice for design and construction of foundation for transmission line towers and poles.</div></div><div><div>IRC:6 (Section-II)</div><div>Standard specifications & Code of practice for road bridges. loads and stresses</div></div><div>Safety</div><div><div>IS:1641</div><div>Code of practice for fire safety of buildings - General principles of fire grading and classification.</div></div><div><div>IS:1642</div><div>Code of practice for fire safety of buildings - Details of construction.</div></div><div><div>IS:3696 (Part-1&2)</div><div>Safety code for scaffolds and ladders.</div></div><div><div>IS:3764</div><div>Excavation work - code of safety.</div></div><div><div>IS:4081</div><div>Safety code for blasting and related drilling operations.</div></div><div><div>IS:4130</div><div>Demolition of buildings - code of safety.</div></div><div><div>IS:5121</div><div>Safety code for piling and other deep foundations.</div></div><div><div>IS:5916</div><div>Safety code for construction involving use of hot bituminous materials.</div></div><div><div>IS:7205</div><div>Safety code for erection of structural steel work.</div></div><div><div>IS:7293</div><div>Safety code for working with construction machinery.</div></div><div><div>IS:7969</div><div>Safety code for handling and storage of building materials.</div></div><div><div>Indian Explosives Act 1940)</div><div>(As updated)</div></div><div>Architectural Design of Buildings</div><div><div>SP:7</div><div>National Building Code of India</div></div><div><div>SP:41</div><div>Hand book on functional requirements of buildings (other than industrial buildings)</div></div></div>		
KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES		TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO. THDC/RKSH/CC-9915-371	SUB-SECTION-D-01 CIVIL WORKS
			PAGE 119 OF 142

CLAUSE NO.	TECHNICAL REQUIREMENTS			
	<div><div>ECBC</div><div>Energy Conservation Building Code</div></div> <div><div>GRIHA</div><div>Green Rating For Integrated Habitat Assessment.</div></div> <div><div>Chimney</div><div></div></div> <div><div>IS:4998</div><div>Criteria for design of reinforced chimneys</div></div> <div><div>IS:6533</div><div>Code of practice for design and construction of steel chimneys</div></div> <div><div>ICAO</div><div>International Civil Aviation Organisation (ICAO)</div></div> <div><div>DGCA</div><div>Instruction of Director General of Civil Aviation , India</div></div> <div><div>ACI:307</div><div>Specification for the design and construction of reinforced concrete chimneys</div></div> <div><div>BS:4076</div><div>Specification for steel chimneys</div></div> <div><div>CICIND</div><div>Model Code for concrete chimneys Model code for steel chimneys</div></div> <div><div>ASCE Code</div><div>Design and construction of steel chimney liners prepared by Task committee on steel chimney liners. Fossil power committee, Power division published by ASCE - 1975.</div></div> <div><div>IS:1554</div><div>PVC insulated (heavy duty) electric cables</div></div> <div><div>IS:2606</div><div>Alloy lead anodes for chromium plating</div></div> <div><div>IS:3043</div><div>Code of Practice for Earthing</div></div> <div><div>IS:9537</div><div>Conduits for electrical installations. The Indian Electricity Rules The Indian Electricity Act The Indian Electricity (Supply) Act The Indian Factories Act</div></div> <div><div>IS:2309</div><div>Practice for protection of buildings and allied structures against lightning</div></div> <div><div>Miscellaneous</div><div></div></div> <div><div>IS:802 (Relevant parts)</div><div>Code of practice for use of structural steel in overhead trans- mission line towers.</div></div> <div><div>IS:803</div><div>Code of practice for design, fabrication and erection of vertical mild steel cylindrically welded in storage tanks.</div></div> <div><div>IS:10430</div><div>Criteria for design of lined canals and guidance for selection of type of lining.</div></div>			
KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES		TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO. THDC/RKSH/CC-9915-371	SUB-SECTION-D-01 CIVIL WORKS	PAGE 120 OF 142

CLAUSE NO.	<div><div></div><div>TECHNICAL REQUIREMENTS</div><div></div></div>	
	<div>IS:11592</div> <div>IS:12867</div> <div>IS 11504</div> <div>BS:4485 (IV)</div> <div>CIRIA Publication IS 4671</div>	<div>Code of practice for selection and design of belt conveyors.</div> <div>PVC handrails covers.</div> <div>Criteria for structural design of reinforced concrete natural draught cooling towers</div> <div>British Standard : Code of design for water cooling towers</div> <div>Design and construction of buried thin-wall pipes.</div> <div>Expanded polystyrene for thermal insulation purposes.</div>
<div><div><div>KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES</div></div><div><div>TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO. THDC/RKSH/CC-9915-371</div></div><div><div>SUB-SECTION-D-01 CIVIL WORKS</div></div><div><div>PAGE 121 OF 142</div></div></div>		

CLAUSE NO.	<div></div> <div>TECHNICAL REQUIREMENTS</div> <div></div>		
	<div>ANNEXURE (B)</div> <div>CONSTRUCTION METHODOLOGY</div> <p>Construction and erection activities shall be fully mechanized from the start of the work.</p> <p>All excavation and backfilling work shall be done using excavators, loaders, dumpers, dozers, poclains, excavator mounted rock breakers, rollers, sprinklers, water tankers, etc. Manual excavation can be done only on isolated places with specific approval of engineer.</p> <p>For controlled rock blasting specialized agency, equipped with sensors to assess the impact of the blast on the adjoining existing structures, shall be employed.</p> <p>Dewatering shall be done using the combination of electrical and standby diesel pumps.</p> <p>Pile installation equipment suitable for flushing with air lift technique shall be used for construction of bored piles.</p> <p>For concreting, weigh batching plants, transit mixers, concrete pumps, hoists, etc. shall be used.</p> <p>All fabrication and erection activities of structural steel shall be carried out using automatic submerged arc welding machines, cutting machines, gantry cranes, crawler mounted heavy cranes and other equipment like heavy plate bending machines, shearing machines, lathe, milling machines, etc. Use of derricks shall not be permitted. Special enclosures, for blast cleaning of steel structure surface preparation, shall be used.</p> <p>All handling of materials shall be with cranes. Heavy trailers shall be used for transportation.</p> <p>Mechanized modular units of scaffolding and shuttering shall be used.</p> <p>Grouting shall be carried out using hydraulically controlled grouting equipment.</p> <p>Roadwork shall be done using pavers, rollers and premix plant.</p> <p>All finishing items shall be installed using appropriate modern mechanical tools. Manual punching etc. shall not be permitted.</p> <p>Heavy duty hoists for lifting of construction materials shall be deployed. Compressors for cleaning of foundations and other surfaces shall be used.</p> <p>Field laboratory shall be provided with all modern equipment for survey, testing of soil, aggregates, concrete, welding, etc. For testing of steel works, ultrasonic testing machines, radiographic testing machines, dye penetration test equipment, destruction testing equipment, etc. shall be deployed.</p> <p>All persons working at site shall be provided with necessary safety equipment and all safety aspects shall be duly considered for each construction/ erection activity. Moreover, only the persons who are trained in the respective trade shall be employed for executing that particular work.</p>		
KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES	TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO. THDC/RKSH/CC-9915-371	SUB-SECTION-D-01 CIVIL WORKS	PAGE 122 OF 142

CLAUSE NO.		<div><div><div>एनटीपीसी</div><div>NTPC</div></div><div><div>एनटीपीसी</div><div>NTPC</div></div></div> <div>TECHNICAL REQUIREMENTS</div>		<div><div>ANNEXURE- (C)</div><div>BORE LOG DATA</div></div>	
<div><div><div><div><div>Geotechnical Investigation for Proposed 2X660 MW Khurja Thermal Power Project at Khurja, Uttar Pradesh</div><div>M/s. THDC India Limited</div></div><div><div>ISO/IEC 17025:2005</div><div>Certified Laboratory</div><div>(NABL)</div><div>Certificate No. T-1741</div></div><div><div><div>खुरजा, उ.प्र.</div><div>UTM Coordinates : 785926 E, 3118909 N</div></div><div><div>Soil Profile (BH-4)</div><div>Termination Depth : 35.45 m (m)</div><div>Ground Water Depth : 5.50 m</div></div><div><div>Drilling Method : Shell & Auger</div><div>Casing Depth : 32.0 m</div><div>Boring Start : 07-Jan-18</div><div>Boring Finish : 08-Jan-18</div></div></div></div></div></div>		<div><div><div><div><div>Depth, m</div><div>To</div><div>From</div></div><div>0.00</div><div>0.50</div><div>1.00</div><div>1.45</div><div>2.00</div><div>2.45</div><div>3.00</div><div>3.45</div><div>4.00</div><div>4.45</div><div>5.00</div><div>5.45</div><div>6.00</div><div>6.45</div><div>7.00</div><div>7.45</div><div>8.00</div><div>8.45</div><div>9.00</div><div>9.45</div><div>10.00</div><div>10.45</div><div>11.00</div><div>11.45</div><div>12.00</div><div>12.45</div><div>13.00</div><div>13.45</div><div>14.00</div><div>14.45</div><div>15.00</div><div>15.45</div><div>16.00</div><div>16.45</div></div><div>Sample No.</div><div>DS1</div><div>UDS1</div><div>SPT1</div><div>UDS2</div><div>SPT2</div><div>DS2</div><div>SPT3</div><div>DS3</div><div>SPT4</div><div>DS4</div><div>SPT5</div><div>DS5</div></div><div>SPT⁽¹⁾</div><div>Field Value, N₆₀</div><div>Corrected Value, N₆₀</div><div>11</div><div>15</div><div>17</div><div>21</div><div>31</div></div>		<div><div><div><div><div>SOIL DESCRIPTION</div><div>Stiff grey sandy with gravels, low plastic (CL)</div><div>Medium dense grey silty fine sand (SM)</div><div>Medium dense to dense grey fine sand (SP-SM)</div><div>- medium dense, 7.0 to 14.0 m</div><div>- dense, 14.0 to 16.5 m</div></div><div>Symbol</div><div><div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div><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⁽¹⁾ SPT is outside NABL scope

CLAUSE NO.



TECHNICAL REQUIREMENTS



Geotechnical Investigation for Proposed 2X660 MW Khurja Thermal Power Project at Khurja, Uttar Pradesh
M/s. THDC India Limited

Soil Profile (BH-4)



ISO/IEC 17025:2005
Certified Laboratory
(NABL)
Certificate No. T-1741

Location : Khurja, U.P.
UTM Coordinates : 785928 E, 3118909 N

Boring Method : Shell & Auger
Casing Depth : 32.0 m
Boring Start : 07-Jan-18
Boring Finish : 08-Jan-18

Termination Depth : 35.45 m (m)
Ground Water Depth : 5.50 m

Depth, m	Sample No.	SPT ⁽¹⁾		SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
		Field Value, N _f	Corrected Value, N _c			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm ³)	Dry Density (gms/cm ³)	Moisture Content (%)		Type of Test	Confining Pressure, (kg/cm ²)	Cohesion Intercept, 'c' (kg/cm ²)	Angle of Internal Friction, ϕ (degrees)	
17.00	SP16	45	36	Dense to very dense brown silty fine sand (SM)		0	84	16	0				2.00	1.75	14.5						
19.00	DS6			- dense, 17.0 to 23.0 m																	
20.00	SP17	48	36																		
22.00	UDS3																				
23.00	SP18	59	42	- very dense, 23.0 to 29.0 m																	
25.00	DS7																				
26.00	SP19	100/20cm	-																		
28.00	DS8																				
29.00	SP110	34	22	- dense, 29.0 to 32.0 m																	
31.00	DS9																				
32.00	SP111	57	35	- very dense, 32.0 to 34.5 m																	
34.00	DS10																				

⁽¹⁾ SPT is outside MSL scope.

KHURJA SUPER THERMAL POWER PROJECT
(2X660 MW)
TURBINE GENERATOR AND ASSOCIATED PACKAGES

TECHNICAL SPECIFICATION
SECTION – VI, PART-B
BID DOC NO. THDC/RKSH/CC-9915-371

SUB-SECTION-D-01
CIVIL WORKS

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CLAUSE NO.	<div><div><div><div><div><div></div><div>एनटीपीसी</div><div>NTPC</div></div></div><div><div><div></div><div>एनटीपीसी</div><div>NTPC</div></div></div></div><div><div><div></div><div>TECHNICAL REQUIREMENTS</div></div></div></div><div><div><div><div><div></div><div>एनटीपीसी</div><div>NTPC</div></div></div><div><div><div></div><div>एनटीपीसी</div><div>NTPC</div></div></div></div><div><div><div></div><div>एनटीपीसी</div><div>NTPC</div></div></div></div></div>	
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⁽¹⁾ SPT is outside NABL scope

CLAUSE NO.



TECHNICAL REQUIREMENTS



Depth, m	Sample No.	SPT ⁽¹⁾	Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
						Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm ³)	Dry Density (gms/cm ³)	Moisture Content (%)		Type of Test	Confining Pressure, (kg/cm ²)	Cohesion Intercept, 'c' (kg/cm ²)	Angle of Internal Friction, ϕ (degrees)	
0.00	DS1			Stiff brown sandy silt with gravels, low plastic (CL)	4.00	5	40	48	7				1.90	1.71	11.0						
1.00	UDS1																				
2.00	SPT1	10	13																		
4.00	UDS2			Medium dense brown silty fine sand (SM)									1.93	1.67	16.1						
5.00	SPT2	18	19			0	83	17	0												
7.00	DS2																				
8.00	SPT3	15	14																		
*0.00	DS3																				
11.00	SPT4	15	13			0	58	41	1												
*3.00	DS4																				
*4.00	SPT5	12	10			0	80	20	0												
*6.00	DS5																				

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SUB-SECTION-D-01
CIVIL WORKS








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Depth, m	Sample No.	SPT ⁽¹⁾		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
		Field Value, N _f	Corrected Value, N ^a				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm ³)	Dry Density (gms/cm ³)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm ²)	Cohesion Intercept, 'c' (kg/cm ²)	Angle of Internal Friction, ϕ (degrees)	Free Swell Index, (%)
From	To	35	28		Dense brown silty fine sand (SM)	17.50															
	17.00	17.45	SPT6																		
	17.50	17.70	DS6		Hard brown silty clay, high plastic (CH)	19.00															
	19.00	20.00	DS7																		
	20.00	20.45	SPT7		Dense to very dense grey fine sand (SP-SM)																
	22.00	22.35	UDS3																		
	23.00	23.45	SPT8		- dense, 19.0 to 26.0 m		0	94	5	0	52.0	27.5	24.5								
	25.00	25.50	DS8																		
	26.00	26.45	SPT9		- very dense, 26.0 to 29.0 m																
	28.00	29.00	DS9																		
	29.00	29.45	SPT10		- dense, 29.0 to 32.0 m		0	89	11	0				1.96	1.67	17.7					
	31.00	32.00	DS10																		
	32.00	32.45	SPT11		- very dense, 32.0 to 34.0 m																

⁽¹⁾ SPT is outside NABL scope.

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Geotechnical Investigation for Proposed 2X660 MW Khurja Thermal Power Project at Khurja, Uttar Pradesh
M/s. THDC India Limited

Soil Profile (BH-6)



ISO/IEC 17025:2005
Certified Laboratory
(NABL)
Certificate No. T-1741

Location : Khurja, U.P.
UTM Coordinates : 786940 E, 3118715 N

Boring Method : Shell & Auger
Casing Depth : 48.5 m
Boring Start : 10-Jan-18
Boring Finish : 12-Jan-18

Termination Depth : 50.32m (m)
Ground Water Depth : 5.80 m

Depth, m	Sample No.	SPT ⁽¹⁾	Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Shear Tests					Free Swell Index, (%)
						Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm ³)	Dry Density (gms/cm ³)	Moisture Content (%)	Specific Gravity	Type of Test	Confining Pressure, (kg/cm ²)	Cohesion Intercept, 'c' (kg/cm ²)	Angle of Internal Friction, ϕ (degrees)	
34.00	DS11				41.00	0	80	20	0												
35.00	SPT12	51	30	Very dense grey fine sand (SP-SM)																	
37.00	DS12																				
38.00	SPT13	73	41																		
40.00	DS13																				
41.00	SPT14	109/20cm	-	Very dense brown silty fine sand (SM)	50.32																
43.00	DS14																				
44.00	SPT15	103/16cm	-																		
46.00	DS15																				
47.00	SPT16	101/20cm	-																		
49.00	DS16																				
50.00	SPT17	107/17cm	-																		

⁽¹⁾ SPT is outside NABL scope

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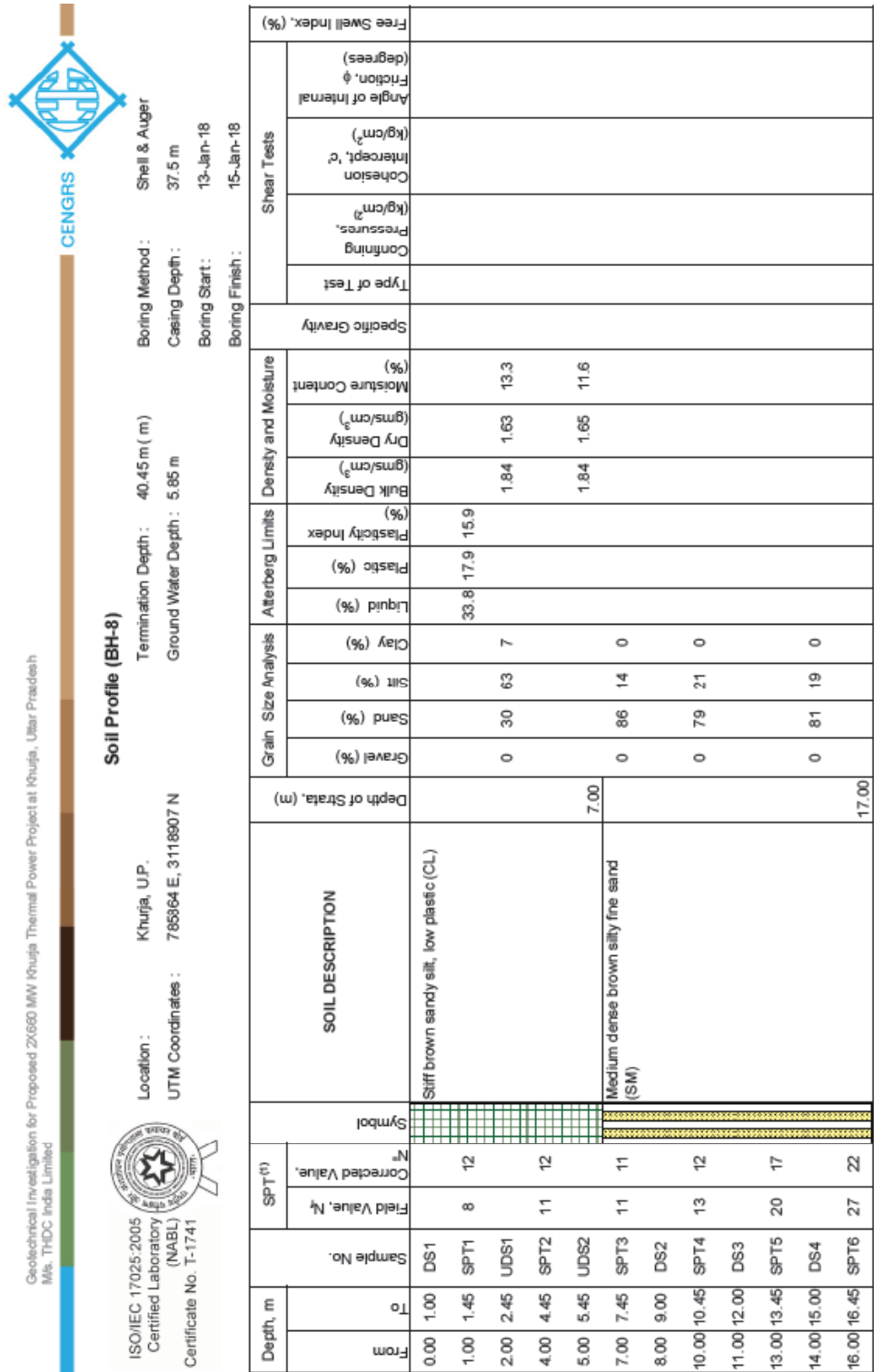
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⁽¹⁾ SPT is outside NABL scope.

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Geotechnical Investigation for Proposed 2X660 MW Khurja Thermal Power Project at Khurja, Uttar Pradesh
M/s. THDC India Limited

Soil Profile (BH-9)



Location : Khurja, U.P.
UTM Coordinates : 785846 E, 3118762 N

Termination Depth : 50.43 m (m)
Ground Water Depth : 5.00 m

Boring Method : Shell & Auger
Casing Depth : 46.0 m
Boring Start : 04-Jan-18
Boring Finish : 08-Jan-18

Depth, m	Sample No.	SPT ⁽¹⁾		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
		Field Value, N ₆₀	Corrected Value, N ₆₀				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm ³)	Dry Density (gms/cm ³)	Moisture Content (%)		Type of Test	Confining Pressure, (kg/cm ²)	Cohesion Intercept, 'c' (kg/cm ²)	Angle of Internal Friction, ϕ (degrees)	
0.00	DS1				Loose to medium dense grey silty fine sand (SM)												2.68	DS	0.5, 1, 1.5	0.0	36.0	
1.00	SPT1	9	14		- loose, 0.0 to 3.0 m		0	81	19	0				1.86	1.72	8.4						
2.00	UDS1				- medium dense, 3.0 to 6.0 m																	
3.00	SPT2	16	19																			
5.00	UDS2					6.00																
6.00	SPT3	23	24		Medium dense grey fine sand (SP-SM)		0	94	6	0				1.92	1.71	12.1						
8.00	DS2																					
9.00	SPT4	25	24																			
11.00	DS3																					
12.00	SPT5	18	16			14.00																
14.00	DS4				Medium dense brown silty fine sand with traces of gravel (SM)		4	81	15	0												
15.00	SPT6	22	19			17.00																

(1) SPT is outside NABL scope.

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Depth, m	Sample No.	SPT ⁽¹⁾	Field Value, N _f	Corrected Value, N _c	Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Shear Tests				Free Swell Index, (%)
								Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm ³)	Dry Density (gms/cm ³)	Moisture Content (%)	Type of Test	Confining Pressures, (kg/cm ²)	Cohesion Intercept, 'c' (kg/cm ²)	Angle of Internal Friction, φ (degrees)	
17.00	DS5	16	20	16		Medium dense grey fine sand (SP-SM)	21.00															
18.00	SPT7	20	20	16			23.00															
20.00	DS6	36	36	27		Hard brown sandy silt, low plastic (CL)																
21.00	SPT8	44	44	31		Dense to very dense grey fine sand (SP-SM)																
23.00	DS7	62	62	42		- dense, 24.0 to 27.0 m																
24.00	SPT9	65	65	42		- very dense, 27.0 to 33.0 m																
26.00	DS8																					
27.00	SPT10																					
29.00	DS9																					
30.00	SPT11																					
32.00	DS10																					
33.00	SPT12																					

⁽¹⁾ SPT is outside NABL scope.

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M/s. THDC India Limited

Soil Profile (BH-9)



ISO/IEC 17025:2005
Certified Laboratory
(NABL)
Certificate No. T-1741

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Boring Method : Shell & Auger
Casing Depth : 46.0 m
Boring Start : 04-Jan-18
Boring Finish : 08-Jan-18

Depth, m	Sample No.	SPT ⁽¹⁾	Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
						Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm ³)	Dry Density (gms/cm ³)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm ²)	Cohesion Intercept, 'c' (kg/cm ²)	Angle of Internal Friction, ϕ (degrees)	
35.00 to 36.45	DS11	-		Very dense grey fine sand (SP-SM)	36.00										12.1						
36.00 to 36.45	SPT13	84		Hard brown sandy silt, low plastic (CL)	36.00																
36.00 to 36.45	DS12	-		Very dense grey fine sand (SP-SM)																	
36.00 to 36.42	SPT14	104/27cm																			
41.00 to 41.45	DS13	-																			
42.00 to 42.40	SPT15	105/25cm																			
44.00 to 44.45	DS14	-																			
45.00 to 45.35	SPT16	102/20cm																			
47.00 to 47.45	DS15	-																			
48.00 to 48.45	SPT17	80																			
50.00 to 50.43	SPT18	102/28cm			50.43																



(1) SPT is outside NABL scope



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	<div>ANNEXURE- (D)</div> <div>CRITERIA FOR WIND RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT</div> <div>All structures shall be designed for wind forces in accordance with IS: 875 (Part-3) and as specified in this document. See Annexure – B for site specific information.</div> <div>Along wind forces shall generally be computed by the Peak (i.e. 3 second gust) Wind Speed method as defined in the standard.</div> <div>Along wind forces on slender and wind sensitive structures and structural elements shall also be computed, for dynamic effects, using the Gust Factor or Gust Effectiveness Factor Method as defined in the standard. The structures shall be designed for the higher of the forces obtained from Gust Factor method and the Peak Wind Speed method.</div> <div>Analysis for dynamic effects of wind must be undertaken for any structure which has a height to minimum lateral dimension ratio greater than “5” and/or if the fundamental frequency of the structure is less than 1 Hz.</div> <div>Susceptibility of structures to across-wind forces, galloping, flutter, ovaling etc. should be examined and designed/detailed accordingly following the recommendations of IS:875(Part-3) and other relevant Indian standards.</div> <div>It should be estimated if size and relative position of other structures are likely to enhance the wind loading on the structure under consideration. Enhancement factor, if necessary, shall suitably be estimated and applied to the wind loading to account for the interference effects.</div> <div>Damping in Structures</div> <div>The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for:</div> <div><div>a) Welded steel structures</div><div>: 1.0%</div><div>b) Bolted steel structures</div><div>: 2.0%</div><div>c) Reinforced concrete structures</div><div>: 1.6%</div><div>d) Steel stacks</div><div>: As per IS: 6533 & CICIND Model Code whichever is more critical.</div></div>		
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	<p>Appendix-I</p> <p>SITE SPECIFIC DESIGN PARAMETERS</p> <p>The various design parameters, as defined in IS: 875 (Part-3), to be adopted for the project site shall be as follows:</p> <div><div>a)</div><div>The basic wind speed “Vb” at ten metre above the mean ground level : 47 metre/second</div></div> <div><div>b)</div><div>The risk coefficient “K1” : 1.07</div></div> <div><div>c)</div><div>Category of terrain : Category-2</div></div>		
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	<div>Annexure-(E)</div> <div>CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT</div> <div>All structures and equipment shall be designed for seismic forces adopting the site specific seismic information provided in this document and using the other provisions in accordance with IS: 1893 (Part 1 to Part 4). Pending finalization of Part 5 of IS: 1893, provisions of part 1 shall be read along with the relevant clauses of IS: 1893:1984, for embankments.</div> <div>A site specific seismic study has been conducted for the project site. The peak ground horizontal acceleration for the project site, the site specific acceleration spectral coefficients (in units of gravity acceleration 'g') in the horizontal direction for the various damping values and the multiplying factor (to be used over the spectral coefficients) for evaluating the design acceleration spectra are as given at Appendix-I.</div> <div>Vertical acceleration spectral values shall be taken as 2/3rd of the corresponding horizontal values.</div> <div>The site specific design acceleration spectra shall be used in place of the response acceleration spectra, given at figure-2 in IS: 1893 (Part 1) and Annex B of IS: 1893 (Part 4). The site specific acceleration spectra along with multiplying factors specified in Appendix-I includes the effect of the seismic environment of the site, the importance factor related to the structures and the response reduction factor. Hence, the design spectra do not require any further consideration of the zone factor (Z), the importance factor (I) and response reduction factor (R) as used in the IS: 1893 (Part 1 to Part 4).</div> <div>Damping in Structures</div> <div>The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for:</div> <div><table><tr><td>a)</td><td>Steel structures</td><td>:</td><td>2%</td></tr><tr><td>b)</td><td>Reinforced Concrete structures</td><td>:</td><td>5%</td></tr><tr><td>c)</td><td>Reinforced Concrete Stacks</td><td>:</td><td>3%</td></tr><tr><td>d)</td><td>Steel stacks</td><td>:</td><td>2%</td></tr></table></div>			a)	Steel structures	:	2%	b)	Reinforced Concrete structures	:	5%	c)	Reinforced Concrete Stacks	:	3%	d)	Steel stacks	:	2%
a)	Steel structures	:	2%																
b)	Reinforced Concrete structures	:	5%																
c)	Reinforced Concrete Stacks	:	3%																
d)	Steel stacks	:	2%																
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	<p>Method of Analysis</p> <p>Since most structures in a power plant are irregular in shape and have irregular distribution of mass and stiffness, dynamic analysis for obtaining the design seismic forces shall be carried out using the response spectrum method. The number of vibration modes used in the analysis should be such that the sum total of modal masses of all modes considered is at least 90 percent of the total seismic mass and shall also meet requirements of IS: 1893 (Part 1). Modal combination of the peak response quantities shall be performed as per Complete Quadratic Combination (CQC) method or by an acceptable alternative as per IS: 1893 (Part 1).</p> <p>In general, seismic analysis shall be performed for the three orthogonal (two principal horizontal and one vertical) components of earthquake motion. The seismic response from the three components shall be combined as specified in IS: 1893 (Part 1).</p> <p>The spectral acceleration coefficient shall get restricted to the peak spectral value if the fundamental natural period of the structure falls to the left of the peak in the spectral acceleration curve.</p> <p>For buildings, if the design base shear (VB) obtained from modal combination is less than the base shear ($\bar{V}B$) computed using the approximate fundamental period (T_a) given in IS: 1893: Part 1 and using site specific acceleration spectra with appropriate multiplying factor, the response quantities (e.g. member forces, displacements, storey forces, storey shears and base reactions) shall be enhanced in the ratio of $\bar{V}B/ VB$. However, no reduction is permitted if $\bar{V}B$ is less than VB.</p> <p>.</p> <p>Design/Detailing for Ductility for Structures</p> <p>The site specific design acceleration spectra is a reduced spectra and has an in-built allowance for ductility. Structures shall be engineered and detailed in accordance with relevant Indian/International standards to achieve ductility.</p>		
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	<div>APPENDIX-I</div> <div><u>SITE SPECIFIC SEISMIC PARAMETERS FOR DESIGN OF STRUCTURES AND EQUIPMENT FOR KHURJA STPP</u></div> <div>The various site specific seismic parameters for the project site shall be as follows:</div> <div><div><div>1)</div><div>Peak ground horizontal acceleration (MCE)</div><div>: 0.32 g</div></div><div><div>2)</div><div>Multiplying factor to be applied to the site specific horizontal acceleration spectral coefficients (in units of gravity acceleration 'g') to obtain the design acceleration spectra</div><div></div><div><div>a)</div><div>for special moment resisting steel frames designed and detailed as per IS:800</div><div>: 0.08</div></div><div><div>b)</div><div>for special concentrically braced steel frames designed and detailed as per IS:800</div><div>: 0.06</div></div><div><div>c)</div><div>For special moment resisting RC frames designed and detailed as per IS:456 and IS:13920</div><div>: 0.048</div></div><div><div>d)</div><div>for RCC chimney, RCC Natural Draft Cooling Tower</div><div>: 0.16</div></div><div><div>e)</div><div>for Liquid retaining tanks</div><div>: 0.096</div></div><div><div>f)</div><div>for Steel chimney, Absorber Tower, Vessels</div><div>: 0.12</div></div><div><div>g)</div><div>for design of structures not covered under 2 (a) to 2 (f) above and under 3 below, in general(excluding special structure/ configuration/ materials)</div><div>: 0.08</div></div><div><div>3)</div><div>Multiplying factor to be applied to the site specific horizontal acceleration spectral coefficients (in units of gravity acceleration 'g') for design of equipment and structures where inelastic action is not relevant or not permitted</div><div>: 0.16</div></div></div><div><div>Note:</div><div>g = Acceleration due to gravity</div></div><div>The horizontal seismic acceleration spectral coefficients are furnished in subsequent pages.</div></div>		
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APPENDIX – II

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (as a percentage of critical damping)		
	2%	3%	5%
0.000	1.000	1.000	1.000
0.030	1.000	1.000	1.000
0.040	2.240	2.032	1.600
0.050	2.450	2.222	1.750
0.060	2.660	2.413	1.900
0.070	2.870	2.604	2.050
0.080	3.080	2.794	2.200
0.090	3.290	2.985	2.350
0.100	3.500	3.175	2.500
0.105	3.500	3.175	2.500
0.110	3.500	3.175	2.500
0.115	3.500	3.175	2.500
0.120	3.500	3.175	2.500
0.125	3.500	3.175	2.500
0.130	3.500	3.175	2.500
0.135	3.500	3.175	2.500
0.140	3.500	3.175	2.500
0.145	3.500	3.175	2.500
0.150	3.500	3.175	2.500
0.200	3.500	3.175	2.500
0.220	3.500	3.175	2.500
0.230	3.500	3.175	2.500
0.240	3.500	3.175	2.500
0.300	3.500	3.175	2.500
0.350	3.500	3.175	2.500
0.400	3.500	3.175	2.500
0.450	3.500	3.175	2.500
0.500	3.500	3.175	2.500
0.550	3.500	3.175	2.500
0.600	3.173	2.879	2.267
0.650	2.929	2.657	2.092
0.700	2.720	2.467	1.943
0.750	2.539	2.303	1.813
0.800	2.380	2.159	1.700
0.850	2.240	2.032	1.600

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Time Period (Sec)	Damping Factor (as a percentage of critical damping)		
	2%	3%	5%
0.900	2.116	1.919	1.511
0.950	2.004	1.818	1.432
1.000	1.904	1.727	1.360
1.050	1.813	1.645	1.295
1.100	1.731	1.570	1.236
1.150	1.656	1.502	1.183
1.200	1.587	1.439	1.133
1.250	1.523	1.382	1.088
1.300	1.465	1.329	1.046
1.350	1.410	1.279	1.007
1.400	1.360	1.234	0.971
1.450	1.313	1.191	0.938
1.500	1.269	1.151	0.907
1.550	1.228	1.114	0.877
1.600	1.190	1.080	0.850
1.650	1.154	1.047	0.824
1.700	1.120	1.016	0.800
1.750	1.088	0.987	0.777
1.800	1.058	0.960	0.756
1.850	1.029	0.934	0.735
1.900	1.002	0.909	0.716
1.950	0.976	0.886	0.697
2.000	0.952	0.864	0.680
2.050	0.929	0.843	0.663
2.100	0.907	0.822	0.648
2.150	0.886	0.803	0.633
2.200	0.865	0.785	0.618
2.250	0.846	0.768	0.604
2.300	0.828	0.751	0.591
2.350	0.810	0.735	0.579
2.400	0.793	0.720	0.567
2.450	0.777	0.705	0.555
2.500	0.762	0.691	0.544
2.550	0.747	0.677	0.533
2.600	0.732	0.664	0.523
2.650	0.718	0.652	0.513
2.700	0.705	0.640	0.504
2.800	0.680	0.617	0.486
2.850	0.668	0.606	0.477
2.900	0.657	0.596	0.469

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TECHNICAL REQUIREMENTS



Time Period (Sec)	Damping Factor (as a percentage of critical damping)		
	2%	3%	5%
2.950	0.645	0.585	0.461
3.000	0.635	0.576	0.453
3.050	0.624	0.566	0.446
3.100	0.614	0.557	0.439
3.150	0.604	0.548	0.432
3.200	0.595	0.540	0.425
3.250	0.586	0.531	0.418
3.300	0.577	0.523	0.412
3.350	0.568	0.516	0.406
3.400	0.560	0.508	0.400
3.450	0.552	0.501	0.394
3.500	0.544	0.493	0.389
3.550	0.536	0.487	0.383
3.600	0.529	0.480	0.378
3.650	0.522	0.473	0.373
3.700	0.515	0.467	0.368
3.750	0.508	0.461	0.363
3.800	0.501	0.455	0.358
3.850	0.495	0.449	0.353
3.900	0.488	0.443	0.349
3.950	0.482	0.437	0.344
4.000	0.476	0.432	0.340

CLARIFICATIONS

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
	SECTION / PART	BOOK/ SUB-SEC.	PAGE NO.	CLAUSE NO.			
1	VI/C	GTR	28 of 89	8.10.01	Lube Oil & FRF: All the first fills of consumables and one year's topping requirements of consumables such as greases, oil, lubricants, servo fluids/ control fluids...etc. Bidder shall supply a quantity not less than 10% of the full charge or one (1) year topping requirement mentioned above (Whichever is higher) of each variety of lubricants, servo fluids, gases, chemicals etc. (as detailed above) which is expected to be utilized during the first year of operation. This additional quantity shall be supplied in separate Containers.	Clause 1.03.00 & 8.10.01 are contradictory. Bidder understand that a quantity not less than 10% of the full charge of each variety of lubricants to be supplied in separate containers, which is expected to be utilised during the first year of operation/ topping up. Therefore, Lube Oil & FRF quantity required for First Fill + 10% of full charge is to be supplied.	Bidder may note that first fills of consumables along with topping up requirement (which shall not be less than 10% of the full charge) to be considered. The specification requirements are clear.
	VI/A	A-2	1 of 3	1.03.00	Bidder shall also supply a quantity not less than 10% of the full charge of each variety of lubricants, servo fluids, gases, chemicals etc (as detailed above) used which is expected to be utilized during the first year of operation. This additional quantity shall be supplied in separate containers.		

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
	VI/B	A-01	2 of 3	1.04.00			
2					The plant shall be designed to operate continuously under two shift and cyclic modes. The design would cover adequate provision for quick start up and loading of the units to full load at a fast rate. The unit shall have minimum rate of loading or unloading of 5% per minute above the control load (i.e. 50% MCR). Plant shall be capable of minimum N1 number of daily load cycles (N1 shall not be less than 2), i.e. load variation from 100% to 50 % (and vice versa) of MCR without affecting the design life of boiler and turbine systems. In addition, the plant shall also be capable of minimum N2 number of daily load cycling (N2 shall not be less than 1) from 50% to 30% (and vice versa) of MCR with a minimum ramp rate of 3% per minute without affecting the design life of boiler and turbine systems.	Bidder understand that the Mode of Operation of the plant is as "Base Load" as per Specification Clause 3.00.00 of VI-A-A-01, Page 1 of 13. Hence, the clause 1.04.00 of VI-B-A-01 at Page 2 of 3 to be deleted.	Bidder to comply the specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
3	VI/B	A-01	2 of 3	1.05.00	Bidder shall furnish, within 6 (six) months from the date of placement of award/ during detail engineering, following details:1. 'Fatigue Damage', resulting from a. The number of Cold start up, Warm start up and Hot start up as defined elsewhere in the specification and b. Load cycling during defined plant life.2. Creep Damage.3. Creep-Fatigue interaction curve for materials (selected for vulnerable locations) for which fatigue and creep damage have been computed along with the reference used for creep fatigue interaction curve.4. The combined creep fatigue damage shall lie within acceptable limits.5. Material data used for determining the fatigue and creep damage.6. Code used for determining fatigue and creep along with details of its validation.7. Details of specific changes in design to accommodate the defined load cycling.	These documents are of proprietary information of OEM and cannot be furnished.	Bidder to comply the specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
4	VI/A	A-3	9 of 10	13.00.00	13.01.00: The set of maintenance and repair tools including all special tools and tackles used during the installation, commissioning, testing, calibration, modification and maintenance shall be handed over to the employer.13.02.00: In addition, one set of all special tools and tackles required for the installation, commissioning, testing, calibration, modification and maintenance of equipment(s)/ system shall also be supplied. These tools and tackles shall not be used for erection/commissioning purposes and shall be in new condition, when handed over to the Employer. These tools and tackles shall be separately packed and brought to site. A list of all such special tools and tackles shall be submitted along with the offer.	Bidder understand that for Steam Turbine & Generator, only One set of tools & tackles is required to be supplied.	Two sets of maintenance and repair tools to be supplied. One set consisting of tools and tackles used during the installation, commissioning, testing, calibration, modification and maintenance. Another set consists of new and unused set of tools and tackles. Specification requirement are clear. Bidder to comply.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
5	VI/B	A-3	30 of 92	1.23.00	Type test(s) to be conducted:Life cycle test, meridional yield rupture test and squirm test on one each of following type of metallic expansion joints:i. Condenser neck (if applicable)ii. Cross-over pipe (largest size)iii. LPH extraction line (highest pressure and temperature)iv. LPT Gland bellows (if applicable)	We understand Type test of metallic expansion joints are to be conducted for:(ii) Cross-over pipe (largest size) - only one metallic expansion joint which is of largest size.(iii) LPH extraction line (highest pressure & temperature) - only one metallic expansion joint which bears highest pressure and temperature.(iv) LPT Gland bellows (if applicable) - only one metallic expansion joint which is of largest size.THDC to confirm Bidder's understanding.	Specification requirements are clear. Bidder to comply.
6	VI / A Functional Guarantees	Functional Guarantee	2 of 20	1.00.01 (g)	All instruments required for performance testing shall be of the type and accuracy required by the ASME PTC code. Prior to the start of the initial operation, the contractor shall get these instruments calibrated in an independent test Institute approved by the Employer.	Calibration in a Laboratory of National/ International reput shall also be acceptable, provided that the laboratory is certified for the respective calibration purpose (i.e. according to ISO 17025 or NABL) or at Bidder's NABL accredited calibration centre and supervision of the same is not envisaged. Calibration standards are in accordance with international certification and ASME PTC 6 code.	The requirement specified in the technical specification to be considered.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
			18 of 20	2.02.02	The test procedures, Calibration Standards, Calibration procedures etc., shall be subject to Employer's approval. All the instruments including the flow nozzle shall be calibrated by the contractor before initial operation in a reputed international institute as approved by the Employer. These calibrations shall be performed in the presence of the Employer.		
7	VI / A / Functional Guarantee	Functional Guarantee	2 of 20	1.00.01 (i)	The PG test procedure including demonstration tests shall be submitted within 90 days of the date of Notification of Award and finalization of the PG test procedure shall be done within 180 days from the date of Notification of Award.	The start of work on performance test procedure depends on placing of order from NTPC at bidder and on Technical inputs from NTPC. The 90/180 days after award of contract to bidder are considered as too short. It is recommended to have 180/90 days before First commissioning.	Bidder to comply the specification requirement.
8	VI / A / Functional Guarantee	Functional Guarantee	2 of 20	1.00.01 (i)	However, preliminary test reports shall be submitted to the Employer after completing each test run.	The data of each test run will be furnished at end of each test run, however, detailed test report will be submitted within one month after successful completion of PG test.	Bidder to comply the specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
9	VI/B	A-3	30 of 92	1.22.03	(h) Variation in power factor, frequency, generator hydrogen pressure and voltage.	Hydrogen pressure is maintained constant during operation to ensure operational safety of generator. Hence, the correction for generator hydrogen pressure is not applicable.	The correction is considered to facilitate the bidder to match with the boundary condition while conducting PG test when there is a change in the boundary condition. If any bidder does not want to consider any correction then it is up to them. However, the technical specification requirement will remain the same.
10	VI / A / Functional Guarantee	Functional Guarantee	18/19 of 20	2.02.03	When the system is properly isolated for a performance test, the unaccounted for leakages should not be more than 0.1% of the design throttle flow at that load. To achieve the above value of unaccounted for leakages, the Bidder shall prepare the unit before start of initial operation. However, during the test, if it is found that the unaccounted for leakage is more than 0.1% of design throttle flow at that load, then heat rate will be increased by an amount equal to half the difference between actual unaccounted for leakage expressed as percentage of design throttle flow at that load and 0.1% (allowed by the code).	"When the system is properly isolated for a performance test, the unaccounted for the leakage shall not exceed 0.3% of test throttle flow at that Load." "However, during the test, if it is found that the unaccounted for leakage is more than 0.3% of design throttle flow at that load, then heat rate will be increased by an amount equal to half the difference between actual unaccounted for leakage expressed as percentage of design throttle at that load and 0.3% ".	Bidder to comply the specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
11	VI / A / Functional Guarantee	Functional Guarantee	19 of 20	2.02.04	<p>Period of ageing shall be considered from the date of first synchronization to the date of conductance of PG test.</p> <p>In calculating the above factor any period(s) during which the turbine has not been in operation at a stretch for more than a week shall not be considered.</p>	Aging is a physical phenomenon and once steam enters into the cycle the aging of the components start. This is irrespective of whether the machine is in operation or not. Hence the aging period will be considered from the date of first synchronization to the conductance of PG test without any exclusion. Hence, last para to be deleted.	Bidder to comply the specification requirement.
	VI/B/ Operating capability of plant	Operating capability of plant	1 of 3	1.02.00 (c)	Operate continuously with HP heaters out of service with maximum specified cooling water temperature, 3% cycle make up and normal auxiliary steam requirement being tapped from cold reheat line, to generate maximum output without over stressing turbine components.	Steam parameters at exhaust of turbine casings are selected based on Turbine cycle parameters conceived by employer. Variation in these exhaust parameters is governed by limits of excursions permitted by OEM design/ IEC/ other design codes. Hence, to ensure safety of HP Turbine module, it can operate continuously with HP heaters out of service subject to HP exhaust pressure remaining within allowable limits.	Bidder to comply the specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
12	VI/B	A-3	3 of 92	1.01.02 (g)	Extent and duration of permissible variations in rated steam temperature shall be same as specified for rated steam temperature upto 566 deg C in IEC-45 even though rated steam temperature exceeds 566 deg C.	Bidder is offering proven turbine modules designed with temperature/ pressure variations as per OEM guidelines. Increasing these limits to IEC-45 limits (valid upto 566 deg C) shall call for redesign of modules, which is not feasible. Hence variation in offered proven modules shall be as per OEM guidelines.	Bidder to comply the specification requirement.
13	VI/B	A-3	29 of 92	1.22.01 (Note)	Any Additional heat balances deemed necessary by the Employer shall be furnished. All the heat balances.....shaft driven auxiliaries, if any.	Since generation of HBDs at different conditions involves detailed calculations. The same needs to be performed at one go. Therefore HBDs for new conditions cannot be done repeatedly. Hence List of HBDs should be finalised within 3 months of signing contract and later request cannot be complied with.	Bidder to comply the specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
14	VI/B/ Pre-com & com	Pre-com & com	3 of 17	3.02.02	<p>Turbine Generator Set Capability</p> <p>The steam turbine generator unit shall be capable of delivering at generator terminals the output as indicated by the BIDDER in the heat balances submitted along with his bid, under the following condition</p> <p>(a) Maximum continuous output at generator terminals corresponding to both strings of HP heaters out of operation, under rated steam conditions, at a condenser pressure of 89 mm of Hg (Abs) and 3% make up& Aux. Steam requirement tapped from CRH, generating not less than the rated output OR output corresponding to design BMCR heat duty, whichever is less without overstressing turbine components.</p>	These tests will be done with available plant instruments without any additional tolerance. However, NTPC to provide load whenever requested by bidder after all preparatory work is done during commissioning period to carry out the demonstration.	Bidder to comply the specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
15	VI/B/Pre-com & com	Pre-com & com	3 of 17	3.02.03 (i)	<p>H.P./L.P. Bypass Capabilities</p> <p>The HP & LP Bypass system should satisfy the following functional requirements under automatic interlock action. It should come into operation automatically under the following conditions:</p> <p>(a) Generator circuit breaker opening.</p> <p>(b) HP - IP stop valves closing due to turbine tripping.</p> <p>(c) Sudden reduction in demand to house load.</p> <p>Under all these conditions, while passing the required steam flows as per the relevant heat balances, the condenser should be able to swallow the entire steam without increasing the exhaust hood temperature and condenser pressure beyond the maximum permissible value indicated by the BIDDER in his offer and accepted by the EMPLOYER. The same shall be demonstrated.</p>	<p>This test can only be done by tripping the unit, accordingly NTPC to provide opportunity to trip the unit during commissioning after all preparatory work is done by bidder.</p>	<p>Bidder to comply the specification requirement.</p>

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
16	VI/G/ Technic al data sheet/ DA2(I)	Technical data sheet/ DA2(I)	4 of 30	1.01.01	(x) 65% unit rated output under modified sliding pressure operation at condenser pressure of 77 mm Hg (abs) with 0% and 3% make up.	HBDs will be generated in line with cl no.1.22.01/Sec-VI/ Part B of chapter steam turbine and auxiliaries system in tender specification. (i.e. HBD at 65% unit rated output under modified sliding pressure operation at condenser pressure of 77 mm Hg (abs) with 0% and 3% make up is not applicable).	Bidder to comply the specification requirement.
17	VI/G/ Technic al data sheet/ DA2(I)	Technical data sheet/ DA2(I)	6 of 30	1.01.02	The expansion lines are to be furnished for the following operating conditions: i) 660 MW output under rated steam conditions at condenser pressure of 77 mm Hg (abs) & 0% make up	In line with cl no.1.22.04 /Sec-VI/ Part B of chapter steam turbine and auxiliaries system, Turbine expansion line diagrams are to be furnished for Guaranteed load points. Hence, Turbine expansion line diagrams will be generated for guaranteed load points only.	Bidder to comply the specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
18	VI/G/ Technical data sheet/ DA2(II)	Technical data sheet/ DA2(II)	12 of 137	2.34.06	<p>Pressure drops.....</p> <p>.....</p> <p>i) Extraction lines to HPH-5A & i) From stage outlet to turbine flange.</p> <p>ii) From turbine flange to heater inlet</p> <p>j) Extraction line to deaerator i) From stage outlet to turbine flange.</p> <p>ii) From turbine flange to deaerator inlet</p> <p>k) Extraction line to LPH-3 i) From stage outlet to turbine flange.</p> <p>ii) From turbine flange to heater inlet</p> <p>l) Extraction line to LPP-2 i) From stage outlet to turbine flange.</p> <p>ii) From turbine flange to heater inlet</p> <p>m) Extraction line to LP Heater(s) & Condenser neck i) From stage outlet to turbine flange.</p> <p>ii) From turbine flange to heater inlet</p> <p>.....</p>	<p>The data which is proprietary in nature cannot be furnished. Hence Pressure drop values will be furnished for selected items as below</p> <p>i) Extraction lines to HPH-5A & i) From stage outlet to turbine flange.</p> <p>ii) From turbine flange to heater inlet</p> <p>j) Extraction line to deaerator i) From stage outlet to turbine flange.</p> <p>ii) From turbine flange to deaerator inlet</p> <p>k) Extraction line to LPH-3 i) From stage outlet to turbine flange.</p> <p>ii) From turbine flange to deaerator inlet</p> <p>l) Extraction line to LPP-2 i) From stage outlet to turbine flange.</p> <p>ii) From turbine flange to heater inlet</p> <p>m) Extraction line to LP Heater(s) & Condenser neck i) From stage outlet to turbine flange.</p> <p>ii) From turbine flange to heater inlet</p>	Bidder to comply the specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
19	VI/G/ Technical data sheet/ DA2(II)	Technical data sheet/ DA2(II)	13 of 137	2.34.07	Gland leakage coefficients a) Stop and control valves b) HP front c) HP rear d) Reheat stop & control valve e) IP front f) IP rear	Such data requested in data sheets is proprietary in nature, hence, cannot be furnished.	Bidder to comply the specification requirement.
20	VI/G/ Technical data sheet/ DA2(II)	Technical data sheet/ DA2(II)	47 of 137	4.01.15	i) Design back end loading T/hr-m2 ii) Back end loading under following conditions T/hr-m2 a) EMCR b) VWO c) VWO + over pressure. d) HP heaters out	As per Cl. 1.06.00 (h)/sec-VI/Part-B of chapter Steam turbine and auxiliaries, back end loading under V.W.O. condition not to exceed 90% of design stress value. Accordingly, back end loading will be furnished for these two load cases only to substantiate the design margins.	Bidder to comply the specification requirement.
21	VI/B/ Steam turbine & auxiliaries	Steam turbine and auxiliaries	9 of 92	1.06.00 (h)	Ensure stress induced in LPT blading due to back end steam loading under V.W.O. conditions not to exceed 90% of design stress value.		Bidder to comply the specification requirement.
22	VI/B/ Steam turbine and auxiliaries	Steam turbine and auxiliaries	30 of 92	1.22.06	Furnish turbine clearance diagram indicating values for radial & axial clearances and leakage rate from glands.	Turbine clearance diagram indicating values for radial & axial clearances and leakage rate from glands will be furnished for design condition only.	Bidder to comply the specification requirement.
23	VI/B	PRE-COM & COM	04 of 17	3.02.03(ii) (b)	Oxygen content in condensate, at hotwell outlet, shall not exceed 0.015 CC per litre over the entire load range and shall be determined according to calorimetric Indigo - Carmine method.	For supercritical projects, oxygen is dosed in the condensate system to prevent the corrosion of the piping and fittings. Hence, limiting of oxygen content to 0.015cc/l at	Bidder to comply the specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
		A-3	31 of 92	2.00.00 (h)	Max. oxygen content of condensate leaving the condenser shall be 0.015 CC per litre over the entire load range.	hotwell outlet is not required. This is in-line-with the practice adopted for other 660/ 800 MW supercritical projects and is an internationally accepted practice. Customer is requested to accept the same and remove this clause.	
24	VI/B	B-01	11 of 40	6.00.00 (15-G)	Permanently connected independent sensing unit for each Generator shall be provided along with necessary terminal equipment to detect turn to turn shorting in field winding of Generator.	Bidder understands that Independent flux sensor is to be provided for each generator. However, flux monitoring unit/ evaluation unit, suitable for monitoring flux sensor signal from more than one generators, can be common for both the generators.	Bidder's understanding is in order.
25	VI/B	D-01	6 Of 142	4.01.00	Face of the buildings and facilities are located in such a way so as to have an offset of minimum 20m with respect to centre line of double lane road and 15 metre with respect to centre line of single lane road.	Bidder requests to enforce this clause subject to the layout constraints. At few locations , this may be difficult to maintain. Please confirm	Bidder is requested to adhere to the provisions of bid documents.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
26	VI/B	D-01	7 Of 142	5.01.00 f)	Architectural design of all Power Plant Building shall be suitable for installation of solar photovoltaic panels on roof tops for renewable energy purpose	Bidder understands that if live load in excess of solar panel loads has been considered on TG building roof, then solar panel load need not be applied separately. Please confirm	Bidder is advised to refer clause 6.02.02 of Part B Sub Section D-01 of Technical specification which states "Imposed loads in different areas shall include live loads, erection, operation and maintenance loads. Equipment loads (which constitute all loads of equipment to be supported on the building frame) are not included in the imposed loads furnished below and shall be considered in addition to imposed loads."
27	VI/B	D-01	8 Of 142	5.01.00 j)	All the buildings and site development including landscaping shall be designed to take care of rain water harvesting & ground water recharging. Development of rain water harvesting scheme for the project and obtaining approval of the scheme from Central Ground Water Board is in Bidder's Scope.	Bidder understands that rain water harvesting only for the buildings covered in this specification is under bidder scope of works and not all the buildings of the plant. Please confirm	Rain water harvesting for the buildings covered in this package is under bidder scope of works and obtaining approval of the scheme from Central Ground Water Board is in Bidder's Scope.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
28	VI/B	D-01	8 Of 142	5.01.00 k)	For control rooms in MPH , dry wall construction technology shall be incorporated	Bidder understands that the said provision is to be incorporated only for internal walls of the control room which is the AC area. Please confirm. Further, it is requested to give detailed specification for dry wall construction technology.	Bidder is requested to refer amendment to Technical Specification.
29	VI/B	D-01	8 Of 142	5.01.00 l)	Full glass wall partitionwith aluminium frame to be provided between CCR, CERof Offsite Control RoomsandMPH Control room.	Bidder opines that full glass wall partition is not suitable owing to movement of panels/ equipments that may damage the glass. It is suggested to use half height glass partition over aluminium glazed partition. Please confirm	Bidder is requested to adhere to the provisions of bid documents.
30	VI/B	D-01	8 Of 142	5.01.00 l)	Full glass wall partitionwith aluminium frame to be provided between CCR, CER of Offsite Control Rooms and MPH Control room.	Bidder understands that these partitions are to be provided in the main control room only and not for auxiliary control rooms for specific buildings. Please confirm.	Bidder is requested to adhere to the provisions of bid documents.
31	VI/B	D-01	8 Of 142	5.01.00 m)	There shall be comprehensive landscape development in entire plant area to create a pleasant and healthy environment.	Bidder understands that the scope of landscaping would only be in and around the buildings covered by this specification. Please confirm.	Comprehensive landscape development to the plant area under the scope of this package shall be in Bidder's scope. Bidder is requested to refer amendment to Technical Specification in this regard.

KHURJA SUPER THERMAL POWER PROJECT (2X 660 MW)TURBINE GENERATOR AND ASSOCIATED PACKAGES Bid Document No.: THDC/RKSH/CC-9915-371	CLARIFICATION NO. THDC/RKSH/CC-9915-371-CLRF-03	PAGE 17 OF 86
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CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
32	VI/B	D-01	9 Of 142	5.02	The roof slab shall consist of 40mm thick (min.) RCC slab supported on profiled metal deck sheet.	Bidder understands that this thickness of 40 mm is the thickness above the crest of the metal deck sheet.	For roof slab supported on metal deck, minimum thickness of Concrete above crest of metal deck shall be 40 mm. Bidder is requested to also refer amendment to the Technical Specification in this regard
33	VI/B	D-01	10 Of 142	5.02.01	All edges of openings shall have edge protection angles (minimum ISA 75x75x6) and handrails with hand posts (Hand post spacing 1.50maximum) (Hand post spacing 1m maximum).	Hand Post spacing information has been given twice. Please confirm the Hand Rail spacing to be adopted.	Bidder is requested to refer amendment to Technical Specification
34	VI/B	D-01	10 of 142	5.02.01 ii	The building shall have connectivity with walkways from Boiler & Service Building through sliding bearing only	Bidder understands that since, TG building can have only sliding connection for interconnection, the horizontal force due to C-D bay piping shall be transferred on Boiler/Service building and not on TG building.	Interconnections from Boiler/Service Building shall have sliding bearing at TG building end.
35	VI/B	D-01	10 Of 142	5.02.01 ii	Adequate number of thermal expansion gap (minimum 2.00m) between adjacent structural frames at expansion joint and minimum 50mm between RCC slabs at expansion joint) shall be provided between the units and Common Control Building.	Bidder requests to modify the minimum gap requirement for steel building to 1.5 m to facilitate smooth transitions for crane movement. Please confirm	Bidder is requested to adhere to the provisions of bid documents.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
36	VI/B	D-01	10 Of 142	5.02.01 ii	The roof truss to column connection shall be bolted connection using high strength bolts (grade 8.8/ IS 1367). The roof truss of Turbine Hall shall be adequately braced in plan using Tie level and rafter level bracings.	Based on the information given, bidder understands that roof truss provision is also an option in addition to provision of I girders for supporting the turbine bay roof. Please confirm.	This option is already stipulated in specification for Main Powerhouse (TG bay) roof.
37	VI/B	D-01	11 Of 142	5.02.01 iii	In front of the power transformers, RCC fire barrier wall shall be provided as per functional requirement in lieu of brick wall at A-row	Bidder understands that the requirement of fire barrier wall shall be as per the electrical norms and the same may or may not be required. Please confirm.	Bidder is requested to adhere to the provisions of bid documents.
38	VI/B	D-01	11 Of 142	5.02.01 iii	The 'A' row & Gable End columns projecting inside the turbine hall shall be concealed with single skin profiled metal sheet from operating floor level to crane girder bracket top level.	Bidder understands that there would be double skin cladding from operating floor till crane bracket level. However, this requirement has been mentioned as two single skin claddings at this level. Please confirm if the glasswool between the sheets is required.	Bidder is requested to adhere to the provisions of bid documents.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
39	VI/B	D-01	11 of 142	5.02.01 iii	The external vertical face (herein stated as 'C' row) facing (& adjacent to) the Boiler area shall be completely covered upto the Deaerator floor level with vertical cladding comprising 3.0m high brick wall on ground floor followed by either single skin metal sheeting with runners or brick wall sandwiched with single skin metal sheeting on external face (for all floors requiring 4 hours of fire rating e.g.cable spreader room, ventilation/ air washer room, AHU Roomsand air conditioned areas)	Considering the difficulties of space constraint and multiple openings, bidder proposes to have only brickwall cladding instead of brickwall cladding in addition to single sheet cladding.	Bidder is requested to adhere to the provisions of bid documents.
40	VI/B	D-01	12 of 142	5.02.01 iii	...in addition one no ladies toilet shall be provided in each unit at 0.00M and mezzanine floor level and CCR level.	Bidder understands that ladies toilet is to be provided at 0 m & CCR level. However, mezzanine floor at EL(+) 8.5 is not suitable for providing ladies toilet. Please confirm the location and floor elevation where ladies toilet is to be provided.	Bidder is requested to adhere to the provisions of bid documents.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
41	VI/B	D-01	13 of 142	5.02.02	Bidder has the option to choose either Alternative -1 or Alternative-2 based on his design philosophy and practice. However in case Alternative-2 is adopted by bidder, then the bidder has to furnish extended warranty of five years for satisfactory static and dynamic performance of the foundation system.	Bidder understands that this additional warranty is only for the foundations(of TG & BFP) and not for the equipments coming over it. Please confirm	Bidder's understanding is correct.
42	VI/B	D-01	14 of 142	5.02.03 (ii)	The end portals shall be designed as rigid frames hinged (pinned support) at the base plate level (on top of the trestle column).	In line with the standard practice and also all other executed projects, Bidder proposes to have the support condition as fixed in one direction and pinned in other direction.	Bidder is requested to adhere to the provisions of bid documents.
43	VI/B	D-01	15 of 142	5.02.04 (ii)	This building shall be five storeyed (Ground +4 stories above) and shall be provided with floor area of 4500 sq.m with RCC framed structure.	Bidder understands that the total area of building includes the area at the ground floor also. Hence, plan area of building required is 900 Sqm. Please confirm.	Total floor area of the building shall be 4500 sq.m.
44	VI/B	D-01	17 of 142	5.03.01.04	The minimum grade of concrete for all RCC structures shall be M30.	Bidder understands that this statement is valid for liquid retaining structures only and minimum grade of concrete shall be governed by clause 08.02.01. Please clarify.	The minimum grade of concrete for all RCC structures pertaining to CPU shall be M30.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
45	VI/B	D-01	17 of 142	5.03.01.05	Factor of safety against overturning and sliding The structure shall be checked for minimum factor of safety of 1.5 against overturning conditions (ratio of stabilizing moment to overturning moment) and 1.4 against sliding conditions as per IS: 456.	Bidder opines that IS 456 gives 1.4 as factor of safety for overturning and same shall be modified in the specification . Please confirm	Bidder is requested to adhere to the provisions of bid documents.
46	VI/B	D-01	17 of 142	5.03.01.06	Minimum tensile Reinforcement in each direction for all foundation slabs / rafts shall be 0.2% of cross sectional area.	Bidder opines that this value of 0.2 % is the old value of minimum reinforcement when Fe415 grade steel was used. Since, Fe500 grade steel is to be used for this tender, bidder suggests usage of minimum reinforcement as per IS 456. This is also in line with specification clause 6.03.24.Please confirm	Bidder is requested to adhere to the provisions of bid documents.
47	VI/B	D-01	17 of 142	5.03.01.08	All Insert plates (except edge protection angles) provided in liquid retaining structures shall be 12 mm thick GI with lugs not less than 12 mm diameter.	Bidder requests to allow usage of flats also as lugs for insert plates. Please confirm.	Bidder is requested to refer amendment to technical specification in this regard.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
48	VI/B	D-01	17 of 142	5.03.01.07	Minimum thickness of foundation slab / raft and base slab of all liquid retaining tanks / pits shall not be less than 250 mm.	Bidder understands that cable trench/drains not being liquid retaining structure, this provision of minimum thickness is not applicable on these.	Minimum thickness of foundation slab / raft and base slab of all liquid retaining tanks / pits shall not be less than 250 mm.
49	VI/B	D-01	18 of 142	5.03.02	The ceiling of neutralization pit shall be provided with one coat of epoxy primer followed by 2 coats of epoxy paint (150 micron).	Bidder understands that Neutralization Pit being an open structure , there is no ceiling and hence, provision of epoxy primer and paint are not there. Please confirm.	If there is provision of ceiling over the neutralizing pit, than this clause shall be applicable.
50	VI/B	D-01	20 of 142	5.04.00	Complete sewerage system including Packaged Type Sewage Treatment Plant for STG Island facilities within the plant is in bidder's scope.	Bidder understands that sewerage system for only the buildings in bidder scope is covered under the scope of works for this tender. Please confirm.	Complete sewerage system including Sewage Treatment Plant(s) for buildings/facilities in the STG Island is in the scope of Bidder.
51	VI/B	D-01	20 of 142	5.05.00	PLANT STORM WATER DRAINAGE SYSTEM Complete storm water drainage system of STG Island package area is in bidder's scope.	Bidder understands that the scope of plant storm water drainage will be limited to connecting the water drainage till nearest trunk storm water drains. This is as per Part A Section D-1 of the specifications (Refer Page 1 of 4). Please confirm.	RCC Storm water drainage system till nearest trunk storm water drains' as specified in Part A Section D-1 of the specifications is in Bidder's scope

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
52	VI/B	D-01	21 of 142	5.06.00	All roads in STG Island package area shall be of rigid pavements unless otherwise specified. The design of rigid pavement shall be carried out as per IRC: 58.	Bidder understands that as brought out in Part A Section D-1 of the specifications, bidder scope of works would be limited to constructing the approach roads of the building that are part of this tender. Please confirm.	Bidder's understanding is correct.
53	VI/B	D-01	26 of 142	6.02.02	Equipment loads (which constitute all loads of equipment to be supported on the building frame) are not included in the imposed loads furnished below and shall be considered in addition to imposed loads	Bidder opines that this is an extremely general statement and cannot be applied everywhere. For example, in rotor removal area all the live loads are primarily due to equipments. Hence, Bidder suggests to replace the statement as " Where live loads due to equipment are within the range provided below for imposed loads, equipment loads shall not be considered additionally. However, loads due to major equipments like dearator, Heater, flash Tanks, Valves etc are required to be applied separately over and above the imposed load values furnished below". Please confirm.	Provision of specification are clear in this regard. Bidder is advised to refer clause 6.02.02 of Part B Sub Section D-01 of Technical specification which states "Imposed loads in different areas shall include live loads, erection, operation and maintenance loads. Equipment loads (which constitute all loads of equipment to be supported on the building frame) are not included in the imposed loads furnished below and shall be considered in addition to imposed loads."

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
54	VI/B	D-01	27 of 142	6.02.02	Imposed load for Mezzanine Floor - 1.0 T/Sqm	Bidder understands that mezzanine floor corresponds to the floors coming between ground floor and operating floor. Further, live load for 8.5 m floor should be increased to 1.5 T/Sqm. If confirmed, Necessary Amendment may please be issued.	By Mezzanine floor, floor at intermediate level in AB bay (usually at EL(+) 8.5 or 9 m) is meant. Bidder to kindly note that specified values of imposed loads in Clause 6.02.02 of Part B Sub Section D-01 of Technical Specification are minimum values and if Bidder opines that actual load will be higher, then higher impose loads shall be considered for structural analysis and design. Bidder to also kindly note that loads due to equipment, piping and other facilities shall be applied in addition to the minimum imposed loads specified in the Technical Specification.
55	VI/B	D-01	27 of 142	6.02.02	Imposed load for Roof Floor where equipment are located/not located given as 0.5 T/Sqm and 0.15 T/Sqm	Bidder understands that since solar panel are very light equipments of average weight 80 kg/Sqm, such roofs shall be loaded with 0.15 T/Sqm. Please confirm.	Bidder is advised to refer clause 6.02.02 of Part B Sub Section D-01 of Technical specification which states "Imposed loads in different areas shall include live loads, erection, operation and maintenance loads. Equipment loads (which constitute all loads of equipment to be supported on the building frame) are not included in the imposed loads furnished below and shall be considered in addition to imposed loads." Bidder is also requested to refer amendment to Technical Specification
56	VI/B	D-01	28 of 142	6.02.02	Imposed load for cover of channels/trenches given as 0.40 (General)	Unit of this load is given as T/sqm. However, to bring in clarity, bidder requests to mention the unit of this load whether this is given in T/Sqm or T/m	Specified value of loading is in T/sqm.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
57	VI/B	D-01	28 of 142	6.02.02	Imposed load for walkway (general) has been given as 0.5 T/Sqm and for Pipe cable gallery walkway as 0.4 T/Sqm. Walkway for crane gantry has not been given.	Bidder suggests to maintain walkway load for crane gantry on A and B Row as 0.4 T/Sqm in line with Pipe Cable gallery walkway.	Bidder's suggestion of considering imposed load of 4 T/sqm is impractical. Bidder is advised to consider Imposed load on crane girder walkway as 0.5 T/ sqm in line with minimum imposed loads specified for walkway (general).
58	VI/B	D-01	29 of 142	6.02.07	Temperature Load	Bidder request that Values of maximum and minimum temperature and hence annual temperature variation may be mentioned.	Bidder is requested to refer Climatological table provided as Annexure VI to Part A Sub Section A-0 of Technical Specification
59	VI/B	D-01	30 of 142	6.03.02 (i)	Paving in crane corridor shall be designed for the maximum load due to movement of crane.	Bidder requests to clarify the meaning of crane corridor.	Crane corridor is the area where the movement of heavy duty cranes are expected during construction/ erection activity. These corridors shall be decided by the bidder as per his requirement.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
60	VI/B	D-01	29 of 142	6.02.08	Structures shall be designed considering an additional load on account of differential settlement of 1 in 1000 between any two adjacent columns, subject to a maximum differential settlement of 8 mm in case of foundations resting on soils & 4mm in case of foundations resting on rock/ pile. These differential settlement loads shall be taken into consideration for design of footings & structures of Main Power House & Control Tower only. Further, in the analysis of differential settlement loads, adjacent columns interconnected with bracings are preferably to be provided with combined footing. In such cases, where rigid combined foundations are provided below braced columns, differential settlement between those columns needs not be considered. Moreover,the columns supported on the rigid raft need not be considered. However, differential settlement between the raft and the adjacent column footing of the same structure are to be considered. In the structural analysis for differential loads, following approach may be considered: All the alternate columns in structure shall be applied downward displacement as described above and analyzed at a time. The resultant forces/ reactions shall be considered with reversible effects for design of structures and footings.	Bidder requests the owner to enforce this clause subject to actual settlement at site. All the interior columns in longitudinal direction will have similar loadngs (except for braced bay which would be having combined foundations) and will be supported on pile foundations. Pile layouts would be designed for almost full capacity and this would be true for all the columns, chances of differential settlement is minimum. As Soil Bearing capacity (SBC) and Pile capacity is already based on settlement criteria, this additional Specification requirement need not be considered in design. Bidder hence requests the owner to change the wordings as " Possibility of Differential Settlement will be examined and if required differential settlement load shall be applied as given in specifications". Please Confirm.	Bidder is requested to adhere to the provisions of bid documents.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
61	VI/B	D-01	33 of 142	6.03.11	If RCC floor/roof is assumed to act as diaphragm, transmitting lateral loads to braced bays, it shall be provided with shear connectors	Bidder understands that the shear connectors are to be provided in Main beams.	If RCC floor/roof is assumed to act as diaphragm, transmitting lateral loads to braced bays, it shall be provided with shear connectors Bidder is also requested to refer amendment to Technical Specification in this regard.
62	VI/B	D-01	33of 142	6.03.15 6.03.14	Sewers shall be designed for a minimum self-cleansing velocity of 0.75m/sec and the maximum velocity shall not exceed 2.4m/sec. The maximum velocity for pipe drains and open drains shall be limited to 2.4m/sec and 1.8 m/sec. respectively. However, minimum velocity of 0.6m/sec. for self-cleansing shall be ensured.	Sewers being open channel flow, the minimum and maximum velocity limits are different at different places in the specifications. Please clarify.	Provisions of clause 6.03.15 of Part - B Sub Section D-01 shall be considered for sewer design.
63	VI/B	D-01	35of 142	6.03.22	The RCC slab shall be minimum 150mm thick above the top surface (crest) of the metal deck sheet.	Bidder understands that this clause shall not apply to Turbine Bay roof of Main powerhouse for which a thickness of 40 mm has been mentioned elsewhere in the specifications.	For floor slabs supported on metal deck, minimum thickness of Concrete above crest of metal deck shall be 150 mm. Turbine Bay roof slab shall be minimum 40 mm thick above crest of metal deck as specified in Clause 6.03.23 of Part B Sub Section D-01 of Technical Specification

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
64	VI/B	D-01	36 of 142	6.03.22	For outdoor structural steel columns, about 300 mm height of steel columns above the top of paving level shall be provided with at least 125 mm thick encasement with minimum reinforcement to prevent corrosion of the steel columns from surface water.	Bidder understands that this clause is applicable for outdoor columns of pipe and cable racks. Other steel columns in Main powerhouse area shall be given nominal encasement.	Columns of Pipe and Cable racks shall be considered as outdoor columns. Bidder is also requested to refer amendment to the Technical Specification in this regard.
65	VI/B	D-01	36 of 142	6.03.24 (b)	Minimum penetration of piles into Pilecap shall be 75 mm and clear cover to the main reinforcement at the bottom face of the pile cap shall be 100 mm.	Bidder opines that minimum clear cover value of 100 mm is too stringent given the exposure condition of the project location. It is suggested to maintain this value as per IS 456 i.e. 75 mm. please confirm	Bidder is requested to adhere to the provisions of bid documents.
66	VI/B	D-01	36 of 142	6.04.01 c	All steel structures shall be designed by following basic design criteria in ISO 12944 Part 3. However, where it is not feasible to follow the design criteria given in ISO 12944 Part 3 where the steel surface are inaccessible for application of protective coating, corrosion allowance of 1.5 mm shall be kept in thickness(over the design thickness) of structural steel members for Khurja Super Thermal Power Project.	Bidder understands that design thickness need not be increased by 1.5 mm if the structural component can be painted before erection. The word "inaccessible" is not applicable for subsequent painting. Please confirm	Bidder is requested to adhere to the provisions of bid documents. Bidder is also requested to refer amendment to the Technical Specification in this regard.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
67	VI/B	D-01	38 of 142	6.04.08	All structural steel members in switchyard (excluding fencing and gate) shall be hot dip galvanised as specified elsewhere.	Bidder understands that switchyard is not part of scope of works for this tender. Please confirm	Switchyard Civil Works are excluded from Scope of this Package. Bidder is also requested to refer amendment to the Technical Specification in this regard.
68	VI/B	D-01	42 of 142	7.02.02 j	Permissible settlement table	This table is blank and no information is available. Please provide.	The table is available in the specification
69	Part E	-	-	-	Tender Drawings	Please furnish the following drawings in Auto Cad format 1. General Layout Plan 2. Topographical Survey 3. Site Levelling plan	Bidder to kindly note that provision of drawings in Auto CAD format is not envisaged. Drawings shall only be provided in pdf format.
70	VI/B	D-01	38 of 142	6.04.09	For reinforced concrete work. i) The protection for concrete sub-structure shall be provided based on aggressiveness of the soil, chemical analysis of soil/sub-soil water and presence of harmful chemicals/salts.	Please furnish the chemical analysis results of ground water and sub soil samples.	Bidder is requested to refer the amendment to technical specifications in this regard.
71	VI/B	D-01	21 of 142	5.05.00	The invert levels of the drains shall be decided in such a way that the water can easily be discharged to the natural water bodies above the high flood level.	Please provide the high flood level of the plant area.	Refer 'Area Drainage Study' report issued as an amendment to Technical Specification

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
72	VI/B	D-01	2 of 142	1.01.00	Bidder or his agencies engaged as detailer for fabrication drawings should have the experience of detailing for powerhouse structures or steel plant or Industrial structures like Petro/ Chemical/ Refinery/Cement etc. Bidder shall obtain the approval of detailing agency for making fabrication drawings before engaging them.	Bidder understands that only approval of the detailing agency is required. Fabrication drawings prepared by detailer is not subject to approval. Please confirm	Fabrication drawings are not subject to approval by Owner. Bidder is also requested to refer amendment to the Technical Specification in this regard.
73	VI/B	D-01	4 of 142	3.02.00 €	Architectural presentation drawings, detail drawings, perspective view & 3D model. All drawing and document shall be duly stamped by the registered architect.	Bidder understands that 3D Model only for public buildings envisaged in the scope of works are to be submitted. Please confirm	3D Model for MPH Building and Service Building shall be submitted
74	VI/B	D-01	5 of 142	3.03.00 e)	All statutory clearance and permits from concerned local bodies/authorities, write-up on various statutory requirements and their compliance for various buildings, facilities, structures and systems, etc.	Bidder understands that all such clearances are in the scope of owner. Bidder however will provide the supporting documents/drawings etc. Please confirm	Obtaining all statutory clearance and permits from concerned local bodies/authorities, write-up on various statutory requirements and their compliance for various buildings, facilities, structures and systems, etc. is in Bidder's scope. Bidder is requested to adhere.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
75	VI/B	D-01	43 of 142	7.02.03 (ii)	The minimum diameter of pile shall be 600 mm. The allowable load capacity of the pile in different modes (vertical compression, lateral and pullout) shall be as per approved geotechnical report & shall be limited to following values.....	Bidder proposes that based on the actual geotechnical report, apart from the three types of piles given in the clause, few additional types of piles (with minimum diameter 600 mm) can be used for specifically dealing with pile foundations wherein lateral/uplift load is critical. In these additional piles the restriction of uplift capacity (35% of vertical capacity) and Lateral capacity (5 % of vertical capacity) may be dispensed with. Please confirm	Bidder is requested to adhere to the provisions of bid documents.
76	VI/B	D-01	4 of 142	3.01.00 (c).	Plants 'General Layout Plan' drawing with coordinates of roads, boundary wall, buildings and facilities, pipe/cable corridors, railway lines, Green Belt etc.	This clause refers to submission. As railway lines and Green Belt are not in scope of bidder, it is requested to include these items as exclusions in Part A.	Bidder is requested to adhere to provisions of bid documents. Bidder is also requested to refer amendment to the Technical Specification in this regard.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
77	VI/B	D-01	138 of 142	ANNEXURE -E	For buildings, if the design base shear (VB) obtained from modal combination is less than the base shear (`VB) computed using the approximate fundamental period (Ta) given in IS:1893: Part 1 and using site specific acceleration spectra with appropriate multiplying factor, the response quantities (e.g. member forces, displacements, storey forces, storey shears and base reactions) shall be enhanced in the ratio of `VB/ VB. However, no reduction is permitted if `VB is less than VB.	Please refer to IS 1893 Part 4 wherein provision of base shear enhancement is not there.Hence, Bidder envisages no base shear enhancement and request the owner to allow the analysis and design as per IS 1893 part 4.	Bidder is requested to adhere to provisions of bid documents.
78	VI/B	D-01	101 of 142	10.04.02	Rolled Sections and plates shall be of grade designation E350 or higher, Quality B0 conforming to IS: 2062.	Bidder understands that Rolled sections are not available in E350 grade. Please confirm	Bidder to kindly note that provision is there in Technical Specification for using E250 or E350 grade of steel (Clause 10.04.00 of Part B Sub Section D-01 of Technical Specification).Bidder is requested to adhere to the provisions of bid documents.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
79	VI/B	D-01	100 of 142	10.01.00	Cement Fly ash based portlandpozzolana cement conforming to IS: 1489 (Part-1) shall be used for all areas other than for the critical structures identified below. Other properties shall be as per IS code. Ordinary Portland Cement (OPC) shall necessarily be used for the following structures. a) TG foundation top deck b) Spring supported decks of all machine foundations such as TDBFP/MDBFP c) RCC for Chimney shell. d) NDCT shell and racker columns of NDCT.	Bidder understands that Chimney and NDCT are not part of this contract. Please confirm.	Civil Works for Chimney and NDCT are not in the scope of this package. Bidder is also requested to refer amendment to Technical Specification in this regard
80	VI/B	D-01	70 of 142	9.02.01	RCC staircase shall be provided for main entrance of Turbine building; control tower area and all other RCC construction buildings.	Please define the main entrances in cases of Turbine building and Control tower. Further, it is suggested to have steel staircase for steel structure and RCC staircase for RCC building.	Staircase with lift lobby is normally considered main entrance of MPH building and hence shall be provided with RCC staircase. For other areas, other relevant clauses of technical specification shall be followed.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
81	VI/B	D-01	85 of 142	9.11.11	Electrically operated, self operable/closing, aluminium framed with tinted glass, sliding doors shall be provided at the entrance of all common control rooms, entrance lobby of facility building.	Bidder understands that these doors are to be provided for main control room only and not for control rooms provided in smaller buildings outside Main power house . Please confirm.	Bidder is requested to adhere to provisions of bid documents.
82	VI/B	D-01	82 of 142	9.10.10	All internal paints shall be of low VOC content conforming to GRIHA rating for reduction of VOC content.	Bidder requests to provide extent of maximum permissible VOC that may be given.	Maximum permissible VOC shall be 50g /litre
83	VI/B	D-01	32 of 142	6.03.08	The vertical deflection of metal deck sheet for floor shall be limited to span/250.	Bidder understands that deck sheets to be used for roofing are to be checked in deflection for DL + LL case (Self weight of green concrete and deck sheet and construction live load of 0.1T/Sqm) only and not for wind load. Deck sheet used for side cladding shall however be checked for deflection in wind load case. Please confirm.	Bidder is requested to refer amendment to the Technical Specification.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
84	VI/B	D-01	70 of 142	9.02.01 b	All stairs shall have a maximum riser height of 180mm and a minimum tread width of 275 mm. Minimum clear width of stair shall be 1200 mm unless specified otherwise.	Bidder opines that riser height of 180 mm can be maintained everywhere, however, minimum tread width of 275mm and minimum clear width of staircase as 1200 mm may be difficult to attain occasionally wherein staircases of lesser tread and width may be allowed. Please confirm.	Bidder is requested to adhere to provisions of bid documents.
85	VI/B	D-01	71 of 142	9.03.02	Minimum Toilet facilities have been provided	Small buildings and pumphouses where only 1-2 users would use the toilet, the requirement of pantry, physically challenged person toilet, Janitor space etc can be dispensed with. Please confirm.	Bidder is requested to adhere to provisions of bid documents.
86	VI/A	D-1	1 of 4	1.00.0	Anti -weed treatment has been included in the scope of civil works	Bidder understands that anti weed treatment is not required to be done for areas where paving slab would come. Please confirm. For other areas, please furnish the detailed spec. for anti weed treatment	Bidder's understanding is correct. Successful Bidder has to propose anti-weed treatment and get it approved by EIC.
87	VI/A	D-1	1 of 4	1.00.0	Detailed geotechnical investigation has been included in the scope of works.	Bidder understands that geotechnical investigation has to be carried out for the area under bidder scope of works only.	Bidder's understanding is correct.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
88	VI/A	D-1	1 of 4	1.00.0	Sewerage system with Packaged type Sewage Treatment Plant (STP) for facilities in bidder's scope.	Considering that there are multiple packages for the entire plant area, Bidder understands that there would be only one sewage treatment plant which is not part of scope of works of the current tender. Further, bidder understands that only collection and transfer to STP for buildings in the current tender is in bidders scope. Please confirm.	Complete sewerage system including Packaged Type Sewage Treatment Plant for KHURJA SUPER THERMAL POWER PROJECT (2X 660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES facilities within the plant is in bidder's scope. Bidder to refer clause 5.04.00, Section-VI, Part-B (page 20 of 142) of Technical Specification.
89	VI/B	D-1	37 of 142	6.04.02	Painting of Steel Surfaces Embedded in concrete	Bidder understands that this clause will not be applicable for cases where steel structure is only encased by concrete (Example- Base plate, Column lower part, Wall beam etc) . Please confirm.	This clause is applicable for all steel surfaces embedded in concrete.
90	VI/B	D-1	38 of 142	6.04.08.	All structural steel members in switchyard (excluding fencing and gate) shall be hot dip galvanised as specified elsewhere	Bidder understands that Switchyard is not in the scope of works in the current tender. Please confirm.	See clarification at S.no. 67 above.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
91	VI/B	D-1	20 of 142	5.05.00	Storm water drain shall be designed taking into account the finished ground levels of the plant area, drainage pattern, intensity of rainfall, etc. with a return period of 50 years. These values shall be based on minimum rainfall intensity of 75mm/hr and minimum runoff coefficient 0.6.	Bidder understands that design rainfall intensity to be taken for design is 75 mm/hr. Otherwise it is requested to provide the design value.	Provisions of Technical Specification are clear in this regard. Bidder is requested to adhere to provisions of bid documents.
92	VI/B	D-1	40 of 142	7.02.01	e) Bidder shall also ensure that there is no damage to existing nearby foundations and the foundations pertaining to this package are not placed at shallower depth than the nearby foundations. If required depth of foundation is deeper than the existing foundations, proper protection shall be provided to existing foundations.	Please furnish the details of existing foundations nearby the project site.	In this clause the "existing foundations" refers to foundations which are already constructed either under this package or under any other package existing at the time of construction of foundations.
93	VI/B	D-1	41 of 142	7.02.02	Offsite buildings & structures, CPU, Transformer yard area (except transformer foundations) and all other structures which are not founded on pile foundation are to be placed on open foundation and if the depth of foundation is less than 5.0m below the EGL than the ground improvement shall be done using stone columns as per clause 7.02.04.	Method of ground improvement if required, shall be decided based on approved Geotechnical Investigation Report. Please confirm.	Bidder is requested to adhere to the provisions of bid documents.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
94	VI/B	D-1	41 of 142	7.02.02 i)	During design, the Allowable Bearing Pressure shall be adopted after approval of geotechnical investigation report. However, the maximum allowable bearing pressure shall be as per approved geotechnical report and shall be limited to the values as furnished in Table-1. The ground improvement scheme shall be approved by owner before execution.	Allowable bearing pressures shall be adopted based on approved Geotechnical Investigation Report.Please Confirm.	During design, the Allowable Bearing Pressure shall be adopted after approval of geotechnical investigation report. However, the maximum allowable bearing pressure shall be lower of the two values i.e. as per approved geotechnical report and as per the values furnished in Table-1. Bidder is requested to also refer the amendment to technical specifications in this regard.
95	VI/B	D-1	42 of 142	7.02.02 j)	For open foundations, the total permissible settlement shall be governed by IS: 1904/ IS: 13063 and from functional requirements whichever is more stringent. However, total settlement shall be restricted to the following:	Please furnish the total permissible settlement requirement for different structures.	Bidder to refer Clause no. 7.02.02 (j) for permissible settlement for the specific structures.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
96	VI/B	D-1	42 of 142	7.02.03	Following structures are to be placed on pile foundation: Main Power house including Control room, TGs, Service Building, Transformer foundations, Pipe cable gallery, any other heavily loaded structure etc.	a. "Any other heavily loaded structure" etc. may please be specified in which pile foundation is required. Please clarify. b. Piling should be mandatory in case of GT foundation only. UT, UAT and Station Transformers shall be placed on raft foundation. Please confirm. c. Pipe and cable galleries require very low values of bearing capacity (About 8-10 T/Sqm which is available). Moreover, the design is often governed by uplift forces which would be taken care of by the specification requirement-- Minimum depth of foundation shall be 5m below the existing ground level. As such pile foundations are not mandatorily required in pipe & cable racks. Please confirm.	Bidder is requested to refer amendment to technical specifications in this regard.
97	VI/B	D-1	43 of 142	7.02.03 i)	Two stage flushing of pile bore shall be ensured by airlift technique duly approved by the Employer.	Flushing of pile bore shall be done as per IS 2911 Part-1 Section-2. Please confirm.	Bidder is requested to adhere to the provisions of bid documents.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
98	VI/B	D-1	43 of 142	7.02.03 ii)	The minimum diameter of pile shall be 600 mm. The allowable load capacity of the pile in different modes (vertical compression, lateral and pullout) shall be as per approved geotechnical report & shall be limited to following values:	The allowable load capacity of the pile in different modes (vertical compression, lateral and pullout) shall be as per approved geotechnical report. Please confirm.	The allowable load capacity of the pile in different modes (vertical compression, lateral and pullout) shall be least of the three values i.e. as per approved geotechnical report, as per the values furnished in following table of technical specification and capacity achieved in pile load tests. Bidder is requested to also refer the amendment to technical specifications in this regard.
99	VI/B	D-1	43 of 142	7.02.03 ii)	The uplift and lateral load capacity shall be respectively restricted to 35% and 5% of the allowable load capacity in vertical compression.	The uplift and lateral load capacity of pile should not be restricted to 35% and 5% of the allowable load capacity in vertical compression. The same shall be as per actual calculation and based on initial pile load test results. Please confirm.	Bidder is requested to adhere to the provisions of bid documents.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
100	VI/B	D-1	47 of 142	7.02.05	Ground Improvement below roads & drains: In order to mitigate liquefaction below roads & drains, ground improvement by dynamic compaction or any other method can be done.	Ground improvement below roads, drains, paving, pits, trenches and grade slab is not required as the same will be rested on controlled compacted fill. To mitigate liquefaction if any, necessary ground improvement as per approved Geotechnical Investiagtion Report will be provided below the foundation of the buildings/structures only. Please confirm.	Bidder is requested to adhere to the provisions of bid documents.
101	-	-	-	-	General	Please furnish the electrical resistivity values of sub strata of the project site.	Bidder is requested to refer amendment to the Technical Specification
102	VI/B	D-1	11 of 142	5.02.01	In front of the power transformers, RCC fire barrier wall shall be provided as per functional requirement in lieu of brick wall at A-row	Bidder proposes that for fire protection, option of providing 345 thick brick wall should be given in addition to the RCC wall at A Row. Please confirm.	Bidder is requested to adhere to the provisions of bid documents.
103	VI/B	D-1	24 of 142	5.08.00	RCC Firewall shall also be provided between the transformers wherever required.	Bidder proposes that for fire protection, option of providing 345 thick brick wall should be given in addition to the RCC wall between the transformers. Please confirm.	Bidder is requested to adhere to the provisions of bid documents.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
104	VI/B	D-1	40 OF 142	7.02.01	For equipment's of static weight between 1.5 T and 20 T, the equipment may be supported on compacted sand filling with the load intensity below the equipment limited to 4T/m2. The minimum depth of foundation is 1.0m below FFL. Other requirements of sand compaction below the foundation shall be adhered, as specified elsewhere in the specifications.	Bidder requests an additional option of resting the equipment of static weight between 1.5 T and 20 T on compacted earth fill (as per specification) also. Load intensity to be restricted to 4 T/Sqm. Please confirm.	Bidder is requested to adhere to the provisions of bid documents.
105	SECTION VI, PART-B	A-3	76 OF 92	7.02.01	one (1) no of Electrically operated travelling cranes (Double Girder type) for each unit with associated auxiliaries, alongwith electrical equipment, control & instrumentation as required and specified shall be provided in the BC bay for erection and maintenance of Boiler feed pump and their auxiliaries.	One (1) no. of electrically operated travelling crane for each unit with associated auxiliaries, along with electrical equipment, control & instrumentation as required and specified shall be provided in the BC bay for operation and maintenance of Boiler Feed Pumps and their auxiliaries.	Bidder to comply specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
106	SECTION VI, PART-B	A-8	6 OF 6	2.01.00	<p>Suitable EOT Crane/HOT Crane/ Monorail beams with hoists/Chain Pulley Blocks of adequate capacity, to meet the erection and maintenance requirements are to be provided by the vendor for the various areas/ equipment. Some of the areas/ equipment not covered by TG hall EOT cranes are indicated below. For balance areas/ equipment, not listed hereinafter, the requirements of Specification shall be followed.</p> <p>(a) Feed water heaters & deaerator. (b) Various pumps & Heat Exchangers. (c) Condenser Water Boxes (front & rear) (d) Vacuum Pumps (e) CW Butterfly Valves (f) Control Fluid Room (g) Auxiliary cooling water (clarified) pumps and DM cooling water pumps of ECW systems. (h) Central Lube Oil System room. (i) Any other equipment.</p> <p>The above requirement is indicative only, the requirement given in the respective chapter is to be adhered to.</p>	<p>a) Heaters are handled by TG Hall EOT in AB Bay & then dragged to their locations. As such no separate EOT/Hoist is required.</p> <p>Also, one time erection of De-aerator shall done by mobile crane from CD Bay. As such no separate EOT Crane / Hoist is required.</p> <p>i) There is no other major equipment. Hence no other EOT/ Hoist is being envisaged.</p> <p>Please confirm.</p>	Bidder to comply specification requirement.
107	SECTION VI, PART-A	A-3	8 OF 10	10.02.00	<p>EOT CRANE FOR BOILER FEED PUMP</p> <p>Further the EOT crane shall have necessary facilities such as lifting beam with swivelling arrangement and slings for erection as well as maintenance of the equipment.</p>	<p>Lifting beam and swiveling arrangement for BFP crane is not required. Hence same is not being considered. Kindly confirm.</p>	Please refer amendment in this regard.
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CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
108	SECTION VI, PART-E			Drawing No.: 9915-999-POM-F-002	TENDER DRAWINGS FOR TURBINE GENERATOR AND ASSOCIATED PACKAGES (LAYOUT DRAWINGS) Dimension marked * are indicative only	<p>1. Bidder understands that dimensions/ levels marked as * (including operating floor level) are tentative and can be changed/ optimized by the bidder taking care of minimum/ binding requirements mentioned elsewhere in the specification.</p> <p>2. Bidder understands that equipment layouts furnished in the specification are tentative and can be changed/ optimized (like location/ level of TDBFP, MDBFP, Heaters etc.) by the bidder taking care of minimum/ binding requirements mentioned elsewhere in the specification. Please Confirm.</p>	Bidder understanding is correct.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
109	SECTION VI, PART-A	A-9	3 OF 10	2.01.00	(b.) Matching pieces/ Tubular Transition Pieces/ Sleeves: (i) The TG contractor shall also supply under their scope necessary material matching pieces/sleeves, shop welded to equipment/valve (in TG package scope of supply) nozzles mentioned at (ii) below, in case material of nozzles for these equipment/valve etc. is dissimilar to the connecting pipe material (SG package scope) at SG/TG interface point.	For the piping under SG scope, matching pieces for connection with TG scope equipment/ valve etc. should be considered in SG package at TG/ SG interface point. Please confirm.	Technical Specification Requirements are Clear. Bidder to Comply the same.
110	-	-	-	-	-	Thermal Insulation specification for TG scope piping & equipments is not available in the tender documents. Kindly provide the same.	Necessary Amendment for including " Part-B Technical Specifications for Power Cycle Piping / Chapter A9 " is being issued. Bidder to refer the same for these queries.
111	SECTION VI / PART-A	B-1	8 of 15	1.11.00	Station Lighting	Minimum number required for Lighting Masts is not specified in the specification. Please confirm the minimum number.	04 no. s of Lighting mast shall be considered.
112	SECTION VI/ PART-B	B-0	6 OF 9	3.11.00	D.C. Systems An ageing factor of 1.25 shall be considered.	Bidder would like to clarify that for plant batteries the applicable ageing factor shall be 1.0 as per IEEE 485. Please confirm.	1.25 ageing factor shall apply to both.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
113	SEC VI/ PART-B	B-05	4 of 23	3.02.02(F)	Cantilever arms of 320mm, 620mm and 750mm ...with tray in position	Since only 600mm, 300mm and 150mm are to be installed as per technical specification, Cantilever arms of 300mm for 150mm wide tray, 450mm for 300mm wide tray and 750mm for 600mm wide cable tray shall be provided. The same is in line with other NTPC projects executed by Bidder.	The Technical specification is clear bidder to comply specification.
114	SEC VI/ PART-B	B-05	2 of 23	2.01.05	The cable vault.....maintenance of cables.	600mm wide and 2.1m high movement pas-sage shall be provided for walk ways in cable vaults / cable spreader room for easy maintenance of cables. Please accept.	As per the Specification 800MM wide passage shall be provided.
115	SEC VI/ PART-B	B-12	5 of 8	4.01.03	The standard length of HT Cable shall be 1000m for all single core.....750m for 3 core cable.	Standard length for single core and 3 core cable HT power cable shall be 500/750m so as to avoid wastage. Please accept.	The standard drum length for HT power cables with a maximum tolerance of +/- 5%, may be decided by the bidder subject to condition that there shall not be any joint in cable, where application length of cable is up to & including 1000 meter for single core cable, and 750 meter for multicore cable.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
116	SEC VI/ PART-B	B-06	12 of 62	4.22.00	Employer reserves the right to alter the cable entries, if required during detailed engineering, without any additional commercial implication.	Bidder understands that LV switchgear can have top or bottom cable entry. Please confirm.	LV Switchgears shall generally have bottom cable entry. Top cable entry may be allowed in case of layout constraint during detail engg.
117	SEC VI/ PART-B	B-02	2 of 9	3.01.00 (b)	Continuous duty LT motors upto 200 KW Output rating (at 50 deg.C ambient temperature), shall be Premium Efficiency class-IE3, conforming to IS 12615, or IEC:60034-30. HT motors shall have minimum design efficiency of 95 % Tolerance on efficiency value applicable as per IEC 60034	Bidder would like to clarify that the starting current for IE3 motors shall be followed as per IS 12615 only. Please confirm.	Bidder's clarification is in order subject to the ratio of locked rotor KVA at rated voltage to rated KW not exceed the specification requirement at clause no. 8.00.00, section-VI, part-B, sub-section B-02.
118	SEC VI/ PART-B	B-03	4 of 6	2.14.05	All LT power cables of sizes more than 120 sq.mm. shall be XLPE insulated and sizes shall be 1Cx150, 1Cx300, 1Cx630, 3Cx150 & 3Cx240 sq.mm. However for cable sizes upto 120 sq.mm. both XLPE insulated & PVC insulated LT power cables are acceptable.	Bidder requests owner to allow 3Cx185 sq.mm. & 3Cx300 sq.mm. cable sizes in addition to the sizes specified in the referred clause. Please Accept.	The technical specification is clear. Bidder to comply Technical specification.
119	SEC VI/ PART-B	B-03	4 of 6	3.01.00(b)	1.1KV grade PVC power cables shall have aluminium conductor(compact type for sizes above 10 sq.mm), PVC Insulated, PVC inner sheathed (as applicable) armoured/ unarmoured, PVC outer-sheathed conforming to IS:1554 (Part-I).	Bidder proposes Copper conductor for 2.5 & 4 sq.mm cable sizes.Please Accept.	Noted.
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CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
120	SEC VI/ PART-B	B-05	4 of 23	3.1.04	Cable troughs shall be required for branching out few cables from main cable route.	The following sentence may be considered instead of the sentence on the left column mentioned in the specification i.e. "Wherever few cables are branching out from main trunk route troughs/ Local Buried Pipe / Slit / Branch Trays shall be used. Please confirm. (The above is in line with other clauses of specification since the specification also informs to use Slits, branch trays.)	The Technical specification is clear bidder to comply Technical specification.
121	SEC VI/ PART-B	B-05	6 of 23	3.05.01	33 kV, 11 kV, 6.6 KV and 3.3kV grade joints and terminations shall be type tested and Type Test reports as per IS: 13573 part-II and IEC-60502 shall be furnished.	Previously conducted type test reports of similar termination & jointing kits shall be furnished.Please accept.	Please refer clause NO.7.01.01 SEC VI/ PART- B, B-05 it states that "the contractor shall submit for Owner's approval the reports of all the type tests as listed in this specification and carried out within last ten years from the date of bid opening".
122	SEC VI/ PART-B	B-05	7 of 23	3.07.01	Cable lugs/ferrules for power cables shall be tinned copper solderless crimping type suitable for aluminium compacted conductor cables. Cable lugs and ferrules for control cables shall be tinned copper type.	Aluminium solderless crimping lugs/ ferrules shall be used for Aluminium power cables. Copper lugs shall be used for control cables.Please Accept.	The Technical specification is clear. Bidder to comply Technical specification.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
123	SEC VI/ PART-B	B-05	7 of 23	3.09.01	The cable clamps/ties required to clamp multicore cables shall be of SS-316 material, 12mm wide, polyster coated ladder lock type.	Self-locking, Nylon ties shall be used for clamping of multicore cables.Please Accept.	The Technical specification is clear. Bidder to comply Technical specification.
124	SEC VI/ PART-B	B-05	10 of 23	4.4.04	Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every one metre.	Single core cable in trefoil formation shall be laid with a distance of three times the diam-eter of cable between trefoil center lines resulting in clear space of 1D between the cables. Kindly confirm (Please note that 1D shall be sufficient to bolt the trefoil clamps as the trefoil clamps can be placed offset)	The Technical specification is clear. Bidder to comply Technical specification.
125	SEC VI/ PART-B	B-05	10 of 23	4.4.09	Wherever few cables are branching out from main trunk route troughs shall be used.	The following sentence may be considered instead of the sentence on the left column mentioned in the specification i.e. "Wherever few cables are branching out from main trunk, route troughs/ Local Buried Pipe / Slit / Branch Trays shall be used".Please confirm. (The above is in line with other clauses of specification since the specification also informs to use Slits, branch trays.)	The Technical specification is clear. Bidder to comply Technical specification..

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
126	SEC VI/ PART-B	B-05	11 of 23	4.4.14(3)	Power and control cables for AC drives and corresponding emergency AC or DC drives shall be laid in segregated routes. Cable routes for one set of auxiliaries of same unit shall be segregated from the other set.	This clause shall be complied to the extent feasible for essential drives only based on layout constraint .Drawing for the same shall be submitted to customer for approval during detail engineering Please Accept.	The Technical specification is clear. Bidder to comply Technical specification.
127	SEC VI/ PART-B	B-02	5 of 9	7.10.00	3.3 KV motors shall be offered with dust tight phase separated double walled (metallic as well as insulated barrier) Terminal box. Suitable termination kit shall be provided for the offered Terminal box. The offered Terminal Box shall be suitable for fault level of 250 MVA for 0.12 sec.	3.3 KV motors shall be offered with dust tight phase separated double walled (metallic as well as insulated barrier) Terminal box. Suitable termination kit shall be provided for the offered Terminal box. The offered Terminal Box shall be suitable for fault level of 25 KA for 0.12 seconds as per CEA guidelines and 11 KV motor PSTB requirements. Please Confirm.	Bidder to comply specification requirements.
128	SEC VI/ PART-B	B-12	1 OF 8	2.02.00	All cables including EPR cables	As per specification (vol VI/Part B, B12,clause no.3.03.00) only Trailing cables are EPR insulated. No HT Power cables are with EPR insulation. Fire Survival (FS) HT power cables are not envisaged. Please confirm.	Bidder to comply technical specification

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
129	SEC VI / PART-B	B-12	3 of 8	2.10.00(C)	In addition to manufacturer's identification on cables as per IS, following marking shall also be provided over outer sheath : Screen Fault current __ _KA for __ _ Sec. (Value of current & time shall be indicated)	According to IS 7098 Part-2 embossing of screen fault current is not required on outer sheath. Please confirm	Bidder to comply technical specification
130	SEC VI / PART-B	B-03	2 OF 6	2.02.00	All cables including EPR cables	As per specification (vol VI-1/Part B, B09,clause no. 6.00.00) only Trailing cables are EPR insulated. No LT Power cables are with EPR insulation. Fire Survival (FS) LT Power cables are not en-visaged. Please confirm.	Bidder to comply technical specification
131	SEC VI / PART-B	B-04	1 OF 6	2.02.00	All cables including EPR cables	As per specification (vol VI-1/Part B, B09,clause no. 6.00.00) only Trailing cables are EPR insulated. No LT control cables are with EPR insulation. Fire Survival (FS) control cables are not envisaged. Please confirm.	Bidder to comply technical specification
132	SEC-VI /Part-B	IIIC-07	2 OF 14	2.01.00 (4c)	Durable marking at intervals not exceeding 625 mm shall include manufacturer's name, insulation material, conductor's size, number of pairs, voltage rating, type of cable, year of manufacturer to be provided on outer sheath.	Progressive marking by embossing shall be provided @ 5 meter to include manufacturer's name, insulation material, conductor's size, number of pairs, voltage rating, type of cable, and year of manufacturer.Please confirm.	Bidder to comply with specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
133	SEC-VI /Part-B	C-01	5 of 5	7.05.00	For coastal areas, all conduits / cable sub trays / cabling accessories shall be provided with durable epoxy coating for all exposed surfaces.	Since the project is not located in coastal area, the requirement provided in clause no. 7.05.00 is not being considered. Please confirm.	Bidder to comply with specification requirement.
134	Single line diagram-STG package XXXX-999-POE-J-002.					Rating of UT, GT, ST, Unit service transformer, station service transformer, MV switchboard & LV switchboard has already been indicated by customer in SLD. It is assumed that sizing has already been done by customer and these are the final rating to be considered for tendering purpose.	Bidder understanding is clear.
135	SEC-VI /Part-B	IIIC-10	8 of 8	14	Public Address System	Technical specification is not available for Public Address system. Therefore, it is assumed that Public Address system is not applicable for TG package	Bidders understanding is correct.
136	SEC-VI /Part-B (QA)	E-40	1 of 1				Bidders understanding is correct.
137	SEC-VI /Part-B (QA)	E-45	1 of 1		Cathodic protection	Technical specification is not available for Cathodic protection. Therefore, it is assumed that Cathodic protection is not applicable for TG package	Cathodic protection shall be applicable for the station under ground piping as per the scope of this package. Bidder to comply specification requirement .

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
138	SEC VI / PART-B	B-0	7 of 9	4.00.00	Islanding scheme The plant shall be designed to operate in islanding mode of operation by tripping all the lines and generators except for one pre-selected unit, which shall run with the available plant load under such condition.	As per tender specification SEC-VI/Part-A , TERMINAL POINTS & EXCLUSIONS clause no.11.02.01, switchyard is excluded from bidders scope. Islanding scheme (in line with earlier projects) should be in scope of switchyard vendor. Please confirm.	Bidders control system shall be compatible for the same.
139	SECTION VI, PART-A	SUB-SECTION IIC	PAGE 1 OF 33	1.01.00	The Contractor shall provide Control & Instrumentation system for control, monitoring and operation of entire plant including all the systems, equipment etc covered under various sections of these specification(like Mechanical sections for SG/TG/Auxiliaries/Offsite etc, Electrical sections for Generator/MCC/SWGR/ Transformer etc.), in all regimes of operation in safe and most efficient manner.	Bidder understands that the Control & Instrumentation system for control, monitoring and operation to be provided for TG & Associated Packages only.Please confirm.	SUB SECTION IIC-01, PART-A in conjunction with its Appendices form the scope of Control & Instrumentation system for this package .
140	SECTION VI, PART-A	SUB-SECTION IIC	PAGE 2 OF 7	1.00.00	The scope of C&I systems under this specification Steam Turbine and Generator (STG) C&I system & TG Stand-alone C&I System is covered in Part-A and Part-B of this specification.		

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
141	SECTION VI/ PART-B & SECTION VI/ PART-E	SUB-SECTION A - 5 & P&I Diagram Of Condensate Polishing Plant (9915-371-110-POM-A-001)Rev-A	6 of 24	4.05.00 (a-1)	Condensate polisher vessels complete with condensate inlet and outlet connections, pre-filters,.....all fittings and appurtenances etc. as specified and as required.	As per referred clause, Pre-Filter need to be used. However as per P&I diagram, Pre-Filer is not applicable. Please clarify.	Scope of pre-filter is clearly mentioned in scope chapter of Part-A & also in Part-B. Bidder to comply specification requirement & incorporate the pre-filters in detailed P&ID to be submitted during detailed engg.
142	SECTION VI/ PART-B	SUB-SECTION A - 5	13 of 24	5.06.00	Pre Filter (Cartridge Filter).	We understand that the If Pre-Filters is applicable, then the same shall be employed for the commissioning period, start up period as well as normal continuous operation. Please confirm.	Confirmed. Bidder to refer CI No. 2.02.00 of Chapter A-5, Part-A of Technical Specification.
143	SECTION VI/ PART-B	SUB-SECTION A - 5	13 of 24	5.06.00	Pre Filter (Cartridge Filter).	The configartion& Cycle period details of Pre-Filters has not been provided. Please provide.	Qty is mentioned in Part-A Chapter A-5. Bidder to provide other details as per proven practice meeting system requirements.
144	SECTION VI/ PART-E	P&I Diagram Of Condensate Polishing Plant (9915-371-110-POM-A-001)-Rev-A PLANT WATER SCHEME & TP DETAILS (9915-999-POM-A-037)-Rev-C			P&I Diagram Of Condensate Polishing Plant. & PLANT WATER SCHEME & TP DETAILS	Terminal point for Filling of DM water storgae tank in CPU regeneration area has not been provided.We understand that the filling of DM water storage tank in CPU Regeneration area is in Owner's scope. Please confirm.	Bidder to refer drg. Plant water scheme and TP details.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
145	SECTION VI/ PART-B	Mechanical	-	-		Owner to note that we have not found any detailed technical specification of Equipment for Hydrogen Generation Plant in mechanical portion of technical specification. We understand that Hydrogen Generation Plant is not applicable for this project. Please clarify.	Bidder's understanding is correct.
146	SECTION VI/ PART-B	CIVIL WORKS/ SUB-SECTION-D-01	20 of 142	5.04.00	Complete sewerage system including Packaged Type Sewage Treatment Plant for STG Island facilities within the plant is in bidder's scope.....and MBBR technology shall be used for centralized sewerage treatment plant..... Bidder shall have to provide complete arrangement for sewage disposal up to the sewage treatment plant including pumping facilities.	We understand that,complete arrangement for sewage disposal of only TG area up to the sewage treatment plant needs to be provided.However as per stated clause bidder to provide Sewage Treatment Plant for complete plant facilities. Please clarify the scope of STP.	Complete sewerage system including Packaged Type Sewage Treatment Plant for STG Island facilities within the plant is in bidder's scope. Bidder to refer clause 5.04.00, Section-VI, Part-B (page 20 of 142) of Technical Specification.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
147	SECTION VI, PART-B	SUB-SECTION-A-3 TURBINE GENERATOR AND AUXILIARIES	PAGE 3 OF 92	1.01.03 (a)	Boiler maximum continuous rating (BMCR) of 102% of the turbine VWO steam flow requirement subject to a minimum of 2580 Tonnes/hr. For sizing of various auxiliaries in Bidder's scope of supply like BFP, HP-LP Bypass system etc. the Bidder shall therefore consider BMCR steam flow of 2580T/hr. or 102% of turbine VWO steam flow, whichever is higher.	The BMCR flow rate of 2580 T/Hr as specified in the specification seems to be on the higher side. For a 660 MW plant the BMCR flow rate is generally in the range of 2100 to 2150 T/Hr. Customer is requested to check and confirm the same	Refer amendment in this regard.
148	PLANT WATER SCHEME & TP DETAILS			Drg No-9915-999-POM-A-037		Boiler maximum continuous rating (BMCR) of 102% of the turbine VWO steam flow requirement subject to a minimum of 2580 Tonnes/hr. For sizing of various auxiliaries in Bidder's scope of supply like BFP, HP-LP Bypass system etc. the Bidder shall therefore consider BMCR steam flow of 2580T/hr. or 102% of turbine VWO steam flow, whichever is higher.	Refer amendment regarding BMCR flow.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
149	SECTION – VI, PART-A	SUB-SECTION-A-4 EQUIPMENT COOLING WATER SYSTEM	PAGE 1 OF 1	1.02.00	To meet the condensate transfer system one (1) no of horizontal centrifugal type Condensate transfer pumpfor each unit without any standby.....The capacity of each pumpshall be designed considering minimum 20 % of the TMCR Condition condensate flow	Boiler maximum continuous rating (BMCR) of 102% of the turbine VWO steam flow requirement subject to aminimum of 2580 Tonnes/hr. For sizing of various auxiliaries in Bidder's scope of supply like BFP, HP-LP Bypass system etc. the Bidder shall therefore consider BMCR steam flow of 2580T/hr. or 102% of turbine VWO steam flow, whichever is higher.	Bidder to comply specification requirements.
150	SECTION VI, PART-B	SUB-SECTION-A-4 EQUIPMENT COOLING WATER SYSTEM	PAGE 2 OF 20	2.08.00	Make up to the closed loop primary circuit shall be taken from the DM water transfer pumps located near DM water storage tank and emergency make up shall be from the discharge of condensate transfer pumps.	Boiler maximum continuous rating (BMCR) of 102% of the turbine VWO steam flow requirement subject to aminimum of 2580 Tonnes/hr. For sizing of various auxiliaries in Bidder's scope of supply like BFP, HP-LP Bypass system etc. the Bidder shall therefore consider BMCR steam flow of 2580T/hr. or 102% of turbine VWO steam flow, whichever is higher.	Bidder to comply specification requirements.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
151	SECTION VI, PART-B	SUB-SECTION A -5 CONDENSATE POLISHING UNIT	PAGE 14 OF 24	5.10.00	.....capacity of each tank shall be equivalent to 1.5 times the DM water required for one(1)regeneration operation.....However, the capacity of each DM water storage tank shall be 600m ³ minimum.	Boiler maximum continuous rating (BMCR) of 102% of the turbine VWO steam flow requirement subject to a minimum of 2580 Tonnes/hr. For sizing of various auxiliaries in Bidder's scope of supply like BFP, HP-LP Bypass system etc. the Bidder shall therefore consider BMCR steam flow of 2580T/hr. or 102% of turbine VWO steam flow, whichever is higher.	Bidder to comply specification requirements.
152	SECTION VI, PART-B	SUB-SECTION N- A10 AIR CONDITIONING SYSTEM	2 OF 37 and 4 OF 37	7 and 18.5	As per clause 7:- In air conditioning system the return air shall be through ducts and use of plenum space for return air shall be avoided. Further, for service building where various floors are airconditioned and no intermediate or intervening floor are left non-air-conditioned, the space above false ceiling shall be used as return air plenum. As per clause 18.5:- Insulation for supply and return air ducts: Supply and return ducts shall be insulated	There is contradiction in requirement of return air duct for service building. Further customer to note that due to large size of service building it is not feasible to provide return air duct for service building. In view of the this bidder have envisaged space above false ceiling as return air plenum. Please confirm.	Refer Amendment in this regard.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
153	SECTION VI, PART-B	SUB-SECTION-A10 AIR CONDITIONING SYSTEM and sub section- D-01 (CIVIL WORK)	2 OF 37 and 87 OF 142	2.00.00 13 and 9.13.10	<p>As per clause no. 2.00.00 13:- Requirement of Underdeck Insulation (for A/C area) Underdeck insulation of 50 mm nominal thickness of glass wool (32 Kg/cu.m) or rock wool (48 Kg/cu.m) shall be provided if: i) Non A/C area is located just above the A/C area. In this case, underdeck insulation shall be provided underneath of the ceiling of A/C area. ii) Non A/C area is located just below the A/C area. In this case, underdeck insulation shall be provided underneath of the ceiling of Non A/C area. iii) Underneath the ceiling of AHU room located below the non A/C area or exposed to Atmosphere.</p> <p>As per clause no. 9.13.10:- "Underdeck insulation shall be provided on the ceiling (underside of roof slab) and underside of floor slab of air-conditioned area depending upon the functional requirements. This underdeck insulation shall consist of 50mm thick mineral wool insulation with 0.05 mm thick aluminium foil & 0.6 mm x 25mm mesh wire netting and shall be fixed to the ceiling with 2 mm wire ties."</p>	<p>Different requirements are mentioned in two different clauses. Bidder proposes underdeck insulation as per clause no. 2.00.00.13.</p> <p>Please confirm .</p>	<p>Both the referred clauses for underdeck insulation are in-line with each other. Hence, Bidder to comply with Specification requirements.</p>

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
154	SECTION VI, PART-B	SUB-SECTION N- A10 AIR CONDITIONING SYSTEM	1 OF 37	1.02.00	All equipments shall be located indoor unless otherwise agreed to by the Employer. The equipment and layout shall generally be in accordance with the General Layout Plant drawings	We understand that Unitary air filtration unit, cooling tower and its tank, water softening plant, outdoor unit of condensing unit, outdoor unit of package AC and outdoor unit of split AC as applicable shall be located outdoor open to atmosphere. Please Accept.	Unitary air filtration units shall be located indoor (steel shed) and for rest of the equipments, Bidder's understanding is correct.
155	SECTION VI, PART-B	SUB-SECTION-A10 AIR CONDITIONING SYSTEM	3 OF 37	2.00.00 16	For other areas, where A/C load is of the order of 25-60 TR, Direct Expansion (D-X) type air cooled condensing units alongwith AHUs shall be provided depending on the availability of space/ layout etc. For areas, where A/C load is of the order of 5-25TR, ductable split/package A/C shall be provided. Smaller areas which are away from the D-X type condensing unit /central chilling units which may require air conditioning upto 5 TR rating shall be served with non-ductable Split (Hi-wall/Cassette) air conditioner units as per requirement.	Kindly provide the selection criteria if AC load exceed 60 TR.	For areas, where A/C load is more than 60 TR, water cooled chillers shall be provided.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
156	SECTION VI, PART-B	SUB-SECTION-A10 AIR CONDITIONING SYSTEM	24 OF 37	7.02.03 and 7.02.04	<p>As per clause no.7.02.03:- Bidder shall provide Microprocessor/PLC based Control System along with Human Machine Interface System with two nos. Operator work station and one (1) no A-4 size color laser printer located at service building control room.</p> <p>As per clause no.7.02.04:-The operation of each Air Conditioning system shall be possible through Microprocessor based dedicated controllers to be provided by Contractor for each Screw /centrifugal Chiller units with local start / stop & indication for main plant A/C system in addition to Main DDCMIS based Control system of A/C plant (provided by contractor) for Main plant area , " ESP CONTROL ROOM, FGD CONTROL ROOM & AHP CONTROL ROOM" further these microprocessor based control panels of Chiller units shall be suitably interfaced with DDCMIS based Control panels</p>	<p>Different requirements are mentioned in two different clauses. Bidder proposes DDCMIS based control system for complete AC and Ventilation system of TG-package.</p> <p>Please confirm .</p>	<p>Bidder to refer Clause No. 2.03.01 of Sub-Section-IIC (Control & Instrumentation System) and 3.02.00 of Appendix-I to Sub-Section-IIC (Control & Instrumentation System), Part-A of Technical Specification.</p> <p>Further, Bidder to refer Amendment in this regard.</p>

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
157	SECTION VI, PART-B	SUB-SECTION-A10 AIR CONDITIONING SYSTEM	24 OF 37 and 2 OF 37	7.02.03 and 2.00.00 (4)	<p>As per clause no.7.02.03:- Adequate nos. of occupancy sensor and day light sensor shall be provided. CO2 sensor shall be provided in each AHU room to regulate the fresh air fan damper.</p> <p>As per clause no.2.00.00 (4):-The fresh air quantity for air-conditioned areas of Control Room / Control Equipment Room / UPS, etc. shall be 0.45 M3/minutes/person or 1.0 air change per hour whichever is greater. However, for areas like service building, etc. quantity of fresh air shall be minimum 1.5 air changes per hour. Fresh air fan capacity shall be minimum 10% of the total CMH value of working indoor units</p>	<p>As per clause 2.00.00 (4) continuous fresh air is required and fresh air requirement sizing criteria is also mentioned. In view of the above CO2 sensor to regulate fresh air is not envisaged.</p> <p>Please confirm .</p>	Refer Amendment in this regard.
158	SECTION VI, PART-B	SUB-SECTION-A10 AIR CONDITIONING SYSTEM	24 OF 37	7.02.03	Adequate nos. of occupancy sensor and day light sensor shall be provided. CO2 sensor shall be provided in each AHU room to regulate the fresh air fan damper.	Day light sensor are required for switch off/on the light (Eclectic light like LED etc.) as per the availability of sun light, hence same are not applicable for AC system. Please confirm.	Noted. Refer Amendment in this regard.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
159	SECTION VI, PART-B	SUB-SECTION-A10 AIR CONDITIONING SYSTEM	26 OF 37	7.04.00 (a)	Inside room temperature and humidity shall be maintained by controlling the chilled water flow by means of motor operated three way modulating valve and by varying the flow by means of VFD driven AHU's which shall get its signal from Control system for main plant A/C system. For Service building & Administrative building inside room temperature and humidity shall be controlled by varying the chilled water flow of secondary chilled water pumps through VFD driven motor and by varying the air flow of AHU through VFD driven motor.	As per clause 3.00.00 AHU's with VFD are required for service building only. Further Administrative building is not applicable for subject project. Please clarify.	Bidder's understanding is correct. Further, Administrative Building is not covered in scope of TURBINE GENERATOR AND ASSOCIATED PACKAGES for KHURJA SUPER THERMAL POWER PROJECT (2X 660 MW).
160	SECTION VI, PART-B	SUB SECTION N-A11 VENTILATION SYSTEM	13 OF 25	4.06.00	Acoustic Insulation:- All ducts up to a distance of 5 meters from Air washer unit fan, UAF fan and other centrifugal fan outlet shall be acoustically lined from inside with 25 mm thick resin bonded glass wool of 48 Kg/Cu.M density and 30 gauge perforated aluminium sheet having 5 mm dia perforation at 8 to 10 mm centre-to-centre distance. Insulation shall be fixed on wooden frame of 600 x 600 mm dimension. Fiber glass tissue sheet shall be applied over the outer surface of insulation before applying perforated aluminium sheet. Application of acoustic insulation shall be inline with the requirements specified above.	From the moist air of Air washer/UAF acoustic insulation get rotten and will smell, hence same is not technically recommended in the wet ventilation system. Please review the same.	Acoustic insulation is required to reduce noise level within the specified limit. Hence, Bidder to comply with Specification requirements.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
161	Section VI / Part E	List of tender drawings		Drawing no. 9915-999-POM-A-037	As per TP-13 in table, make up water flow for HVAC is mentioned as 60 CMH.	As per the drawing 9915-999-POM-A-037 HVAC make up water is in Water system package and make-up water shall be provided as 60 CMH. However we have requirement of 100 CMH make up water flow for HVAC. Pressure requirement shall be furnish during detail engineering. Please confirm to provide make up water for HVAC as per above requirement.	Make-up water requirement of 60 CMH as specified in referred tender drawing for various A/C and ventilation equipments under TURBINE GENERATOR AND ASSOCIATED PACKAGES for KHURJA SUPER THERMAL POWER PROJECT (2X 660 MW) is sufficient. Bidder to comply with specification requirement.
162	SECTION VI, PART-B	SUB SECTION-A11 VENTILATION SYSTEM and SUB-SECTION-A10 AIR CONDITIONING SYSTEM	2 OF 25 24 of 37 27 OF 37	2.00.00 9(iv), 7.02.02 and 7.07.00 (e)	As per clause 2.00.00 9(iv):- Cable Galleries of ESP/FGD Building As per clause 7.02.02:- "ESP control rooms, FGD control room & AHP control room" shall be maintained by controlling the chilled water flow by means of motor operated three way modulating valve at chilled water line, humidified system and duct heater. As per clause 7.07.00 (e):- Relative humidity and temperature measurement of all control rooms and CERs, ESP control room, FGD control room and all major air-conditioned areas shall be available in DDCMIS. Relative humidity and temp. measurement for main plant control room and CERs to be available in multiple numbers.	Scope of AC and Ventilation system for"ESP control rooms, FGD control room & AHP control room" is not in TG- bidder scope. Please clarify.	Refer Amendment in this regard.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
163	SECTION VI, PART-B	SUB-SECTION A - 8 SERVICE ELEVATORS	2 OF 6	1.02.00, iv)	False ceiling: Powder painted	Since, elevator car and ceilings shall be of SS 304, false ceiling shall be of SS 304 accordingly. Hence, it cannot be powder painted. Please confirm the acceptance.	Technical Specifications are clear. False ceiling shall be powder painted as specified at Clause 1.02.00, iv), Sub-section A-8, Part B, Section VI of the technical specifications if the material of construction of false ceiling is other than SS 304.
164	SECTION VI, PART-B	SUB-SECTION A - 8 SERVICE ELEVATORS	3 OF 6	1.03.01, d)	Bidder shall provide emergency indicator to indicate the location of elevator in case of elevator being stuck up between the floors through automatic flashers (both audio & visual)	There are two condition which are envisaged for stuck-up of elevator: <ul style="list-style-type: none"> • If the elevator is stuck between floors in power condition, the floor indicator will be visible with a message – “Out of Service”. • If the elevator is stuck between floors in Power-off condition, the floor indicator will not be available. Once power is restored the lift moves to the nearest landing & the indicator will get updated. Further, as per reputed / regular elevator suppliers, stuck-up condition positioning of elevator cannot be indicated in either of above condition. Kindly furnish acceptance.	Bidder to comply the technical specifications.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
165	SECTION-VI, PART-A	MANDATORY SPARES	25 OF 59	20	Passenger Elevator	We understand that spares mentioned under the referred clause, are meant for entire elevators for TG Building and Service building area. 1 lot of spares as defined under referred clause, shall be considered for entire station as capacity of both TG building and service building elevators are same. Please confirm.	Bidder understanding is correct.
166	SECTION-VI, PART-A	MANDATORY SPARES	25 OF 59	20	Passenger Elevator	Spares mentioned under clause 20 of mandatory spares, Section VI, Part A are only considered for mandatory spares for Elevators. No other spares mentioned in Electrical and C&I part have been considered for Elevators. Please confirm.	Technical specification requirement is clear in this regard .Bidder to comply.
167	SECTION VI, PART-B	SUB-SECTION A - 8 SERVICE ELEVATORS	2 OF 6	1.02.00, 2	Emergency safety devices: The lift shall be provided with safety devices attached to the lift car frame and placed beneath the car. The safety device shall be capable of stopping and sustaining the lift car up at the governor tripping speed with full rated load in car.	Safety device in form of limit switches are placed below the lift car to stop and sustain the lift car. Further, safety governors are also installed on sides of car which come in operation during free fall of elevator or when speeds are higher than trip-ping speeds. During above mentioned situations safety governor gradually hold the guiderail and bring the elevator to complete rest. Kindly provide confirmation.	Confirmed.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
168	SECTION VI, PART-B	SUB-SECTION A - 8 SERVICE ELEVATORS	1 OF 6	1.02.00	Flooring of Cabin: Vitrified ceramic tiles of mat finish	<p>There is ambiguity in tender specification for flooring of cabin in elevator for TG Building & Service Building. We have envisaged Vitrified ceramic tiles of mat finish for flooring of cabin in elevators inline with clause no. 1.02.00 of sub section A-8.</p> <p>Please confirm.</p>	<p>Bidder's understanding is not correct. Flooring of Cabin shall be Vitrified ceramic tiles of mat finish as specified at Clause 1.02.00, Sub-section A-8, Part B, Section VI of the technical specifications. Further bidder has to take care of tiles' weight (approx 80 kg) to be provided for cabin flooring in selecting counter weights as specified at Clause 1.02.02, Sub-section A-8, Part B, Section VI of the technical specifications.</p> <p>Table B,1.u and Table B, 2.a of Sub-section 01-Civil Works, Part B, Section VI of the technical specifications pertain to lift & staircase lobby, entrance lobbies etc.and, hence, are not applicable for elevator car internals.</p>
	SECTION VI, PART-B	SUB-SECTION A - 8 SERVICE ELEVATORS	2 OF 6	1.02.02	Bidder to take care of granite tiles (approx 80 kg) to be provided for cabin flooring in selecting counter weights.		
	SECTION – VI, PART-B	SUB-SECTION N-01 CIVIL WORKS	94 OF 142	Table B, 1. u	Main power house Building Lift and Staircase Lobby: 18mm thick polished granite stone as pattern. 18mm thick polished granite & glass mosaic tile cladding up to False Ceiling Height.		
	SECTION – VI, PART-B	SUB-SECTION N-01 CIVIL WORKS	95 OF 142	Table B, 2. a	Service Building Entrance Lobbies and Lift areas/Foyer/Exhibition space: 18mm thick polished granite stone as/ pattern. Textured paint /18mm thick polished granite cladding/lacquered glass cladding and glass mosaic tile murals in lift lobby & foyer		

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
169	VI / A	A-1	5 of 14	5 (ii)	The Bidder/ its sub-vendor should have designed, manufactured, erected and commissioned EOT cranes of capacity 100T or more with minimum crane span of 28 meters, which is in successful operation in at least one (1) station for a minimum period of one (1) year.	We understand that the requirement of EOT cranes mentioned in the said clause of provenness criteria includes Double Girder EOT Cranes, Gantry Cranes, Semi-Gantry Cranes etc. since design of all these types of cranes are governed by similar Indian Standards (design of Gantry/Semi-Gantry Crane being more stringent w.r.t. requirement of wind load design of these cranes). Please confirm.	(i) Specification requirement is clear. Bidder to comply specification requirement.
						Since Double Girder EOT Cranes supplied in power station are designed based on similar Indian Standard (i.e. IS 3177 and IS 807) as for any other building viz. Steel Plant (which is comparatively heavier duty w.r.t power station), workshop sheds, manufacturing units, cement factories, oil refineries etc; we understand that the word 'station' indicated in provenness criteria includes crane supplied in any of the said buildings and not only power station. Please confirm.	(ii) Bidder's understanding is correct.
170	VI / B	A-3	73 of 92	7.01.00 (iv)a	Vertical deflection caused by safe working load and weight of trolley in central position not to exceed 1/900 of the span	As per IS 807 the vertical deflection of the crane shall be 1/750 of the span of the crane (if the span of the cranes is more than 12m), and 1/600 of the span (if the span of the crane is less than 12m).Kindly confirm.	Bidder to comply the specification requirement.
	VI / B	A-3	78 of 92	7.02.16	The vertical deflection of crane girder shall not exceed 1/800 of the span.		

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
171	VI / B	A-3	73 of 92	7.01.00 (v)	Buffers to be designed to bring the loaded crane to rest from a speed of 50% of the rated speed.	Buffers and end stoppers shall be designed to bring the loaded crane to rest. However, for sizing of Buffers and end stoppers unloaded crane shall be taken into consideration as the suspended load on hook does not transfer to the buffer and end stopper during impact. This suspended load acts on vertical direction only as it is not a stiff masted crane. Kindly accept.	Bidder to comply the specification requirement.
172	VI / B	A-3	75 of 92	7.01.00 (xiv)	Rails to be as per relevant Indian Standard and joints to be butt welded by thermit welding or fusion welding.	Rail to rail joints may be allowed by end clamping method also which is a proven practice in crane industry. Welding of rail and its associated tests are very difficult to carry out at site.	Bidder to comply the specification requirement.
173	VI / B	A-3	82 of 92	7.10.00 (a)	Maximum Span/Depth Ratio for Girder: Plate girders : 18	As per IS 807:2006 clause 25.1, span by depth ratio shall not exceed 25. Kindly accept.	Bidder to comply the specification requirement.
174	VI / B	A-3	76 of 92	7.02.02	EOT Crane for BFP: The EOT crane shall be pendent operated.	We understand that BFP crane shall be pendent push button operated only. Kindly confirm	Bidder to comply the specification requirement.
	VI / B	A-3	79 of 92	7.05.00	Radio remote Control of EOT Crane:		

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
175	VI / B	A-3	78 & 79 of 92	7.04.00 (viii)	Master controller - Desk type having following features	As per standard industrial practice, we understand that Master controller is applicable only for TG Hall crane.	Bidder to comply the specification requirement.
176	VI / B	E-47	17 of 23	7	THE CRANES SHALL BE COMPLETELY ASSEMBLED AT SHOP FOR FINAL TESTING. ALL TESTS FOR DIMENSION, DEFLECTION, LOAD, OVERLOAD, HOISTING MOTION, CROSS TRAVEL ETC. AS PER IS-3177 SHALL BE CARRIED OUT AT SHOP	All test for hoisting & Cross travel shall be demonstrated at Works. However LT i.e Long travel motion testing cannot be shown at Works since the required civil structure including rail to suit the crane span cannot be developed at manufacturer's works. The same shall be demonstrated at site.	Bidder to comply the specification requirement.
177	VI/A	IIC	244 / 392	2.04.12	Suitable interfacing (through OPC protocol) hardware/ software for proven, reliable and full duplex communication link between HMIPIS of DDCMIS and following systems through station LAN as already indicated at Clause no. 2.04.11. (i) SG-DDCMIS (For signal exchange from TG-C&I for ERP) (ii) SG-DDCMIS (For signal exchange of numerical relay data)	THDC may please clarify if the duplex communication link herein refers to FO cable link or wireless link. THDC to provide the location and distances of em-pliers WS, SG DDCMIS from station LAN.	The communication link here refers to FO cable link only. The network panels for Station LAN shall be located in Unit#1 Control Equipment Room (CER). As indicated in the referred clause this interface shall be through Station LAN only. There is no reference to WS DDCMIS in the referred clause.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
178	VI/A	IIC	259 / 392	11.00.00 (1 to 5)	INTERFACING REQUIREMENT TO/FROM EMPLOYER'S PROCURED CONTROL AND INSTRUMENTATION SYSTEM PADO TG Soft link to employer DDCMIS SOE System: Quantity of SOE signal shall be approximately 250 Nos. H/W signal exchange for employer procured control system Mater slave clock	The terminal point for interface of employer systems viz., PADO, Employer DDCMIS, SER, H/W interface, Master clock system shall be TBs/ HMI N/W/ DDCMIS of contractor. THDC may please confirm.	Please refer Cl. No. 7.04.00 of Terminal Points & Exclusions Chapter in Part A of technical specifications, which clearly states that terminal point for al interfacing with Employer's systems shall be Employer's Switch/Hub/Terminal/port
179	VI/A	IIC	1 of 1	APPENDIX- A	LIST OF PC STATION	We understand PC stations are only in the scope of bidder's scope. whereas, connectivity of PC station with employer's station LAN shall be by employer.	The PC stations in the referred Appendix shall be part of the Contractor supplied system and shall be used for Contractor supplied DDCMIS. These PCs shall not be interfaced with Employer's Station LAN.
180	VI/A	IIC	262 / 392 252 / 392	13.09.00 4.00.00 (h)	Comprehensive Annual Maintenance Contract (AMC) for three (03) years after warranty period shall be provided by the contractor for SWAS. Comprehensive Annual Maintenance Contract (AMC) for three (03) years after warranty period shall be provided by the contractor for analyser instruments of CPU plant.	THDC may please clarify the extent of scope of com- prehensive AMC for CEMS as the same is subject to interpretations during contract execution stage and involve cost implication.	Bidder to note that Continuous emission monitoring system (CEMS) for Stack emission & its AMC is not part of this package.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
181	VI/A	IIC	270 / 392	1.00.00	The scope of C&I systems under this specification Steam Turbine and Generator (STG) C&I system && TG Stand-alone C&I System is covered in Part-A and Part-B of this specification.	The scope applicable for the package shall be as specified in PART A. whereas the technical require-ments of the scope defined in Part A shall be in accordance with Part-B. THDC may please confirm.	SUB SECTION IIC-01, PART-A in conjunction with its Appendices form the scope of Control & Instrumentation system for this package
182	VI/A	IIC	294 / 392	1.00.00	3. All cable trays/ sub trays, rigid and flexible conduits, GI/HDPE Conduits, conduit fittings, cable glands, junction boxes including temperature transmitter JBs(both DIN rail mounted and dual temp type), lugs, pull boxes accessories and all supports between the cable trays (trunk route) and equipments as required for installation of all cables, on as required basis	THDC may please provide the BOQ of cable trays/ sub trays, conduits, JBs and other accessories for cables of employer package systems.	Bidder to estimate the same based on the following: a) Quantites of interfaces with external systems given in Cl. No. 11.00.00, SUB-SECTION-IIC, Part-A b) Location of the systems indicated in the GLP c) The terminal points and exclusions defined in the Terminal Points and Exclusions chapter.
183	VI/A	TERMINAL POINTS & EXCLUSIONS	309 / 392	7.02.00 e)	A. Terminal points Employer's DDCMIS Marshalling cab-inets for hardwired signal exchange from SG C&I and BOP C&I control systems.	THDC may please furnish the BOQ of cables to be considered for hardwired interface of employer's SG/ BOP C&I systems with contractor's DDCMIS.	Bidder to refer Cl. No. 11.00.00, SUB-SECTION-IIC, Part-A of specification wherein tentative quantity of signal exchange with BOP C&I and SG C&I system panels is already mentioned. Further, it may be noted that the BOP C&I and SG C&I system panels shall also be placed in the CER. Accordingly, Bidder may estimate the CER to CER cable quantity based on above two considerations.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
184	VI/A	TERMINAL POINTS & EXCLUSIONS	309 / 392	7.02.00 f)	Employer's Vibration Monitoring system cabinet TB's for connecting raw buffer signals of SG related main plant auxiliaries & CW pumps to vibration diagnostics and analysis system.	THDC may please furnish the list of SG main plant auxiliaries and CW pumps (along with location and distances) that are to be connected to bidders vibration analysis system. THDC to furnish the BOQ of cable to be considered for connectivity of employer's VMS with contractor's vibration analysis system.	Bidder to refer Cl. No. 3.00.00 (a), SUB-SECTION-IIC, Part-A of specification wherein quantity of raw buffer signals of SG main plant auxiliaries and CW pumps is already mentioned. VMS of SG auxiliaries shall be placed in the unit CER and that for CW pumps shall be placed in CW Pump house. Location of CW pump house Pump is available in the General Layout Plan. Accordingly, Bidder may estimate the cable quantity based on above quantities and location.
185	VI/A	Mandatory spares	340 / 392 347 / 392	--	Group-B: Mandatory Spares Group-C: Mandatory Spares	THDC Please clarify the classification of Group B & C Mandatory spares.	Group B are for sub-assemblies. Group C are for Inventory Spares.
186	VI/A	Mandatory spares	363 / 392	1.00.00 (7)	7) ANALYSERS	THDC may please clarify the analyzer spares referred herein correspond to SWAS.	This clause is for Analysers coming in CPU system. For SWAS Analysers refer to Clause 6.00.00 under C&I Mandatory Spares.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
187	VI/B	IIIC-07	1 OF 14	1.01.06	Wherever the quantity has been defined as on as required basis, the same are to be furnished by contractor on as required basis within his quoted lump sum price without any further cost implication to the Employer.	It is observed in some instances that discrete quanti-ties as well as "on as required basis"/ "shall be decid-ed during detailed engineering" are indicated in the contract quantities. In such scenario, bidder shall consider discrete quantities. In case of any change of requirement during contract execution shall be han-dled separately through addition/ deletion criteria. THDC may please confirm.	Bidder's query is very generic in nature. Bidder to note that any scope variation during detailed engineering shall be settled as per provisions defined in the contract.
188	VI/B	IIIC-02	24 of 26	13.06.00	Bidder shall deploy at least one engineer, one supervisor and two technicians in the team. The Employer shall approve the exact nos. & composition of team members.	THDC may please review the requirement of warran-ty deputation for SG DDCMIS. Since the package is not EPC, the warranty obligations can be met from contractor's works on as required basis. In view of the same, THDC may please delete the requirement of warranty deputation.	Bidder to comply with specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
189	VI/B	IIIC-02	24 of 26	13.02.00	No repairs/replacement shall normally be carried out by the Employer when the plant is under the supervision of Bidder's supervisory engineers. If in the event of any emergency in the judgment of employer, delay could cause serious loss or damage, repairs may be made by the employer or a third party chosen by the employer without advance notice to the bidder and the cost of work shall be paid by the bidder.	THDC may please note that unauthorized repairs/ trouble shooting by unauthorized agencies for DDCMIS/ other critical C&I equipment may result in improper functioning of the system and withdrawal of warranty obligations. In view of the same, THDC may kindly review the clause for deletion	Bidder to comply with specification requirement.
190	VI/B	IIIC-02	24 of 26	13.03.00	The Bidder shall provide warranty spares and an exhaustive list of warranty spares including components for system hardware and instrumentation and peripherals based on (and keeping adequate margin over) normally experienced failure rate shall be submitted by the Bidder for Employer's review regarding adequacy of the same.	It shall be the responsibility of the contractor to meet the warranty obligations as prescribed in the contract. Any repair/ replacement of items/ equipment as part of warranty obligations shall be handled on as required basis. Supplying of spares required for warranty ahead along with main equipment may not match the actual requirement and will lead to mis-management of spares for warranty. In view of the above, we request THDC to kindly delete the clause on warranty spares.	Bidder to comply with specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
191	VI/B	IIIC-02	24 of 26	14.02.00	The AMC shall cover total maintenance of all hardware & software coming under the scope of DDCMIS and shall include free repair/replacement of all cards/modules/peripherals/cables/components etc., correction of software problems and supply of expendable items. The Bidder shall ensure 99.7% availability of the system with the AMC.	We understand the 99.7% system availability obligation of contractor during AMC period corresponds to comprehensive AMC period of one year and does not include hardware support of two years. THDC may please clarify.	Bidder to comply with specification requirement.
192	VI/B	SUB-SECTION - IIIC-02 DDCMIS ANNEXURE IIIC-02H	3 OF 4	6.00.00	Software package for Merit order rating programme	Only short write-up is provided. NTPC/THDC to provide detailed specification.	Please refer Cl. No. 2.01.00 of SUB-SECTION-IIC CONTROL & INSTRUMENTATION SYSTEM, Part-A of Technical specifications which clearly states the clauses applicable of Annexure IIIC02-H. Hence, Merit Order Rating is not applicable for the project.

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
193	VI/C VI/B	GENRAL TECHNICAL REQUIREMENTS (GTR) SUB-SECTION-IIC-02 DDCMIS	47 OF 89 23 OF 26	13.00.00 11.00.00	TRAINING OF EMPLOYER'S PERSONNEL (c.) DDCMIS as detailed in Part-B TRAINING For exact details and duration of training, refer to Part-C, Sub-Section-VI of specification.	THDC to provide exact details and duration of training for DDCMIS since requirement is not specified in tender documents.	The total requirement of training mandays is mentioned under tables indicated at 13.06.00, Part-C of specification. Out of that, exact details and duration of training for DDCMIS shall be discussed and finalized during post award stage as mentioned under clause no.13.06.00 (2), Part-C of GTR.
194	VI/A	APPENDIX-I TO Sub-Section-IIC-01	1 of 2 & 2 of 2	ANNEXURE-I TO CONT. QUAN. FOR DDCMIS	HMI CONTRACT QUANTITIES	In many part of the technical specification it is observed that specification is not readable/ mis-aligned. Request THDC to provide readable tender document i.e. PART-A & PART-B so that responsive offer can be prepared.	Bidder to recheck. Text is legible

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
195	VI/A	IIC			GENERAL	It is observed in some instances that discrete quantities as well as "on as required basis"/ "shall be decided during detailed engineering" are indicated in the contract quantities. In such scenario, bidder shall consider discrete quantities. In case of any change of requirement during contract execution shall be handled separately through addition/ deletion criteria. THDC may please confirm.	Bidder's query is very generic in nature. Bidder to note that any scope variation during detailed engineering shall be settled as per provisions defined in the contract.
196	SECTION-VI, PART-D	ECC	12 of 58	27.01.00	FACILITIES TO BE PROVIDED BY THE EMPLOYER Space:- The Contractor shall advise the Employer within thirty (30) days from the date of acceptance of the Notification of Award about his exact requirement of space for his office, storage area, pre-assembly and fabrication areas, etc. The above requirement shall be reviewed by the Employer and space as decided by Employer will be allotted to the Contractor for construction of his temporary structures/ facilities like office, storage sheds, pre-assembly and fabrication areas, etc. for Contractor's as well as his Sub-Contractor's use.	Tentative land requirement for Office , stores and other temporary works are as follows 1. Fabrication/Preassembly Yard : 5,000 Sqm 2. Open Storage Yard : 30,000 Sqm 3. Closed Storage Sheds: 2000 Sqm 4. Contractors Stores &Office : 5,000 Sqm 5. BHEL Site Office & Mess Building : 1800 Sqm Employer to confirm the availability of same.	Land shall be allotted by the Project Incharge based on land available to the successful Bidders

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
197	SECTION-VI, PART-D	ECC	13 of 58	27.03.00	FACILITIES TO BE PROVIDED BY THE EMPLOYER Water:- Contractor shall make all arrangements himself for the supply of construction water as well as potable water for labour and other personnel at the worksite/ colony.	Kindly clarify that whether water supply shall be made available by the customer from bore well or not.	Technical Specification Requirements are Clear. Bidder to Comply the same.
198	SECTION - VI, PART-A	A-9 POWER CYCLE PIPING	6 of 10	3.01.00	(e.) Preparation of piping layout drawings & isometric drawings for site routed piping (i.e. for pipe sizes below 65NB) and submission of the same to the Employer for records.	Piping 50NB and below are site routed as per site conditions. Bidder does not prepare layout drawings for such piping.	Technical Specification Requirements are Clear. Bidder to Comply the same.
199	SECTION – VI, PART-B	B-15 POWER TRANSFORMERS	1 of 36	1.01.00 (i)	Rating (GT, ST, SR)	Power ratings of Generator transformer, Station transformer and shunt reactor to be confirmed.	GT & ST Ratings shall be as per STG SLD. Reactors ratings shall be as per Switchyard SLD.
				1.01.00 (ii)	Generation Volt (GT)	Generation Volt / LV rating of GT to be provided.	Same shall be as per Bidders Proposal
				1.01.00 (v)	Vector Group (GT, ST)	Vector group for GT, ST to be provided.	GT & ST Vector Groups shall be as per STG SLD
200			7 of 36	1.06.02 (a)	Tank shall be of welded construction & fabricated from tested quality low carbon steel of adequate thickness.	The shunt reactor tank will be conventional type with bolted cover . We are providing same type of design to all the major utilities in India. Bell type tanks for Shunt reactor are not recommended.	Noted

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SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
				1.06.02 (b)	The GT Tank shall be Bell type, <i>Shunt Reactor tank shall preferably be Bell type.</i> Bell Type Tank bolted joint shall be at about 500 mm above bottom of the tank and shall have 4nos. <i>of lifting pads on bell Tank cover</i> so as to lift it for rim gasket replacement.	Since, shunt reactor tank will be of conventional type, lifting pads on tank cover shall not be applicable.	Noted
201			11 of 36	1.06.08	All CTs (except WTI) shall be mounted in the turret of bushings, mounting inside the tank is not permitted.	In case of shunt reactor, all the CTs (except the neutral CTs), are frame mounted inside the tank.	Noted
202	VI/ A		349 of 392	1 (xxvii)	Seal kit for Electrohydraulic actuators for HP and LP bypass system – 200%	Our understanding is that the requirement is for twice the quantity required for one 660MW unit.Please confirm.	Bidder to comply the technical specification.
203	VI/ A		349 of 392	1 (xxviii)	Seal kit for HP/LP bypass servo/proportional valve and blocking unit– 200%	Our understanding is that the requirement is for twice the quantity required for one 660MW unit. Please confirm.	Bidder understanding is correct.
204	VI/ A		349 of 392	2 (i)	Coupling assembly between valve & servomotor HPBYPASS VALVE, HPBYPASS SPRAY VALVE – 1 No. for each valve	Our understanding is that the requirement is for 1 No. of the coupling assembly for each type of valve. Please confirm.	Bidder to note that the specification requirement is for total population of each type of valve of one 660MW unit.
205	VI/ A	A-3	349 of 392	2 (ii)	Soft packing like gaskets, gland packing, Orings for HPBYPASS VALVE, HPBYPASS SPRAY VALVE – 2 sets for each valve	Our understanding is that the requirement is for 2 sets of the components for 1 No. of each type of valve. Please confirm.	Bidder to note that the specification requirement is for total population of each type of valve of one 660MW unit.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
206	VI/ A		349 of 392	2 (iii)	Servomotor spindle with piston for servomotors of HPBYPASS VALVE– 1 set of each	Our understanding is that the requirement is for servomotor spindle with piston for 1 No. HP bypass valve.Please confirm.	Bidder to note that the specification requirement is for total population of each type of valve of one 660MW unit.
207	VI/ A		373 of 392	7.00.00 – A3	Qty – 1 set	Our understanding is that the requirement is for 1 set of the components of HP bypass system for one 660 MW unit. Please confirm.	The specified mandatory spares are for 2X660 MW units.
208	VI/ A		373 of 392	7.00.00 – A4	Qty – 2 complete sets	Our understanding is that the requirement is for 2 sets of HP bypass system for one 660 MW unit. Please confirm.	The specified mandatory spares are for 2X660 MW units.
209	SECTION VI, PART-B	SUB SECTION B-06	PAGE12 OF 62	4.17.00	All draw-out modules shall be provided with “Closed door operation” feature wherein movement of the module from “Isolated” position to “Service” position & vice-versa and power ON / OFF operation of the module shall be possible only with the module door closed condition	We propose all draw-out modules shall be as per normal conventional design in stead of "Closed door operation" feature.	Bidder to comply the technical specification.
210	VI/B	D-01	52 of 142	8.01.02.7	All cable trenches located inside buildings shall have minimum 6mm thick (o/p) chequered plate covers.	Bidder proposes an option of precast RCC covers in addition to 6 mm thick chequered plate covers. Please accept.	Bidder is requested to adhere to the provisions of bid documents.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
211	VI/B	D-01	52 of 142	8.01.02.13	Structural steel column base plates and bolts, gussets, etc., shall not project above the floor level unless and noted otherwise. These shall be encased by concrete cover up to floor level with concrete grade M25.	Since, this encasement concrete is not used for structural purposes, Bidder proposes the grade of encasement concrete to be M20. Please confirm.	Bidder is requested to adhere to the provisions of bid documents.
212	VI/B	D-01	53 of 142	8.01.02.25	Minimum 2.0m wide walkway with plain cement concrete (nominal mix M15 grade) paving 150 mm thick laid over 75 mm thick bed of dry aggregate shall be provided connecting all buildings and facilities. The top of walkway shall be minimum 200mm above FGL, unless specified otherwise.	Bidder understands that this walkway would be required only when separate approach road to building has not been provided. Please confirm.	This is a general clause for facilities in outlying area and it is not applicable for TURBINE GENERATOR AND ASSOCIATED PACKAGES FOR KHURJA SUPER THERMAL POWER PROJECT (2X 660 MW) .
213	VI/B	D-01	55 of 142	8.02.01 c	Minimum Grade of Concrete for ii) BFP foundations (in case of springs supported) / (in case of block foundation) M35 / M30	a. In case BFP is supported on VIS foundation, M35 grade concrete shall be provided over springs and M25 grade concrete shall be provided below spring. Please Accept. b. Bidder understands that for both block and frame foundations of BFP minimum grade of concrete shall be M 30 for the entire foundation. Please Confirm.	Bidder's understanding is correct.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
214	SECTION – VI, PART-A	Functional Guarantees & Liquidated Damages	15 OF 20	1.03.03	Equipment Cooling Water System (ii) Design heat load of plate type heat exchangers and Inlet & Outlet temperatures of the Plate type heat exchangers on the primary and secondary side to be demonstrated at site. Pressure drop across the Plate type heat exchanger on the primary & secondary water circuit to be demonstrated at site too.	NTPC is requested to amend the Guarantee Performance requirement of PHE for TG Package inline with the Guarantee Performance requirement of PHE for 2X660 MW Khurja SG Package & Patratu tender where only pressure drop across the heat exchanger on the primary & secondary water circuit is to be demonstrated at site.	Bidder to comply specification requirements.
215	SECTION – VI, PART-A	MANDATORY SPARES	7 OF 59	GROUP: A Sl. No. 16 (b)	ACW Pumps and DMCW Pumps motor with motor bearing : 1 no motor of each type and 1 Set brg of each type	As Motor along with Motor Bearing for DMCW Pumps (ECW Pumps) is covered under GROUP A. Hence, Mandatory Spares for same Motor mentioned in GROUP B shall not be considered to avoid duplicacy of spare. Kindly confirm.	Please refer amendment in this regard.
	SECTION – VI, PART-A	MANDATORY SPARES	14 OF 59	GROUP: B Sl. No. 11 (iv)	ECW pump motor for TG auxiliaries : 1 no.		
216	SECTION – VI, PART-A	MANDATORY SPARES	12 OF 59	GROUP: B Sl. No. VII		Different Mandatory Spares are mentioned in GROUP B and GROUP C for same Pumps (ACW Pumps & DMCW Pumps). Kindly confirm the Mandatory Spares to be considered for submission of offer.	Both are required. Bidder to comply specification requirement.
	SECTION – VI, PART-A	MANDATORY SPARES	23 OF 59	GROUP: C Sl. No. 18			

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
217	SECTION – VI, PART-B	SUB-SECTION- PRE-COM & COM	4 OF 17	3.02.03 (ii)	Condenser on load tube cleaning system life of sponge rubber balls & Number of balls lost during 1000 hrs of plant operation shall be as indicated by bidder in the offer & accepted by the Employer.	Ball life & ball loss demonstration during commissioning shall not be feasible. Therefore, it is proposed to either delete this clause from Pre-Commissioning/ Commissioning or put it in PG Test as per prevailing practice of NTPC earlier projects.	Bidder to comply the specification requirement.
218	SECTION – VI, PART-E	Drg. No. 9915-110-POM-A-025 (P&ID OF EQUIPMENT COOLING WATER SYSTEM)			Water is going into Vacuum Pump Heat Exchanger through 2X100 % Automatic Self Cleaning Filter.	As different strainers are shown in 2 separate drawings, it is understood that only Automatic Self Cleaning Filters are to be provided as per Drg. No. 9915-110-POM-A-025 and Duplex Strainer is not to be provided. Please Confirm.	Query is not correct. The requirement specified in the technical specification to be considered.
	SECTION – VI, PART-E	Drg. No. 9915-110-POM-A-016 (Air extraction system and Condenser on load tube cleaning system)			Water is going into Vacuum Pump Heat Exchanger through Duplex Strainer.		
219	SECTION – VI, PART-E	Drg. No. CW-CS-9915-000-POM-A-037 (Plant Water Scheme & TP Details)			Terminal Point for Potable Water at TP 17 from WS Package to TG Package with Potable Water Tank in TG Package is shown.	Details of Potable Water Tank (Size, Location and Type(RCC or Steel Fabricated)) are not available. Please provide the details for Potable Water Tank to be provided in TG Package.	Necessary Amendment for including " Part-B Technical Specifications for Low Pressure Piping / Chapter A6 " is being issued. Bidder to refer the same for these queries.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

SL. NO.	ENQUIRY SPECIFICATION				TENDER SPECIFICATION REQUIREMENT	DESCRIPTION OF COMMENTS/ CLARIFICATIONS	Employer Clarification
220	VI/B	D-01	29 of 142	6.02.08	For crane loads, an impact factor of 25% and lateral crane surge of 10% (of lifted weight +trolley weight) shall be considered in the analysis of frame according to the provisions of IS:875.	Bidder understands that impact factor shall be considered in line with IS 875 for both gantry girders as well as columns.	Bidder is requested to adhere to the provisions of bid documents.
221	Single line diagram-STG package XXXX - 999-POE-J-002.					kindly clarify regarding scope of supply and rating of dry type transformer & LT switchgear of Hydrogen generation plant.	Refer amended tender SLD. Hydrogen plant not envisaged
222	Single line diagram-STG package XXXX - 999-POE-J-002.					Switchgear rating of TMCC & Air washer MCC has not been indicated in SLD. Kindly provide the same in line with load data requirement of TMCC & Air washer MCC	Sizing shall be carried out by Bidder.
223	SEC VI / PART-A & B				General	Text is not clear in many sub section of specification like in terminal points and exlcusions in Sec-VI part-A,Cl. 5.00.00/Sub Section- II C sectionVI/part-A/Page 6 of 7, Appndixes to sub-section IIC-01/part-A,sub-sec: IIC05 clause no.1.03.00(B1),2.02.00, 3.01.03, 3.05.00, 4.01.00, 4.02.00 of Sec-VI Part-B,sub-sec: IIC07 clause no.1.00.00,2.00.00 of Sec-VI Part-B etc. Please furnish the legible .pdf version.	Bidder to recheck. Text is legible

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
1	SECTION – VI, PART-B A-3	1.01.03 e)	PAGE 4 OF 92	wherever, auxiliary steam is being used for equipment under his scope of supply. Bidder to further note that when auxiliary steam is being tapped from auxiliary boiler, auxiliary steam will be available at temperature of 240°C.	Minimum Auxiliary steam temperature required for steam turbine is 300 deg C	Bidder to comply the specification requirement.
2	SUB-SECTION-A-3 TURBINE GENERATOR AND AUXILIARIES	1.01.04	PAGE 4 OF 92	Operational Capabilities H.P. heaters out of service: Turbine Generator set shall be capable of continuous operation with HP heaters out of service with maximum output not less than 660 MW.	Bidder understands that clause shall be modified as follows:- H.P. heaters out of service: Turbine Generator set shall be capable of continuous operation with HP heaters out of service with maximum output not less than 660 MW or output corresponding to design BMCR heat duty, whichever is lower.	Bidder to comply the specification requirement.
	SECTION-VI, PART-B SUB-SECTION-A-01	1.02.00 c)	PAGE 1 OF 3	Operate continuously with HP heaters out of service with maximum specified cooling water temperature, 3% cycle make up and normal auxiliary steam requirement being tapped from cold reheat line, to generate maximum output without over stressing turbine components. The power output of the unit under this operating condition shall not be less than 660MW or output corresponding to design BMCR heat duty, whichever is lower.		
3	SECTION-VI, PART-A SUB-SECTION-A-3	2.02.03	PAGE 2 OF 10	2.02.03 Centralised oil storage and purification system shall be common for all the units including clean oil tank, dirty oil tank, transfer pumps, purifying unit with interconnecting piping, necessary instrumentation and control hardware to make the system complete in all respects	Bidder system requires only one transfer pump and is as per Bidders standard practice.	Bidder to comply the specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
4	SECTION-VI, PART-A SUB-SECTION-A-3	12.06.00	PAGE 9 OF 10	Chemical cleaning of all equipment and systems after their erection shall be in Bidder's scope.	Chemical cleaning of Turbine and its components are done after manufacturing and is conducted at shop itself, hence chemical cleaning of such components is not envisaged after erection and is inline with OEM proven practice.	Bidder to comply the specification requirement.
5	SECTION – VI, PART-A 1 FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	1.00.00 PERFORMANCE GUARANTEES	PAGE 2 OF 20	g) All test instrumentation, Personal computer(s), necessary server and required interface, software for on line computation of test results & report as required for PG tests shall be supplied by the contractor and shall be retained by the Employer.	Bidder understands that Condensate flow Nozzle used for PG test shall also be retained by the employer. Please confirm.	Bidder to comply the specification requirement.
6	SECTION – VI, PART-A FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	1.01.00 Guarantees under Category-I	PAGE 4 OF 20	(ii) Turbine cycle heat rate at 55% TMCR load	Bidder understands that the guarantee at 55% TMCR load shall be with one BFPT in operation.	Refer amendment in this regard
7	Sec-VI, Part-B, Sub Section-A3	1.01.02 (vii)	1 of 92	Pressure drop in reheat circuit i.e. between H.P. turbine exhaust & IP turbine inlet - 10% of H.P.T exhaust pressure	We understand specified pressure drop is at 100% TMCR Condition. Please confirm.	Pressure drop in reheat circuit i.e. between H.P. turbine exhaust & IP turbine inlet shall be 10% of HPT Exhaust Pressure for BMCR condition and correspondingly lower for different conditions.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
8	Sec-VI, Part-B, Sub Section-A3	1.01.03 (a)	3 of 92	The employer intends to provide a steam generator for each unit having Boiler maximum continuous rating (BMCR) of 102% of the turbine VWO steam flow requirement subject to a minimum of 2580 Tonnes/hr. For sizing of various auxiliaries in Bidder's scope of supply like BFP, HP-LP Bypass system etc. the Bidder shall therefore consider BMCR steam flow of 2580 T/hr. or 102% of turbine VWO steam flow, whichever is higher.	BMCR flow rate of 2580 TPH seems to be too high for a 660 MW plant. Bidder requests Owner to check BMCR flow rate once again and confirm.	Refer amendment in this regard
9	Sec-VI, Part-B, Sub Section-A3	1.01.03 (e)	4 of 92	During unit start up auxiliary steam system will be fed from Main Steam line. The auxiliary steam system will consist of a unit auxiliary steam header at 16 ata/310°C as specified elsewhere in the specification.	Auxiliary steam header parameters shall be finalized based on end consumer requirements.	Bidder to comply the specification requirement.
10	Sec-VI, Part-B, Sub Section-A3	1.20.00 (p)	24 of 92	LP Bypass shall be of double stem design with separate STOP and CONTROL valves.	Alternatively, Integral STOP and CONTROL valves shall also be acceptable. Please confirm.	Bidder to comply the specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
11	Sec-VI, Part-B, Sub Section-A3	1.22.01 (i), (l), (n)	27 of 92	Following Heat balances complete in all respects to be computed & furnished for the conditions (i) 660 MW output under rated steam conditions at condenser pressure of 89 mm Hg (abs) with 3% make-up (l) Output corresponding to VWO flow under rated steam conditions at condenser pressure of 89 mm Hg (abs) with 3% make-up.. (n) HP heaters out of service (One string and both strings) under rated steam conditions at condenser pressure of 77 mm Hg (abs) and 89 mm Hg (abs) with zero percent make up and 3% make-up (o) All HP heaters out of service under rated steam conditions at condenser pressure of 77 mm Hg (abs) and 89 mm Hg (abs) with zero percent make up and 3% make-up and rated output	Worst vacuum corresponding to maximum cooling water temperature of 36 Deg.c will be considered for the referred HBD's preparation instead of 89 mmHg (abs). Please confirm acceptance.	Bidder to comply the specification requirement.
12	Sec-VI, Part-B, Sub Section-A3	2.00.00 (h)	31 of 92	Max. oxygen content of condensate leaving the condenser shall be 0.015 CC per litre over the entire load range.	Oxygen level of Condensate leaving the Condenser shall be as per HEI. Please accept.	Bidder to comply the specification requirement.
13	Sec-VI, Part-B, Sub Section-A3	2.01.00 (c)	31 of 92	Shell material carbon steel as per ASTMA-285 Gr.C or IS 2062 E250BR , welded construction	Alternate material ASTMA 516 Gr 70 shall also be acceptable as shell material. Please confirm.	Bidder to comply the specification requirement.
14	Sec-VI, Part-B, Sub Section-A3	2.01.00 (h)	32 of 92	Tubes shall be welded type stainless steel as per ASTMA-249-TP 316L	The tube material shall be as per OEM recommendation. Also, for this application, ASTMA-249-TP 316L material may not be required. Please confirm.	Bidder to comply the specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
15	Sec-VI, Part-B, Sub Section-A3	2.02.00 (a)	33 of 92	The Condenser shall be designed for heat load corresponding to valve wide open (VWO) condition, 3% makeup and guaranteed condenser pressure and conditions given at Annexure-II of this sub-section.	There is contradiction between these two clauses regarding design Condenser pressure. Please clarify whether VWO condition with 0%MU or VWO condition with 3%MU shall be considered for heat load while calculating Condenser pressure.	Bidder to comply the specification requirement.
	Sec-VI, Part-B, Sub Section-A3	1.22.01 (d)	26 of 92	(d) 693 MW output at 0% make-up , design CW temperature and CW flow (CONDENSER PRESSURE GUARANTEE CONDITION) .		
16	Sec-VI, Part-B, Sub Section-A3	2.06.00 (f)	37 of 92	Hogging operation (at 10 inch (254 mm) of Hg (abs) condenser pressure) : 500 SCFM (850 m3 per hour under standard conditions i.e. 760mm Hg (abs) and 21.1 deg. C)	Hogging capacity shall be as per HEI. Please accept.	Bidder to comply the specification requirement.
17	Sec-VI, Part-B, Sub Section-A3	4.00.00 (h)-(iv)	41 of 92	CEP Other Capabilities: (a) 2 pumps shall be capable of handling the flow corresponding to Unit EMCR, all HP heaters out, 3% m.u. and worst condenser pressure . (b) 2 pumps shall be capable of handling the flow corresponding to HP - LP by pass operation with turbine under tripped condition as well as turbine on house load.	During the operating Condition (As specified in HBDs) "Steam generator output corresponding to BMCR flow under rated steam conditions, turbine in parallel operation with HP-LP bypass with by pass open to full capacity", third CEP may come into operation. Please accept.	Bidder to comply the specification requirement.
18	Sec-VI, Part-B, Sub Section-A3	4.02.00 (l)	45 of 92	(l) Minimum recirculation flow Individual recirculation line for each Drip pump shall be provided. Minimum recirculation flow requirements at design speed of the pump shall be not less than 25% of design	As Drip pumps are 2X100%, common recirculation line for both pumps shall be acceptable. Please confirm.	Bidder to comply the specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
19	Sec-VI, Part-B, Sub Section-A3	5.00.00 (h)	48 of 92	Provision of start-up and operating vents with orifices and relief valves and provision for removing non-condensable gases collecting on shell side individually to condenser. Vent orifice shall be sized to pass one half percent of TMCR extraction steam flow to respective heater under TMCR conditions.	Alternatively HP heaters vents may be cascaded to Deaerator and LP heaters vents may be cascaded to Condenser. Please accept.	Bidder to comply the specification requirement.
	Sec-VI, Part-E, Tender Drawings	Drg.No.- 9915-999-POM-A011	-	HP heaters vents are connected to Condenser via HP flash tank while LP heaters vents are connected to Condenser via LP flash tank.		
20	Sec-VI, Part-B, Sub Section-A3	5.00.00 (v)	49 of 92	Provide sentinel relief valve on tube side. Relief valve on shell side sized to pass flow from two ruptured tubes (four open ends) or 10% of water flow corresponding to VWO condition with 3% make up and 77mm Hg(abs) condenser pressure at 10% accumulation whichever is higher and set to open at heater shell design pressure.	BIDDER wishes to clarify that for arriving feedwater heater shell side relief valve capacity as per HEI requirement. Shell side relief valve shall be sized for 10% of the feed water flow, or Flow based on the clean rupture of one heater tube resulting in two (2) open ends discharging , whichever is greater, at 10% accumulation. Please confirm that the relief valve on shell side can be sized as per HEI.	Bidder to comply the specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
21	Sec-VI, Part-B, Sub Section-A3	5.03.02 (a)	53 of 92	Tube side design pressure The Bidder shall consider Feed water pressure of 350 kg/cm2(a) (+/-) 20 kg/cm2 at Economiser inlet TP irrespective of the location of this TP within specified zone, for calculation pressure of HPH tube side.	We understand the specified pressure is the pressure at TP corresponding to lowest spring loaded safety valve on boiler separator blowing condition. Please confirm.	Feed water pressure of 350 kg/cm2(a) (+/-) 20 kg/cm2 at Economiser inlet TP is provided for bidding purpose only .However actual design pressure shall be finalised during detail engineering.
22	Sec-VI, Part-B, Sub Section-A3	5.03.02 (a)	53 of 92	The design pressure of HP heaters' tube side shall not be less than maximum of the following: (i) 1.05 times the maximum operating pressure (including BMCR condition) at BFP discharge.(ii) Pressure required at BFP discharge under lowest spring loaded safety valve on boiler separator blowing condition.(iii) Design pressure as required by IBR/ ASME.The Bidder shall consider Feed water pressure of 350 kg/cm2(a) (+/-) 20 kg/cm2 at Economiser inlet TP irrespective of the location of this TP within specified zone, for calculation pressure of HPH tube side.	Please clarify whether the specified pressure of 350 kg/cm2(a) (+/-) 20 kg/cm2 at Economiser inlet TP is the maximum pressure at TP considering all the three cases specified.Please confirm.	Feed water pressure of 350 kg/cm2(a) (+/-) 20 kg/cm2 at Economiser inlet TP is provided for bidding purpose only. However actual design pressure shall be finalised during detail engineering.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
23	Sec-VI, Part-B, Sub Section-A3	6.01.00 (f)	54 of 92	BFP sizing (i) TDBFP (2) Best efficiency point-Combined flow of 2x50% TDBFPs shall be based on TG unit EMCR and corresponding head. (3) Runout point - One TDBFP shall be capable of handling flow and head corresponding to 60% of unit rated load. (5) (a) BMCR flow and head corresponding to rated steam pressure(at 3% make up). (5) (b) Output corresponding to VWO flow, 3% makeup, worst condenser pressure. (iii) One TDBFP and one MDBFP operating in parallel shall be able to generate flow -and head corresponding to minimum 90% of unit load.	For BFP design and capability check, pressure required at terminal point shall be provided for all these design conditions. Owner is requested to provide the same.	The same shall be provided during detail engineering
24	Sec-VI, Part-B, Sub Section-A3	6.01.00 (f)-(ii)	55 of 92	(ii) MDBFP Sizing (2) The conditions corresponding to (i) (5) shall be meet by MDBFP at 47.5Hz.	As MDBFP is 1x30%, flow of MDBFP at 47.5 Hz shall be 30% of the total flow arrived for 2x50% TDBFPs. Please confirm.	Specification requirement is clear in this regard. Bidder to comply the specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
25	Sec-VI, Part-B, Sub Section-A3	6.01.00 (f)-(i)	54 of 92	(4) Two Turbine driven boiler feed pumps to be capable of generating the discharge pressure not less than steam generator highest safety valve set pressure corresponding to 105% of boiler maximum continuous rating (at 0% make up).	<p>Attached is Interpretation to PG-61.5, Feed Water Supply for a Steam Generator With No Fixed Water Level. This was published in ASME website in July 2014.</p> <div> </div> <p>Per interpretation 1-13-15, it is not required to size the BFP as per PG-61.5.</p> <p>Hence, Bidder would like to consider the emergency point for BFP capability as flow corresponding to BMCR condition and head corresponding to maximum expected pressure at economizer inlet (design pressure) or pressure corresponding to lowest safety valve set pressure. Please accept.</p>	Bidder to comply the specification requirement.
26	Sec-VI, Part-B, Sub Section-A3	6.01.00 (f)-(v)	56 of 92	(c) Rated discharge flow through interstage bleed off from turbine driven feed pump for reheater attemperation - not less than 140 T/hr . Rated discharge flow through interstage bleed off from MDBFP - not less than 60% of the discharge flow through interstage bleed off from TDBFP.	We understand specified interstage flow rate of 140 T/hr is the combined interstage flow of two TDBFP.Please confirm.	Bidder understanding is correct. Bidder to comply specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
27	Sec-VI, Part-B, Sub Section-A3	6.01.00 (m)	57 of 92	(m) Inter-changeability Identical design of boiler feed pumps, booster pumps, drive turbines, motors, hydraulic coupling and major equipments in order to provide complete interchangeability.	As MDBFP is 30% and TDBFP is 50%, so MDBFP & TDBFP will not be interchangeable. However, two TDBFP will be interchangeable and MDBFP & TDBFP can run in parallel. Please accept.	Specification requirement is clear in this regard. Bidder to comply the specification requirement.
28	Sec-VI, Part-B, Sub Section-A3	Annexur e-I Sl.No-4	87 of 92	4. Worst pressure in the condenser - 89 mmHg (abs)	Worst Condenser pressure shall be Condenser pressure corresponding to maximum CW temperature. Please accept.	Bidder to comply the specification requirement.
29	Sec-VI, Part-B, Sub Section-A3	Annexur e-II Sl.No-1 (vi)	90 of 92	Guarantee Condenser pressure : To be optimised by bidder but not exceeding 77 mmHg (abs).	There is contradiction in the two clauses related to upper limiting value of Condenser pressure. Please confirm which value shall be considered.	Specification requirement is clear in this regard. Bidder to comply the specification requirement.
	Sec-VI, Part-A, Sub Section-Functional Guarantees & Liquidated Damages	1.01.02 (iv)	6 of 20	For deficiency in Average Condenser pressure in mm Hg(abs) measured at 300mm above top row of condenser tube at 693 MW, 0% makeup, design CW temperature and design CW flow. Upper limiting value : 65 mmHg(a)		
30	Sec-VI, Part-B, Sub Section-A3	Annexur e-II Sl.No-1 (ix)	90 of 92	Tube material : Stainless Steel as per ASTM-A-249-TP316L	The tube material shall be as per OEM recommendation. Also, for this application, ASTM-A-249-TP 316L material may not be required. Please confirm.	Bidder to comply the specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
31	Sec-VI, Part-A, Sub Section-A9	1.00.00	1 of 10	Power Cycle Piping	Design criteria and Velocity limit for power cycle piping design are not specified in tender spec.Please clarify whether Bidder shall design the power cycle piping based on Bidder's practice.	Necessary Amendment for including "Part-B Technical Specifications for Power Cycle Piping / Chapter A9 " is being issued. Bidder to refer the same for these queries.
32	Sec-VI, Part-B, ANNEXURE IIIC-02B TG C&I CONTROL SYSTEM	1.05.00	4 of 4	HP/LP Bypass System 1. LP Bypass Control System The LP Bypass control system shall consists of steam pressure control loop and steam temperature control loop. 2. HP Bypass control system The system shall consists of steam pressure control loop & steam temperature control loop.	HP Bypass control valve will be provided with temperature control and LP bypass control valve will be provided with enthalpy control as per our standard practice. Owner is requested to accept the proposal of BIDDER.	Bidder to comply with specification requirement.
33	Sec-VI, Part-A, TERMINAL POINTS & EXCLUSIONS	2.03.00	2 of 6	Spray to Aux PRDS: Stub(s) provided on Boiler Feed Water Discharge / Condensate discharge piping system in BC Bay.	As spray water supply system is in Bidder's Scope, we request Owner to provide spray water parameters (Quantity, Pressure & Temperature) for Aux PRDS.	Bidder to comply the specification requirement.
34	Sec-VI, Part-E, Tender Drawings	Drg.No.- 9915-999-P0M-A011Heater Vent and	-	LP heaters Emergency & Normal drains are connected to Condenser via LP flash tank	Bidder understands LP heaters drain connection shown in P&ID is indicative only. Based on bidder practice same may be directly sent to Condenser based on process parameters acceptable to Condenser design as per OEM and proven practice.	Bidder to comply the specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
		Drains P&ID				
35	Sec-VI, Part-E, Tender Drawings	3. System P&ID	-	Scope of instruments & root valves	Discrepancy in Scope of instruments & root valves mounted piping and equipments is found in tender spec.	Bidder's understanding is not correct. Measuring instruments (other than temperature measurements) connected to BOP-C&I/ SG-C&I are excluded from Bidder's scope of supply. All temperature elements along with temperature transmitters in the scope of piping/ducts/equipment in this package are in Bidder's scope whether wired to Bidder's control system or Employer's BOP-C&I/ SG-C&I. Please also refer amendment in this regard.
	SECTION – VI, PART-A	SUB-SECTION IIC CONTROL & INSTRUMENTATION SYSTEM (a)	14 of 33	However, measuring instruments which have been indicated in the tender PID as connected to BOP-C&I/ SG-C&I (being procured by employer under separate package) are excluded from Contractor's scope of supply. In case additional instruments are required as per the standard & proven practice of the Contractor/ sub-vendor, the same shall be supplied by the Contractor within this contract.	As per our understanding, instruments which are wired to TG-C&I are only in Bidder's scope. Please clarify.	
	SECTION – VI, PART-A	SUB-SECTION IIC CONTROL & INSTRUMENTATION SYSTEM (c)	14 of 33	All temperature elements along with associated temperature transmitters in the TG scope piping/ducts/equipments shall be provided by the contractor (unless indicated otherwise) whether wired to Contractor's control system or Employer's BOP-C&I/ SG-C&I control system. In addition to temperature elements indicated in the tender P&ID, any other temperature elements and temperature transmitters which are required for control, interlocks, protection and monitoring of Contractor supplied equipments/ systems shall be in the scope of the Contractor.		

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
36	Sec-VI, Part-A, Sub Section-A9	2.01.00 (b) - (i)	3 of 10	The TG contractor shall also supply under their scope necessary material matching pieces/sleeves, shop welded to equipment/valve (in TG package scope of supply) nozzles mentioned at (ii) below, in case material of nozzles for these equipment/valve etc. is dissimilar to the connecting pipe material (SG package scope) at SG/TG interface point.	Bidder understands for dissimilar material transition pieces has to be supplied by TG contractor, however incase of thickness and size dissimilarity transition piece shall be supplied by SG contractor. Request owner to confirm the same.	Technical Specification Requirements are Clear. Bidder to Comply the same.
	Sec-VI, Part-E, Tender Drawings	Drg.No.- 9915-999-P0M-A004	Note no. 3(I & II)	(i) Matching pieces/tube transition pieces .....Detailed engineering. (ii) (A) Ms strainers inlet Other equipment (if applicable)		
37	Sec-VI, Part-E, Tender Drawings	Drg.No.- 9915-999-P0M-A008	-	Requirement of Permanent Steam Blowing line (min. DN 250 size) on BFPT inlet steam piping.	Bidder seeks a clarification on this requirement. As per industry practice, no steam blowing is envisaged on BFPT inlet steam, after commissioning.	Bidder to comply the specification requirement.
38	Sec-VI, Part-B, Sub Section-A3	5.00.00 (k)	48 of 92	Prevention of super heated steam contact with tube plate and joint at entry to heaters.	As per OEM recommendation, this provision may not be required. Request owner to accept the same.	Bidder to comply the specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
39	SECTION – VI, PART-B / SUB-SECTION A - 59915-371-110-POM-A-001(sheet 1 of 2 and 2 of 2)	4.06.00	7 of 24	External Regeneration Facility (Regeneration Plant)One (1) common facility for regeneration of the ion-exchangeresins from the condensate polishers of all the turbo-generator units shall be provided utilizing three (3) tank concepts and consisting of:1) Resin Separation & Cation Regeneration Vessel.2) Anion Resin Regeneration Vessel.3) Two (2) nos of Mixed Resin Storage Vessels.4) Resin injection hopper, complete with a water ejector system for resin makeup. Resin injection hopper shall be sized to handle upto 150 litre of as received new resins... <u>P&I Diagram of CPU(sheet 02 of 02), Note-1</u> : The regeneration vessels arrangement shown here is indicative only. Bidder should furnish their scheme of vessel arrangement in detail along with the complete instrumentation.	As per Note 1 of CPU flow diagram, Bidder understands that regeneration scheme and no. of vessels shall be as per OEM proven technology & standard practice by respective CPU vendor. Request Owner to confirm Bidder's understanding.	Bidder to comply the specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
40	SECTION – VI, PART-B / SUB-SECTION A - 5	4.04.00, e) 4.05.00, c)	5 of 24 6 OF 24	The resin shall be suitable for the condensate temperature that may be achieved in all operating regimes of TG cycle. However, the anion resin shall be suitable for a temperature of 60°C. (c) Design temperature of service vessel and their internals/appurtenances shall take care of all operating regimes including HP-LP bypass operation and minimum 70°C. Process design temperature shall be based on all operating regimes of TG cycle and minimum 52°C. However, short term excursion of temperature upto 60°C is also expected.	As per the resin supplier recommendation, the Anion Resin will undergo a thermal degradation at high condensate temperature (above 60 Deg C) and will lose the half of its capacity and silica removable capacity is almost Zero. Hence for temperature beyond 60 °C, the CPU bypass valve shall be open 100% to bypass the entire condensate water. Owner to please note that the condensate temperature will always be in 52 °C to 60 ° C range. Request Owner to confirm acceptance.	Insulation is not required. However, TE,TT,TI etc are envisaged in Tender drawing for temperature control & burn-out protection.
41	SECTION – VI, PART-B / SUB-SECTION A - 5	2.07.00	3 OF 24	For vessels of spherical shape, where the bed cross section vary, the diameter (excluding the rubber lining) of the vessel shall be selected considering velocity not exceeding 1.75 m/min.	For vessels of spherical shape, condensate velocity (i.e. average surface flow rate) upto 2 m/min (i.e. 120 m³/h/m²) can also be accepted as per other similar executed projects across the country. Request Owner to accept our proposal in this regard.	Specification is quite clear in this regard. In the referred clause, dissolved solids concentration are mentioned.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
42	SECTION – VI, PART-B / SUB-SECTION A - 5	5.07.00	13 OF 24	This tank shall be provided with burn out protection, pressure relief valve, level transmitters/switches, temperature indicator etc. The heater shall be controlled by the temperature switches provided on the tank. The heaters shall be sized for heating the water from a temperature of 15 °C to 50 °C at the outlet.	We understand the term burn-out protection is referred to tank insulation for personnel safety. Insulation is not required for hot water tank as the temperature of the water inside the tank will be not exceed more than 50 °C. Hence, the burn out protection is not considered for Hot water tank and associated pipe lines and valves. Request Owner's acceptance in this regard.	Specification is quite clear in this regard. In the referred clause, dissolved solids concentration are mentioned.
43	SECTION – VI, PART-B / SUB-SECTION A - 5	2.02.00	2 OF 24	Influent quality:Silica, ppb = 30	The Silica (as SiO2) addressed is reactive silica. Please confirm Bidder's understanding.	Specification is quite clear in this regard. In the referred clause, dissolved solids concentration are mentioned.
44	SECTION – VI, PART-B / SUB-SECTION A - 5	2.02.00	2 OF 24	Influent Iron, ppb = 50 quality:	The iron addressed is 'Total ferrous iron (soluble)'. Please confirm bidder's understanding.	Specification is quite clear in this regard. In the referred clause, dissolved solids concentration are mentioned.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
45	9915-999-POM-A-037 SECTION – VI, PART-A/ SUB-SECTION-A-5	- 2.04.00	- 2 OF 2	Plant water scheme and TP details: All terminal points process parameters, co-ordinates and elevations are not mentioned. Also, length of Neutralization pit effluent pipe is not available. h) Complete Effluent transfer system up to Ash slurry sump along with N-pit, Effluent re-circulation/disposal pumps, piping, valves, fittings etc.	1) In absence of input, bidder understands that pipe from CPU Neutralization pit carrying effluent shall be terminated upto single terminal point at 2 meter distance away from effluent pump discharge. Please confirm bidder's understanding. 2) Request Owner to furnish following parameters for CPU Neutralization pit effluent and Waste water generated during regeneration to CW channel i) Physical location (i.e. Co-ordinates) ii) TP Elevation iii) Connection details iv) Process parameters (like temperature and pressure) at interface points	1) Bidder to refer drg. plant water scheme and TP details wherein it has been indicated that pipe from CPU Neutralization pit carrying effluent shall be terminated at TP point A. 2) Bidder to note that Pressure at TP, TP elevation, connection details shall be finalised during detailed Engg.

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CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
46	SECTION – VI, PART-B / SUB-SECTION A - 5 SECTION – VI, PART-A/ SUB-SECTION-A-5 9915-371-110-POM-A-001(sheet 1 of 2 and 2 of 2)	5.01.00 5.01.00 2.04.00 -	10 OF 24 11 OF 24 2 OF 2 -	Bulk Acid & Alkali Storage Tanks (applicable if included in scope of supply) Acid & Alkali Unloading Pumps (applicable if included in scope of supply) k) Bulk acid and alkali storage tanks and acid & alkali unloading facilities for regeneration system. As per flow diagram 2 Nos. bulk acid storage tanks, 2 Nos. bulk alkali storage tanks, 4 nos. acid/alkali unloading pumps shall be provided.	There is an ambiguity for scope of following equipment related to CPU regeneration facilities as per referred tender clauses. i) Bulk Acid Storage Tank ii) Alkali Storage Tank iii) Acid Unloading Pumps iv) Alkali Unloading Pump Request Owner to revisit and issue amendment.	Specification is quite clear in this regard. There is no ambiguity found in number of tanks or pumps. As per scope chapter(A-5, Part-A), bulk tanks & pumps are applicable & details of the same are given in Part-B & also in Tender drawing..
47	SECTION – VI, PART-B / SUB-SECTION A - 5	5.12.00	16 of 24	All outdoor piping shall be laid above ground and generally laid in pipe trestles including crossing of road/pipe/cable trenches if any.	Bidder understands that resin transfer piping from TG building to regeneration area and associated utility piping shall be laid on Owner's pipe rack/sleepers. No pipe rack/sleeper are envisaged in bidder's scope.Please confirm bidder's understanding.	Scope of pipe rack/supporting structure are given in a separate drawing. Bidder to refer the same.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
48	SECTION – VI, PART-A, SUB-SECTION-A-5 CPU SECTION – VI_2, PART-E Dwg. No. 9915-371-110-POM-A-001 Sht. 1 of 2	2.02.00 -	1 of 2 -	Each Condensate Polishing Unit shall consist of either four (4) service vessels (4 x 33.33% capacity) or three (3) service vessels (3 x 50% capacity) for each TG Unit along with emergency bypass system, resins, blowers, valves, piping etc. <u>Two (2) x 50% backwashable type cartridge pre-filters</u> for each unit shall be provided for the commissioning period, start-up period as first cleaning step as well as normal continuous operation, complete with automatically operated by-pass, associated piping, pumps (with at least one stand-by) pneumatically operated valves etc. <u>Pre-filter is not shown in P&ID.</u>	Owner to note that the P&ID does not show Pre-filter upstream of CPU Service Vessels however the same is asked for in the tender specification. Also, if envisaged, Owner is requested to relook the requirement of cartridge filter. It will not help in reducing the commissioning time or start-up time significantly. It will rather increase the power consumption in normal running as well as operating cost for the cartridge filter. Further, resin bed itself will be acting as filter and hence during start-up, separate resin charge can be used for the intended purpose.	Pre-filter is envisaged for CPU as mentioned in both Part-A & Part-B of Technical specification. Bidder to comply the specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
49	9915-999-POM-F-006 9915-999-POM-A-037 SECTION – VI, PART-A/ SUB-SECTION-A6	- 1.01.00	- 1 of 6	i) Pipe & Cable trestle Layout: ii) Plant water scheme and TP details: Terminal point location and process parameters are not available for CPU regeneration area DM water tank make up. DM water normal make-up piping (condenser makeup, ECW makeup for ECW tanks, make up to CPU regeneration plant	In absence of inputs, request owner to furnish following parameters for CPU regeneration area DM tank make-up water pipes. i) Physical location (i.e. Co-ordinates) ii) TP Elevation iii) Connection details iv) Process parameters (like temperature, pressure and flow rate) at interface points	Bidder to note that single consolidated tap off for condenser makeup, ECW makeup for ECW tanks, make up to CPU regeneration plant etc shall be provided for TG area. Pressure at TP, TP elevation, connection details shall be finalised during detailed Engg
50	SECTION – VI, PART-B / SUB-SECTION A - 5	2.07.00	3 OF 24	For vessels of spherical shape, where the bed cross section vary, the diameter (excluding the rubber lining) of the vessel shall be selected considering velocity not exceeding 1.75 m/min.	Considering the spherical vessel, bidder understands that the stated velocity of 1.75 m/min(maximum) is average velocity. Please confirm bidder's understanding.	The specification is clear in this regard. Bidder to comply the specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
51	Section -VI, Part-A, Sub-section-A-10	2.00.00 (b)	2 of 6	Minimum ten (10) nos. of air washer units (of metallic construction-modular type) each of minimum capacity 1,00,000 m ³ /hr, with all accessories, 1 no. DIDW centrifugal fan, 1 no. circulating water pump, etc. as detailed out in technical specification shall be provided for each unit.	Quantity (numbers) and capacity of air washers shall be as per heat load based on layout suitability and space arrangement to ensure uniform air circulation throughout the design space and proper ductwork . Configuration of each AWU considering number of fans shall be allowed to change/modify considering layout constrains inside TG building.Please confirm.	Bidder to comply with specification requirements.
52	Section -VI, Part-B, Sub-section-A-10	2.00.00 (3.)	1 of 37	Design Philosophy: All air conditioned areas like control room, control equipment rooms, Service building, etc. shall be maintained at 24 deg. C \pm (plus or minus) 1 deg. C and relative humidity of 50% \pm (plus or minus) 5%.	Bidder understands that where split air conditioners are planned (like auxiliary control rooms/RIO rooms and offices), humidity control shall not be provided considering its inability. Please confirm.	Noted. However, cooling load calculations shall be based on 50% RH inside air-conditioned space.

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53	Section -VI, Part-B, Sub- section-A-10	7.04.00	26 of 37	<p>Air Handling Unit (Control Scheme): Inside room temperature and humidity shall be maintained by controlling the chilled water flow by means of motor operated three way modulating valve and by varying the flow by means of VFD driven AHU's which shall get its signal from the Control system for main plant A/C system. For Service building & Administrative building inside room temperature and humidity shall be controlled by varying the chilled water flow of secondary chilled water pumps through VFD driven motor and by varying the air flow of AHU through VFD driven motor.</p>	For service building where AC equipment (secondary chilled water pump, condenser cooling water pump and AHUs) are with VFD driven motor, temperature and humidity shall be maintained by controlling the chilled water flow by means of motor operated two way control valve.	Bidder's understanding is correct.
	Section -VI, Part-B, Sub- section-A-10	3.01.00	4 of 37	<p>Redundancy of various A/C system equipments shall be as follows: a) For <u>Main Plant Areas [control room, control equipment room, UPS room, battery charger, static excitation control room (if applicable) SWAS room & Water Analysis Room] for Unit 1& 2:</u> i) Vapor compression type water chilling units: 3X50% v) AHUs: At least one (1) no. unit, shall be provided as common standby. c) <u>Service Building:</u> i) Screw type water chilling units: 2X100% iii) <u>Secondary chilled water pumps (with VVVF):</u> 2X100% v) <u>Cooling Towers (with VVVF Fan):</u> 2X100% vi) <u>AHUs (with VVVF Fan):</u> All working & no standby.</p>	For other areas (TG building areas) served by chilled water system, no AC equipment is with VFD and temperature and humidity shall be maintained by controlling the chilled water flow by means of motor operated three way modulating valve.	
	Section -VI, Part-B, Sub- section-A-10	2.00.00 (18)	3 of 37	<p>Air Conditioning system for service building, etc. shall be designed in- line with ECBC code to make it "Green Building". Mandatory Requirements of ECBC to be followed for A/C Equipments of service building</p>	Also, bidder is considering only Service building as Green building and accordingly AC equipments i.e. secondary pumps, cooling tower fans and AHUs of service building are only considered with VFD. Please confirm acceptance.	

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
54	Section-VI, Part-E, Tender Drawings	-	-	Drg. No.-9915-002-POM-A-054; Schematic Diagram for A/C System of Main Plant TG building	For Control of temperature and humidity chilled water flow will be controlled/modulated by means of motor operated three way modulating valve and not by two way valve as shown in schematic drawing as chilled water pumps and AHUs of this system are not operating with VFD drives.Please confirm acceptance.	Noted.Refer Amendment in this regard.
55	Section -VI, Part-B, Sub-section-A-2	1.03.00 (32)	9 of 12	For Ventilation requirement from A-row side of TG building, space for installation of multiple modular type Air washer units along with pumps shall be considered in AB bay at suitable elevation. No separate room outside A-row for locating Air Washer equipment and no trestle outside A-row for routing Ventilation duct shall be considered.	Bidder understands all AWU shall be kept inside TG building along A-row, however incase of layout constrains, ducting shall be allowed to route outside A row locally. Request Owner to accept the same.	Ventillation duct shall be routed as per specification stipulations.
56	9915-110-POM-A-025	-	-	It has been shown that Passivated DMCW is supplied from SG Auxiliaries for station auxiliaries. -Plant water scheme & TP details(9915-999-POM-A-037). Passivated DMCW for station Auxiliaries like (Plant air compressor, AHP compressors, MRHS compressors) are not shown.	In absence of clarity, Bidder understands that passivated DMCW water for station auxiliary (for Plant air compressor, AHP compressors, MRHS compressors, FGD fans etc..) shall be tapped from SG ECW circuit. Request owner to confirm bidder's understanding.	Bidder's understanding is correct

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
57	SECTION – VI, PART-A/ TERMINAL POINTS & EXCLUSIONS SECTION – VI, PART-B / SUB-SECTION A - 4 SECTION – VI, PART-B / SUB-SECTION A - 4 SECTION – VI, PART-B / SUB-SECTION A - 4	5.01.02 2.05.00 4.02.00 4.02.00	2 OF 6 2 OF 20 8 OF 20 8 OF 20	The return hot secondary cooling water circuit flow of 1500 Cu.M/hr shall be limited to a temperature rise of 7 deg.C across the Employer's cooling system The outlet temperature of cooling water on the secondary circuit shall in no case exceed the design outlet temperature of circulating water in the condenser. Plate Type Heat Exchangers: a) Design Secondary water : Not less than 36 deg. C inlet temperature Plate Type Heat Exchangers: b) Secondary water outlet : Not more than the design hot water temperature at condenser outlet.	Owner has fixed the TG PHE inlet ACW temperature as 36 Deg C. and also informed to consider return ACW temperature same as condenser return Cooling water temperature as referred in clause. Considering the limitation as specified above for secondary circuit of TG auxiliaries, Bidder request owner to revisit and recheck the temperature rise (7 Deg C) and flow rate of 1500 m3/hr across terminal point of SG ACW circuit as specified.	Noted. PI refer necessary amendment in this regard.
58	SECTION – VI, PART-B / SUB-SECTION A - 4	-	-	Supply and Return piping terminal points of SG ACW circuit are not provided.	In absence of inputs, request owner to furnish the pressure drop across the supply and return piping terminal points of SG ACW circuit. This will be required to finalize the head of ACW pumps.	Bidder to refer to Clause 5.01.02 Terminal Points and Exclusion Chapter in Part A

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
59	Section-VI / Part-A / Sub section-A-3	10.01.00	8 of 10	Option # II:- Each crane shall be capable of lifting at least 105% of the weight of single heaviest component/ equipment/ HP and IP turbine assembly (except generator stator), including lifting beam and slings etc. (as applicable) to be handled in TG hall for erection as well as maintenance of the equipment provided in AB bay. The auxiliary hook capacity shall not be less than 20 Ton. The generator stator shall be handled by the bidder by separate portal cranes / strand jack arrangement.	<p>1) As per recommendation of steam turbine OEM, complete HP assembly and Complete IP assembly should not be handled as a single piece/component. Components of HP and IP turbine shall be handled Individually during maintenance as well as erection. Owner is requested to confirm bidder's understanding and update the specification accordingly.</p> <p>2) Bidder understand that strand jack arrangement shall be hired during erection of generator stator. The same is not needs to be supplied by bidder.</p> <p>Owner is requested to confirm bidder's understanding</p>	<p>Bidder to comply the specification requirement.</p> <p>Regarding strand jack bidder's understanding is correct.</p>
60	Section VI Part B Sub section A2	1.03.00 (6) point b	6 of 12	3.0 m along B-row at operating floor level for interconnection with service building & in front fo Common control room.	Providing 3.0 m space infront of common control room will result in reduction of opening of maintenance bay. Hence Bidder proposes 1.5 m wide passage along B-row at operating floor level in front of Common control room. Owner to confirm.	Specification requirement are to be complied with.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
61	Section VI Part B Sub section A2	1.03.00 (11)	6 of 12	Clear Head room at different floors within TG building below pipes, ducts, structures and cable trays shall be 2.5 (minimum)	Clear Head room at different floors within TG building below pipes, ducts, structures and cable trays shall be 2.2(minimum)	Specification requirement are to be complied with.
62	Section VI Part B Sub section A2	1.03.00 (17)	7 of 12	Two (2) nos. of interconnecting walkways (minimum 2.0m clear width) between main plant building and boiler (on both side of boiler) at mezzanine, Operating, PRDS and De-aerator floor level shall be provided by owner for side mill/rear mill arrangement. In case of front mill arrangement the mill bunker building shall be interconnected with 2.0m clear width platform with TG building at two levels (with one level necessarily connected with TG Hall operating floor and other interconnection level shall be decided during detailed engineering) by owner. The interconnection shall be on both sides of boiler center line for each elevation. The bidder shall consider the same while developing the layout.	Bidder understands that two no. of interconnecting platforms is required between TG building and boiler based on the floor level finalized in BC bay supplied by Owner. Also note that separate floor for PRDS is not envisaged in BC bay.	Bidder shall keep layout provision for 2 nos. of interconnecting platform at each elevation as specified in the subject clause. Its location at the given elevation shall be decided during detailed engineering.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
63	Section VI Part B Sub section A2	1.03.00(17)	7 of 12	Further cables between boiler and TG building shall be routed through interconnecting structure to be provided by owner. Bidder shall consider the same while developing the layout.	Bidder to note that the location of cable route between boiler and TG building shall be decided based on mutually agreed location during detail engineering. Further Technical specification is clear and bidder to comply Technical specification	Bidder to note that the location of cable route between boiler and TG building shall be decided based on mutually agreed location during detail engineering. Further Technical specification is clear and bidder to comply Technical specification
64	Section VI Part B Sub section A2	1.03.00 (21)	7 of 12	All piping shall be routed at a clear height of 2500 mm(min.) from the nearest access level to clear man movement.	All piping shall be routed at a clear height of 2200 mm(min.) from the nearest access level to clear man movement.	Specification requirement are to be complied with.
65	Section VI Part B Sub section A2	1.03.00 (24)	8 of 12	Bidder to note that critical piping routed in CD bay shall be supported by CD bay structure to be provided by the owner. The loading due to CD bay structure shall be considered by the bidder while designing the TG building. Further supporting brackets/beams required on C row columns to support this structure shall be supplied and erected by bidder.	Discrepancy in the drawing and tender specification pertaining to scope of CD bay structure. Please clarify.	Stretch -2 indicated in the drg is the cantilever at C row for routing different station piping and cables. The drg does not indicate the CD bay structure required for critical piping support.
	Part E - Tender Drawings	9915-999-POM-F-006	6 of 6	Stretch 2 is shown as TG scope		

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
66	Section VI Part A Sub section A8	2.01.00 (h)	2 of 2	Central lube oil system room	Lube oil system shall be centrally located outside TG Building A row as per OEM Practice. Room is not envisaged.	Bidder to comply specification requirement.
67	Section VI Part A Sub section A8	2.01.00 (f)	2 of 2	Control Fluid Room	Control oil fluid skid shall be located inside TG Building as per OEM Practice. Room is not envisaged.	Please refer amendment in this regard.
68	Section VI Part E Equipment layout plan at 0.0 M Dwg No. 9915-999-POM-F-001 & 9915-999-POM-F-004	Note No. 12 (iv) & Note No. 13		Oil Equipment Room RCC Wall: 250 mm THK RCC Wall from EL.0.00m to 0.6M for lube oil room	Oil Equipment arrangement shall be as per OEM Standard Practice.	Noted, however detailing shall be done after award of contract considering the safety aspect.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
69	Section VI Part E Equipment layout plan at 0.0 M Dwg No. 9915-999-POM-F-001 & 9915-999-POM-F-004	Note No. 7		Fire Barrier wall is provided on A-row between Axis no 2-8 & 14-20	Based on the oil capacity, if transformers are placed at a distance more than the distance specified in cl. No. 1.02.00 (h), (1) sub section A-02, Section-VI, Part-B then fire wall is not required at A-row. Owner may please confirm bidder's understanding.	Bidder to read the note number -7 of Equipment layout plan at 0.0 M Dwg No. 9915-999-POM-F-001 & 9915-999-POM-F-004 in addition to clear separating distance requirement specified in clause 1.02.00 (h), (1) sub section A-02, Section-VI, Part-B . Further bidder to note that Fire Barrier wall at A-row shall be provided as per the clause 1.02.00 (h), (1) sub section A-02, Section-VI, Part-B .
70	Section VI Part A Terminal Points & Exclusions	2.01.00	1 of 6	Upstream of Economizer inlet (Tentative location: Elevation = 20m to 30m, distance within 2.0m from C row towards D row and no farther than 5m on either side of Condenser Centre Line).	Terminal point location of Upstream of economizer inlet shall be provided at distance within 2.0m from C row towards D row & Elevation = 20m to 30m, however distance shall not be limited with respect to Condenser Centre Line on either side.	Technical Specification Requirements are Clear. Bidder to Comply the same.
71	Section VI Part A Terminal Points & Exclusions	2.02.00	2 of 6	RH Spray: Upstream of RH spray control station (Tentative location: Elevation = 20m to 30m, distance within 2.0m from C row towards D row and no farther than 5m on either side of Condenser Centre Line).	Terminal point location of Upstream of RH spray control station shall be provided at distance within 2.0m from C row towards D row & Elevation = 20m to 30m, however distance shall not be limited with respect to Condenser Centre Line on either side.	Technical Specification Requirements are Clear. Bidder to Comply the same.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
72	Section VI part B Sub section A2	1.02.00 (a)	2 of 12	One separate offsite control room adjacent to main CCR at operating floor in control tower to be provided for operation and monitoring of Ash handling system and Water system. So the HMI of AHP and Water system is to be located in this control room while control panels for these system shall be located near process area.	Bidder proposes to use AHP control Room in local to control the AHP, as TG building off-site control room would be far off. Kindly confirm.	Specifications requirements are clear and bidder to follow specification requirement
73	Section VI part B Sub section A2	1.02.00 (b - ii)	2 of 12	One separate offsite control room to main CCR at operating floor.	Bidder proposes to use AHP control Room in local to control the AHP, as TG building off-site control room would be far off. Kindly confirm.	Specifications requirements are clear and bidder to follow specification requirement
74	Section VI part B Sub section A2	1.03.00 (3)	5 of 12	3. Passage way between TG hall And first row of boiler column - 12 M	3. Bidder understands 12 M distance mentioned is between C-row column centreline to boiler first row of column centreline.	Bidder understanding is correct.
75	Section VI part B Sub section A2	1.03.00 (16)	7 of 12	In TG bay at crane rail level, chequered plate walkway of minimum 500mm clear width from face of the column to the hand rail (excluding hand rail) on crane side to be provided for full length of the building along A-row & B-row columns. Further, inbetween columns, walkway shall be provided in entire column sectional depth.	500mm width clear walkway shall be provided for full length of building along A-row and B-row. However in between columns, walkway is not envisaged in entire column sectional depth, since pipe hatch shall be provided to route the pipes.	Bidder observation is noted and shall be applicable only for the bays which are identified as pipe hatch in totality. In such bays safety handrail shall be provided on both side of the walkway.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
76	Section VI part BSub section A2	1.05.00	12 of 12	Drain network shall be provided to collect effluent generated from floor wash, equipment drain and process drain in TG hall areas for further disposal up to final disposal point. Underground pipes for this purpose shall not be acceptable.	We understand that underground pipe for drain network is not acceptable within TG Hall, However outside TG Hall Underground piping can be provided for interconnection of pit. Also pipe interconnection shall be allowed incase of criss-cross of drains network with cable slits/trench.	Specification requirement are to be complied with.
77	Section VI part B Sub section A2	1.06.00	12 of 12	Bidder shall consider the provision of area for various facilities as tabulated while developing the layout of TG hall and pipe & cable trestles:-	Area requirement for the various facilities as tabulated shall be based on the equipment size and layout consiedration as per tender spec. Request owner to accept the same.	Minimum space required for CCR & CER at operating floor and UPS Charger Room at Mezzanine floor (sr. No. 2 and 3 of the table) has been mentioned in the table , and bidder to follow the same.
78	Section VI part B Sub section A2	1.02.00 (c)	3 of 12	A common SWAS room for units # 1 & # 2 shall be provided and located at 0.0M in TG building. An air conditioned space of 10X10M shall be provided adjacent to SWAS room for locating water analysis lab including office space.	A common SWAS room for Unit # 1 & # 2 shall be provided and located at 0.0M in TG building. Bidder understands that Air conditioned space of 10M X 10M for water analysis lab including office shall be provided by bidder as per spec, however location and elevation shall be as per bidder proposal in vicinity to TG building. Owner to accept the same.	Specification requirement are to be complied with.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
79	Section VI Part E MAIN STEAM,HOT REHEAT & COLD REHEAT P&ID (9915-999-POM-A-004)	NOTE-6		Bidder to provide minimum two numbers of Lp Bypass Valves and The outlet of each Lp Bypass valve shall be connected Straight to each condenser nozzle.	Bidder understands that 2 Nos. of Bypass valve shall be provided. However layout of Upstream and downstream of LP Bypass valve shall be finalised by Bidder.	Bidder to comply specification requirements.
80	Sec-VI, Part-B Sub Section-A9	1.00.00	1 of 10	Power Cycle Piping	Material requirement for power cycle piping is not specified in tender spec. Bidder understands that material selection for power cycle piping shall be as per relevant codes and standards.	Necessary Amendment for including " Part-B Technical Specifications for Power Cycle Piping / Chapter A9 " is being issued. Bidder to refer the same for these queries.
81	Sec-VI, Part-B Sub Section-A6	1.00.00	1 of 6	Low Pressure Piping	Material requirement for low pressure piping is not specified in tender spec. Bidder understands that material selection for low pressure piping shall be as per relevant codes and standards..	Necessary Amendment for including " Part-B Technical Specifications for Power Cycle Piping and Low Pressure Piping / Chapter A6 & A9 " is being issued. Bidder to refer the same for these queries.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
82	Sec-VI, Part-B Sub Section-A9	1.00.00	1 of 10	Power Cycle and Low pressure application all valves	Material of construction and design requirement for power cycle and Low pressure application valves is not specified in tender spec. Bidder understands that material selection for power cycle piping shall be as per relevant codes and standards.	Necessary Amendment for including " Part-B Technical Specifications for Power Cycle Piping and Low Pressure Piping / Chapter A6 & A9 " is being issued. Bidder to refer the amended part for these queries.
83	Sec-VI, Part-B Sub Section-A9	1.00.00	1 of 10	Power Cycle and Low pressure application specialties/inline components.	Material of construction and design requirement for power cycle and Low pressure application inline components is not specified in tender spec. Bidder understands that material selection for power cycle piping shall be as per relevant codes and standards.	Necessary Amendment for including " Part-B Technical Specifications for Power Cycle Piping and Low Pressure Piping / Chapter A6 & A9 " is being issued. Bidder to refer the amended part for these queries.
84	Sec-VI, Part-B Sub Section-A6	1.02.00	2 of 6	Bidder's scope shall also cover distribution of service air, service water and potable water to various facilities/building (under contractor scope) including providing tap offs at various floors of TG building	Bidder understand that the scope of supply for utility lines shall be limited to scope of supply of buildings covered in tender.	Bidder to read this in conjunction with the Terminal Points and Exclusion Chapter also.
85	Sec-VI, Part-B Sub Section-A6	1.03.00 point O)	2 of 6	Thickness calculation of CW duct/large diameter buried pipes as per AWWA-M-11	Owner is requested to clearly define Terminal point for the CW duct/ large diameter pipe for TG scope of supply alongwith diameter/thickness for necessary consideration.	Bidder to refer TP & Exclusion chapter. For diameter and thickness Tech Spec. requirements shall be met.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
86	Sec-VI, Part-B Sub Section-A9	1.00.00	1 of 10	Low pressure Piping	Owner is requested to furnish list of terminal points, sizes and physical location of the same to be considered in TG scope of supply.	Bidder to refer TP& Exclusion chapter and drg. plant scheme & TP details
87	Sec-VI, Part-A Sub Section-A9	2.04.00	5 of 10	Blow out tools, blow through tools, temporary valve heads/valve blow down cover plate/ flanges, blanking inserts, strainers, baskets, bolts & nuts, special tools & tackles, etc. as required for HPT stop & control valves, IPT stop & control valves, CRH NRVs & HP & LP By Pass valves & overload valve as per the scheme & procedure prepared by SG contractor and approved by employer during detailed engineering stage for the steam blowing operation (SG scope) of MS,HRH,CRH,HP&LP By Pass piping systems.	Blow out tools, blow through tools, temporary valve heads/valve blow down cover plate/ flanges, blanking inserts, strainers, baskets, bolts & nuts, special tools & tackles, etc. as required for valves under TG scope of supply shall only be supplied by Bidder.	Technical Specification Requirements are Clear. Bidder to Comply the same.
88	SECTION – VI, PART-A/ SUB-SECTION-A-7	1.00.0, b)	1 OF 3	only Plant water needs to be collected, treated & recycled/reused for various plant use. Storm water drains will be separated out for free discharge.	Bidder understand that plant water/effluents of STG island shall be treated in common water treatment facilities in owner/BOP bidder's scope. Hence, STGI Bidder has not considered any treatment facilities for plant water and effluents generated in STG island. Request owner to confirm bidder's understanding.	The plant water/effluents generated from areas under this package shall be collected and pumped to locations mentioned in the technical specifications for further treatment by the owner.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
89	SECTION – VI, PART-A/SUB-SECTION-A-7	1.00.0, b)	1 OF 3	contaminated water will be diverted to a plant drain sump. After oil skimming, contaminated water of this sump will be sent to employer's	In absence of clarity, bidder understand that contaminated water will be diverted to a plant drain sump for further treatment in employer's waste service water sump. Hence, bidder understand that associated required oil skimming equipment shall be under owner's scope. Request owner to confirm bidder's understanding.	Technical Specification clearly indicates that for plant water/effluents generated from areas under this package, RCC pit/sumps and associated submersible pumps, piping, fitting, valves etc., to discharge the effluent/ wash water/ blow downs etc. from RCC pit/ sump (included in bidder's scope) to Employer's Liquid Effluent Treatment (LET)/ Waste Service Water Sump (WSWS) (as applicable) are to be provided, supplied and installed by the bidder. Further, for oil contaminated water from areas under this package, suitable oil skimming arrangement shall be provided by the bidder.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
90	SECTION – VI, PART-A/ SUB-SECTION-A-7	1.03.00	2 OF 3	All oil drainage shall be routed individually to a common collection tank for collecting oil or any such obnoxious material. Reusable part of oil from this tank shall be transferred to dirty oil tank or drum for further processing.	Bidder understand that the waste oil tank shall be used for collection of waste oil spillage/leakage from main STG lube oil/jacketing oil skid only. Since this is handling contaminated oil, chances of reusing the same is very less. Hence, it is recommended to dispose the oil manually by potable pump. Owner/NTPC to note that same scheme has been followed in NTPC Khargone (2X660 MW) project. Request owner to confirm bidder's understanding.	Bidder to comply specification requirement.
91	9915-110-POM-A-015A	-	-	Proposed Scheme for plant effluent separation TG Area: Two (2) separate sump pits are shown for BFP area for each unit.	Bidder understand that number of sump pits in TG area shall be provided as per drain scheme inside TG building and layout requirement. Request owner to confirm bidder's understanding.	Shall be discussed during detailed engineering.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
92	9915-110-POM-A-015A9915-999-POM-A-037	--	--	Proposed Scheme for plant effluent separation TG Area:Terminal point/interface details not available for TG area effluents.Plant Water Scheme and TP Details:Terminal point/interface details not available for TG area effluents.	In absence of inputs, request owner to furnish following parameters for all terminal points as shown in flow diagram (9915-110-POM-A015A-Proposed Scheme for plant effluent separation TG Area).i) Physical location (i.e. Co-ordinates)ii) TP Elevationiii) Connection details iv) Process parameters (like temperature, pressure and flow rate) at interface points	Bidder to refer drg. For Plant water scheme and TP details. Further, TP pressure, elevation and connection details shall be finalised during detailed engineering.
93	SECTION – VI, PART-A/ SUB-SECTION-A6	1.01.00, (n)	1 of 6	LOW PRESSURE PIPING: Tanks as described elsewhere in the specification for the above systems. (Including condensate storage tanks etc.).	In absence of inputs, request owner to furnish quantities, design basis and Material of construction of Condensate storage tanks.	Necessary Amendment for including "Part-B Technical Specifications for Low Pressure Piping / Chapter A6 " is being issued. Bidder to refer the same for these queries.
94	SECTION – VI, PART-A, SUB-SECTION-A-0 PROJECT INFORMATION	ANNEX URE-VII-2	13 of 13	3 TDS mg/l 230 Total Cations as per Clarified Water Analysis = 238.8 mg/l Total Anions as per Clarified Water Analysis = 238.8 mg/l	The TDS shown is 230 mg/l. However the breakup of Cations (238.8 mg/l) as well as Anions (238.8 mg/l) each sums upto 477.6 mg/l. Owner to clarify the discrepancy.	Technical specification is in order. However, for design purpose, bidder to consider worst water analysis.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
95	SECTION – VI, PART-B, SUB-SECTION-D-01 CIVIL WORKS SECTION – VI_2, PART-E Dwg. No. 9915-999-POM-F-001	7.08.00 a) 6	50 of 142	Condensate storage tank foundation. 3 Nos. boreholes, 3 Nos. ERT and 1 no PLT 25 to 35 m 2 Nos. Condensate Storage Tanks are shown in Equipment Layout Plan.	Bidder understands that no Condensate Storage Tanks (CST) has to be provided. In case the same needs to be considered by bidder, Owner to provide the detailed specification along with Capacity alongwith Data Sheet.	Necessary Amendment for including "Part-B Technical Specifications for Low Pressure Piping / Chapter A6 " is being issued. Bidder to refer the same for these queries.
96	General	-	-	Attachment 3K	Bidder understands that since Attachment-3 does not specify submission of Attachment 3K, the same shall be submitted by the successful bidder after award stage. Please confirm bidder's understanding.	Bidder to comply the specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
97	GeneralSECTION ION – VI, PART-B,APPENDIX - I TO SUB-SECTIONIIIC-01 CONTRACT QUANTITIES OTHER THAN DDCMIS ITEM	-1.02.00	-7 of 15	Hydrogen Generation PlantUPSTG(HY)-03 for HGP	Owner to clarify whether Hydrogen Generation Plant shall be in bidder's scope or not.Accordingly, bidder understands that the UPS for the same shall also be excluded from bidder's scope.Please clarify if Hydrogen Generation Plant shall be considered along with UPS in Bidder's scope or not.	Hydrogen Generation Plant (HGP) is not included in the scope of this package. Please refer Amendment in this regard.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
98	VI / A / A-1 PROVENNESS	6.5.3A	9 of 14	90 MVA, 132 KV or higher rated oil filled transformer manufactured by Bidder should have been successfully short circuit tested.	Bidder request to accept short circuit test report of similar OR higher rated transformers w.r.t to Offered Transformer and not to restrict at 90 MVA, 132kV transformer & above. Owner may please accept.	Bidder to refer clause 6.5.3A, Sub-section A-1, Section -VI, Part A, of technical specification wherein it is clearly indicated that "90 MVA, 132 KV or higher rated oil filled transformer manufactured by Bidder should have been successfully short circuit tested." Documents to substantiate the same is acceptable regarding compliance to provenness as indicated subject clause. Bidder to comply with the requirement of technical specification.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
99	VI / A / FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	1.01.03	8 of 20	<p>Auxiliary Power Consumption</p> $Pa = Pu + TL$ <p>TL = Losses of the transformers supplied by bidder based on works test reports.</p>	<p>Bidder propose Owner to amend transformer losses calculation in auxiliary power consumption in line with recent NTPC tender specification:</p> <p><i>"TL = Losses of the Generator Transformer and Unit Transformers supplied by bidder based on works test reports and the criteria specified in note below:</i></p> <p><i>NOTE: Transformer losses (TL) shall be considered as per following (as applicable)-</i></p> <p><i>GT - 100% no load loss, 54% of Copper losses & 100% Cooler Loss.</i></p> <p><i>UT – 100% no load loss, 52% of Copper losses & 50% Cooler Loss.</i></p> <p><i>Aux/ LT Outdoor/ LT Indoor Transformer: 100% no load loss & 25% of Copper losses"</i></p>	Please refer amendment in this regard.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
100	VI / A / FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES VI / A / FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	1.01.03 1.01.01 (v)	8 of 20 5 of 20	Auxiliary Power Consumption $P_a = P_u + TLP_u$ = Power consumed by the auxiliaries of the unit under test. Note: Power consumption of each of the pump/fan/compressors etc. wherever mentioned shall be measured with its own drive at the switchgear end.	Bidder understands that while measurement of P_u , Power consumption of each of the pump/fan/compressors etc. will be measured with its own drive at respective switchgear end. Owner may please confirm.	Confirmed except for loads where shop test loading is envisaged as per specification.
101	VI / A / TERMINAL POINTS & EXCLUSIONS	8.00.00, Terminal Points - Electrical	4 of 6	Terminal Points for Transformer/Switchgear shall be as indicated in Electrical SLD Tender Drawing No.: 9915-999-POE-J-002. LT terminals of all Employer's Transformers Terminal block of HT motors.	Owner is requested to clarify regarding the scope of HT/LT/Control cables from switchgears under TG package to the HT motors/Transformers/Switchgears/boards under Employer's scope.	Cables which are feeding employers transformer/switchgear/drive and indicated in SLD in Bidders scope shall be provide by Bidder. Refer amendment for clarity.
102	VI / A / TERMINAL POINTS & EXCLUSIONS	11.02.00, Exclusions- Electrical	5 of 6	Switchyard, Generator Protection & Power Transformer Protection. GT and ST overhead connection to Switchyard. Outdoor Transformers	Bidder understands that control cables from bidder supplied HT switchgear/GT/ST to switchyard, protection panels etc will not be in the bidder's scope. Owner may please confirm.	Bidder's understanding is correct.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
103	VI / A / TERMINAL POINTS & EXCLUSIONS	11.02.00, Exclusions-Electrical	5 of 6	Switchyard, Generator Protection & Power Transformer Protection. GT and ST overhead connection to Switchyard. Outdoor Transformers	Owner to specify the required number and rating of current transformers in the bushing of Generator, GT, ST, UT and in the IPBD as protection of Generator and power transformer is out bidder's scope.	Same shall be decided during detailed engineering.
104	VI / A / B-1 ELECTRICAL SYSTEM EQUIPMENTS	1.08.00 (6)	6 of 15	Contractor shall supply and erect following no. of cable trays for employer use in his scope of trestle/area as per DWG NO: 9915-999-POM-F-001/002/003/004/005/006.	Bidder understands that as per dwg. No. 9915-999-POM-F-006, hatched portion in blue is TG package scope. The non hatched portion but indicated in blue and mentioned as "owner's tray" is not in the bidder's scope. Owner may please confirm.	It is in the bidder's scope.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
105	VI / A / B-1 ELECTRICAL SYSTEM EQUIPMENTS	1.08.00 (21) (22)	7 of 15	Cabling between boiler and TG building shall be connected at minimum two different terminals at two different elevations per unit (minimum 8 no of trays of width 600mm per terminal per elevation). The bidder shall consider load of cable tray and its support on its structure.22) Cabling between BMCC to boiler shall be routed with clear space along with support structures along with cable trays for supporting minimum 16 no of cable trays of width 600mm shall be provided for routing of cables from BMCC room to Boiler terminal point through TG building or as agreed by employer in in contractor scope of supply.	Bidder understands that there will be four terminal points per boiler in line with dwg. No. 9915-999-POM-F-006. Owner may please confirm. Also bidder understands that total number of trays for boiler will be 16 nos.. Owner may please confirm as in the dwg. no.9915-999-POM-F-006, twenty(20) number of trays are indicated in SG package.According to above two points equal number of trays at each terminal point of boiler will be decided. Owner may please confirm.	Confirm. Total 32 no. of trays for connection from TG to Boiler is in SG scope.20 no.s of tray shown in Strech-2 is in bidders scope. Inter-connection at terminal point from TG to Boiler is in SG scope
106	VI / A / B-1 ELECTRICAL SYSTEM EQUIPMENTS	1.09.01	7 of 15	In addition to above, HT power cables, as indicated under Clause 1.19.00, required for Employer's requirement shall also be in Contractor scope.	HT power cables are not identified under clause 1.19.00 , "Employer's requirement". Owner may please clarify.	HT power cables for EMPLOYERS REQUIREMENTS (if any) shall be identified in clause 1.19.00

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
107	VI / A / B-1 ELECTRICAL SYSTEM EQUIPMENTS	1.10.00	7 of 15	Interconnection of Earthmats under the scope of Contractor	Underground earthman considered only for the buildings, equipments, area under bidder's scope of work. Owner may please confirm. Also, owner is requested to inform the number of earth mat connections required for interconnection with other packages.	Bidder scope covers to connect at minimum two number of connection to Owners grid on either side of his scope of area.
108	VI / A / B-1 ELECTRICAL SYSTEM EQUIPMENTS	1.15.00	8 of 15	The bidder shall also provide power for meeting the Employer's office/miscellaneous power requirements as indicated in Employer's requirements under Clause 1.19.00	Clause no. 1.19.00 doesn't indicate any power requirement for Owner. Owner may please specify the requirement.	DELETED. Refer Amendment
109	VI / A / B-1 ELECTRICAL SYSTEM EQUIPMENTS VI / A / TERMINAL POINTS & EXCLUSIONS	1.15.00 8.01.00	8 of 15 4 of 6	The Bidder shall extend construction power supply from owners 11 kV Construction power ring main from maximum two locations. Terminal point for Construction power – construction power at two points at 11kV near TG area.	Bidder request Owner to locate two points and provide coordinates from where Construction Power will be provided on Plot Plan.	Shall be provided during detail engineering

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
110	VI / A / B-1 ELECTRICAL SYSTEM EQUIPMENTS	Annexure-A, Employer's Requirement which are under STG island Package, Category I	11 of 15	Rating as per tender SLD	Ratings are not indicated in the tender SLD. Owner is requested to provide rating of all the feeders indicated in Annexure A.	Shall be provided during detail engineering. However, given information is sufficient for bidding purpose.
111	VI / A / B-1 ELECTRICAL SYSTEM EQUIPMENTS	Annexure-A, Employer's Requirement which are under STG island Package Category II, Employer's switchgear	11 of 15	-	Owner is requested to provide rating of all the outgoing feeders indicated in Category II in Annexure A.	Shall be provided during detail engineering. However, given information is sufficient for bidding purpose.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
		requirement				
112	VI / A / B-1 ELECTRICAL SYSTEM EQUIPMENTS	Annexure-A, Employer's Requirement which are under STG island Package Category II, Employer's switchgear requirement	11 of 15	-	Owner may please clarify regarding the scope of HT busducts of the employer's switchgears.	All HT Busducts are in scope of Bidder

<p align="right">KHURJA</p> <p>SUPER THERMAL POWER PROJECT (2X 660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES Bid Document No.: THDC/RKSH/CC-9915-371</p>	<p>CLARIFICATION NO. THDC/RKSH/CC-9915-371-CLRF-03</p>	<p>PAGE 47 OF 95</p>
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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
113	VI / A / B-1 ELECTRICAL SYSTEM EQUIPMENTS	Annexur e-A, Employ er's Require ment which are under STG island Packag e Note: (2)	11 of 15	Above Employer's BOQ is tentative, which may vary during detailed Engineering. Final BOQ shall be provided during detailed Engineering	Bidder shall consider the feeders indicated in Annexure-A for the bidding purpose. Any major change in the feeder list during detail engineering will be mutually discussed and will have price and schedule implication.	Agreed.
114	VI / A / B-1 ELECTRICAL SYSTEM EQUIPMENTS	Annexur e-B, Employ er's LV Switchg ears whose FO Cable& Network ing Under STGisla nd Packag e	13 of 15	-	Owner is requested to provide the length of the FO cable to be considered by Bidder for the employer's system.	Please refer General layout plan in Part-E(tender drgs) for approx. calculation of FO Cable qty.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
115	VI / A / B-1 ELECTRICAL SYSTEM EQUIPMENTS	Annexur e-B, Employ er's LV Switchg ears whose FO Cable& Network ing Under STG island Packag e	13 of 15	Board name, quantity& rating may vary slightly during detail engineering	Any major change in the board rating and quantity during detail engineering will be mutually discussed and will have price and schedule implication.	Agreed.
116	VI / A / B-1 ELECTRICAL SYSTEM EQUIPMENTS	-	-	-	Owner to provide the list along with rating of feeders required from Emergency switchgear for owner' use in other packages such as FGD, SG, Switchyard, ELDB located in other areas etc.	Refer amendment
117	VI / A / B-1 ELECTRICAL SYSTEM EQUIPMENTS	-	-	-	Owner to provide the list along with rating of feeders required from 220V DCDB under TG package for owner' use in other packages such as FGD, SG, ESP, Switchyard, ELDB located in other areas etc.	Refer amendment.

<p align="right">KHURJA</p> <p>SUPER THERMAL POWER PROJECT (2X 660 MW)TURBINE GENERATOR AND ASSOCIATED PACKAGES Bid Document No.: THDC/RKSH/CC-9915-371</p>	<p>CLARIFICATION NO. THDC/RKSH/CC-9915-371-CLRF-03</p>	<p>PAGE 49 OF 95</p>
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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
118	VI / B / SUB-SECTION IIC-01 CONTRACT QUANTITIES OTHER THAN DDCMIS ITEM	APPENDIX - I TO SUB-SECTION IIC-01 CONTRACT QUANTITIES OTHER THAN DDCMIS ITEM	7 of 15	CONTRACT QUANTITIES FOR UPS	Bidder understands that bidder has to supply UPS only for CPU regeneration CR and Hydrogen generation plant. For other loads in TG package, Owner will provide UPS system along with ACDB and Bidder will provide PDBs as identified under clause no. 1.04.00. Owner may please confirm.	Refer amendment.
119	VI / B / B0 GENERAL ELECTRICAL SPECIFICATION	3.11.00	7 of 9	Minimum Battery bank rating-1500AH for lead acid Plante type /990 AH for Ni-Cd High Discharge (KPH) type batteries for Unit.	Owner may please confirm whether the proposed battery system under TG package will only feed to the loads of TG package. In case battery of TG package will feed to other packages of employer's scope then Owner is requested to provide the loads details, to finalize the battery rating. Any change in the rating of the battery during detail engineering will be mutually discussed and major change will have price and schedule implication.	Sizing of Diesel Generator Set is not in Bidders scope. Bidder shall comply with the rating specified in tender.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
120	VI / B / B0 GENERAL ELECTRICAL SPECIFICIATION	3.11.00	7 of 9	150AH for lead acid Plante type /90 AH for Ni-Cd High Discharge (KPH) type batteries for AWRS/Seepage water system, Ash silos,	Bidder understands that 220V battery for AWRS/Seepage water system/Ash silos are not under bidder's scope. Owner may please confirm.	The Technical specification is clear. Bidder to comply technical specification.
121	VI / B / B0 GENERAL ELECTRICAL SPECIFICIATION	3.12.00	7 of 9	Diesel Generator Set	Owner may please provide the emergency loads of Boiler, ESP, FGD, switchyard etc. to verify the rating of DG sets. Alternatively, Bidder will consider the rating of 1500KVA for bidding purpose. Any change in rating during detail engineering will be mutually discussed and will have price and schedule implications.	Bidder to comply specification requirements.
122	VI / A / B-3 LT POWER CABLES	2.14.05	4 of 6	All LT power cables of sizes more than 120 sq.mm. shall be XLPE insulated and sizes shall be 1Cx150, 1Cx300, 1Cx630, 3Cx150 & 3Cx240 sq.mm. However for cable sizes upto 120 sq.mm. both XLPE insulated & PVC insulated LT power cables are acceptable.	Owner is requested to allow for one additional multicore cable size above 240 sq.mm (probably 3.5/3Cx400 sq.mm), to have more economical design.	Bidder to comply technical specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
123	VI / B / B-15 POWER TRANSFORMERS	1.11.07 II) TYPE TEST (#)	20 of 36	Note: vi) **During Infra red thermography test of GT, the temperature of any part of tank shall be limited to 85 deg C.	With an ambient temp. of 50 deg C and oil temp. rise of 35 deg C, the top oil temp. itself will be 85 deg C. Hence the temp. on tank cannot be limited to 85 deg C. We request you to kindly modify the clause as below. <i>"During Infra red thermography test of GT, the temperature of any part of tank shall be limited to 85 deg C temp. rise over ambient temp. or 130 deg C. absolute."</i>	Bidder to comply specification requirements.
124	VI / E / TENDER DRAWINGS	General Layout Plan 9915-999-POC-F-001	-	-	Bidder understands that transformer yard layout will be developed by bidder and owner will plan the location of switchyard gantry and its interconnection accordingly to suit the termination at GT and ST. Owner may please confirm.	Owner will provide the location of switchyard gantry and its interconnection during coarse of detail engineering.
125	VI / E / TENDER DRAWINGS	General Layout Plan 9915-999-POC-F-001	-	-	Owner is also requested to confirm whether there will be any intermediate gantry in transformer yard.	Location of gantry shall be decided during coarse of detail engineering.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
126	VI / E / TENDER DRAWINGS	Equipment Layout Plan at 0.0 M 9915-999-POM-F-001	-	Notes:- 7. Fire barrier wall is provided on A-row between Axis no. 2-8 & 14-20	Based on the oil capacity, if transformers are placed at a distance more than the distance specified in cl. No. 1.02.00 (h), (1) sub section A-02, Section-VI, Part-B then fire wall is not required at A-row. Owner may please confirm bidder's understanding.	Noted
127	VI / E / TENDER DRAWINGS	SINGLE LINE DIAGRAM - STG PACKAGE XXX-999-POE-J-002	-	ST rating	Since the tender is only for STG and bidder cannot verify the rating of ST due to non availability of loads of Boiler, ESP, FGD, FOPH, CHP, AHP, Switchyard etc hence ST rating indicated in the tender SLD will be considered for bidding purpose. Owner may please confirm. Bidder also envisages no change in the ST rating during detail engineering. Any change in the rating during detail engineering will have price and schedule implication.	Rating indicated in SLD is final

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
128	VI / E / TENDER DRAWINGS	SINGLE LINE DIAGRAM - STG PACKAGE XXX-999-POE-J-002	-	UT rating	Since the tender is only for STG and bidder cannot verify the rating of UT due to non availability of loads of Boiler, ESP, FGD, etc hence UT rating indicated in the tender SLD will be considered for bidding purpose. Owner may please confirm. Bidder also envisages no change in the UT rating during detail engineering. Any change in the rating during detail engineering will have price and schedule implication.	Rating indicated in SLD is final
129	VI / E / TENDER DRAWINGS	SINGLE LINE DIAGRAM - STG PACKAGE XXX-999-POE-J-002	-	UAT#1A and UAT#1B, UAT#2A & UAT#2B	Owner may please clarify regarding the scope of HT cable from 11KV unit Switchgears-1UA,1UB,2UA, 2UB to UATs#1A/1B/2A/2B as UATs are excluded from bidder's scope. Also owner is requested to clarify the scope of SPBD from UATs to 3.3KV switchgear.	SPBD are in the scope of bidder. HT cables for UAT excluded from Bidders scope of supply. Refer amendment in SLD

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
130	VI / E / TENDER DRAWINGS VI / B / B0 GENERAL ELECTRICAL SPECIFICATION	SINGLE LINE DIAGRAM - STG PACKAGE XXX-999-POE-J-002 3.11.00	- 6 of 9	220V Unit#1/Unit#2 DCDB Each system shall comprise of two nos. of batteries and two nos. of float-cum-boost chargers each rated for 100% capacity	In the SLD, two batteries are indicated for each bus section of DCDB. This will make four batteries per DC system which is contradicting with other clause of the tender. Hence, Owner is requested to correct the discrepancy.	Refer amendment in this regard.
131	VI / E / TENDER DRAWINGS	SINGLE LINE DIAGRAM - STG PACKAGE XXX-999-POE-J-002	-	DC bus arrangement	Purpose of the DC bus arrangement is not clear. Owner is requested to clarify. Also request to clarify the purpose of indicating feeder to main plant through diodes.	Refer amendment in this regard.
132	VI / E / TENDER DRAWINGS	SINGLE LINE DIAGRAM - STG PACKAGE XXX-999-POE-J-002	-	-	In SLD, Generator is indicated as 800MW unit. Owner is requested to correct the discrepancy.	Refer amendment in this regard.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
133	VI / E / TENDER DRAWINGS	SINGLE LINE DIAGRAM - STG PACKA GEXXX-999-POE-J-002	-	Generator Transformer Impedance at Principal Tap = 15% (Tolerance +-5%)	Bidder requests that Generator transformer impedance at principal tap may be selected between 14% & 16% as against specified value of 15%. However, bidder will limit the range of transformer impedance (lowest to highest - including tolerance) from 12.5% to 17.5% as specified. Owner may please confirm.	Refer amendment in this regard.
134	GENERAL	-	-	-	Bidder understands that dismantling or re-routing, if required, of any EHV/HT/LT lines passing through area of Bidder's scope of work shall be in owner's scope. Please confirm.	Confirmed.
135	Volume VI, Part A, IIC-01	1.11.00	3 of 33	In this package fieldbus based controls and conventional controls (hardwired 4- 20mA/DI/DO) are envisaged. The usage of these two type of controls and devices is indicated below:	Fieldbus shall be applied for monitoring and supervisory type non-critical controls only, and in areas where there is sufficient density of devices available for plugging into fieldbus. Kindly, confirm this understanding.	Bidder's understanding is not correct. Please refer complete clause 1.11.00 in this regard. Specification requirements are clear and to be complied by the Bidder

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
136	Volume VI, Part A, IIC-01	2.06.02	10 of 33	a. One (1) set of programming tool for each such system shall be provided to view & change logic / program /settings. c. One complete fully programmed Integral PLC/Microprocessor based control system for each type of Integral PLC/Microprocessor system as loose along with main supply	a. One common laptop with engineering license for all the PLCs of same make shall meet the requirement. c. Only software back-up drives are to be provided to meet the requirement. Kindly, confirm this understanding.	a. Bidder's understanding is correct c. Bidder's understanding is not correct. Bidder to comply with specification requirement.
137	Volume VI, Part A, IIC-01	2.08.00	11 of 33	In case Bidder's system design requires the termination cabinet independent from system cabinet, the marshalling cabinets can be combined with the termination cabinet. In case, the termination arrangement is part of the system cabinet, independent marshalling cabinets shall be provided.	Marshaling cabinets are not mandatory. Field cables can be terminated directly on DDCMIS/ PLC cards as per DCS/ PLC Supplier's standard proven practice. Kindly, confirm this understanding.	Bidder's understanding is not correct. Bidder to refer Clause No. 2.08.00 (b),(d),€, IIC-01, Part-A in this regard and comply the specification.
138	Volume VI, Part A, IIC-01	3.00.00, (a)	12 of 33	Turbine supervisory system (TSS) including vibration analysis system,vibration monitoring system, axial shift, eccentricity measurement system etc. for Main Turbine and BFP Turbine & Turbine Driven BFP and other HT drives as defined under 4.00.00 (h) of IIC-01 and Clause H of Contract quantities other than DDCMIS items	Bearing vibration measurements, axial displacement, and key-phasor are only applicable to BFP Turbine as per OEM's standard proven practice. Kindly, confirm this understanding.	Bidder to refer Cl. No. 3.01.00, SUB-SECTION-IIIC-03,TG RELATED CONTROL AND INSTRUMENTATION SYSTEM, Part-B and Cl. No. 1.01.03, ANNEXURE IIIC-02B, TG C&I CONTROL SYSTEM, Part-B of Specification in this regard.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
139	Volume VI, Part A, IIC-01	3.00.00, (c)	13 of 33	Complete hardware and software system for turbine stress computation, fatigue analysis for all affected critical components of the turbine, computation of Residual Life Analysis and long term storage of the relevant monitoring of turbine critical components.	This is not applicable for BFP Turbine as per OEM's standard proven practice. Kindly, confirm this understanding.	Bidder to refer Cl. No. 3.01.00, APPENDIX-I TO SUB-SECTION-IIC-01 (CONTRACT QUANTITIES FOR DDCMIS ITEM), Part-A and Cl. No. 1.01.03, ANNEXURE IIIC-02B, TG C&I CONTROL SYSTEM, Part-B of Specification in this regard.
140	Volume VI, Part A, IIC-01	4.00.00, (d)	14 of 33	Contractor to provide triple redundant sensors (Limit switches) for the status of Gates/ Valves to be implemented in 2oo3 configuration being used in protection of critical drives (BFP and CEP).	Redundant limit switches shall not be applicable for valves if there is physical constraint to mount them. Kindly, confirm this understanding.	Triple redundant limit switches for the status of manual valves of BFP and CEP suction have been specified in view of criticality and reliability of protection of these drives as the tripping of these drives can lead to unit tripping and loss of generation. Hence, Bidder to comply with specification requirement.
141	Volume VI, Part A, IIC-01	4.00.00, (e)	15 of 33	Rail mounted/ Rack mounted temperature transmitters are to be provided	Head mounted temperature transmitters with suitable nipple extension per application shall be provided in general as per proven standard industry practice. Kindly, confirm this understanding.	Bidder's understanding is not correct. Bidder to comply with specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
142	Volume VI, Part A, IIC-01	4.00.00, (e)	16 of 33	Wherever process actuated switches are being provided for sequence, protection and alarm purposes, adequate number of blind type switches separate for each application (i.e. sequence, protection, alarm) with separate necessary indicating gauges are to be provided meeting adequate redundancy requirements.	This is not applicable for packages like Vacuum Pump skids, BFP Turbine, On Line Tube Cleaning; where OEM's standard proven practice shall follow. Kindly, confirm this understanding.	Bidder to refer Notes under Cl. 4.00.00, IIC-01, PART-A of specification in this regard.
143	Volume VI, Part A, IIC-01	4.00.00, (g)	16 of 33	For Binary and analog inputs required for protection of boiler , turbine and major auxiliaries of main plant whose non-availability may result in loss of generation triple-sensing devices shall be provided. Binary and analog inputs, which are, required for protection of more than one equipment as well as protection signals for important auxiliaries and HT Drives of main plant (fed by a supply feeder of ratings 3.3 kV onwards) etc., triple sensing devices shall be provided.	Redundant signals using auxiliary contacts of a device shall meet the requirement if there is physical constraint to mount multiple devices. Kindly, confirm this understanding.	Bidder's proposal is not acceptable. Independent triple sensing devices have been specified in view of criticality and reliability of these equipment as their tripping can lead to unit tripping and loss of generation. Hence, bidder to comply with specification requirement.
144	Volume VI, Part A, IIC-01	4.00.00, Notes-1 (iv)	17 of 33	Guided wave radar type level transmitters shall be provided for measurement of Condenser / Hotwell level, LP Heaters level, Deaerator level, ID/FD/PA Fans lub oil tanks level, Mills lub oil tanks level, Main Turbine main oil tank level, BFP Drive Turbine main oil tank level, Main Turbine control fluid tank level, BFP Drive Turbine control fluid tank level (if applicable) and HP/LP bypass oil tank level	a. ID/FD/PA Fans lube oil tanks level, Mills lube oil tanks level are not applicable for this contract. b. For tank oil level Diaphragm seal DP type level transmitters shall also be acceptable per respective OEM practice. Kindly, confirm this understanding.	a) Bidder's understanding is correct. b) Bidder's proposal is not acceptable. Bidder to comply with specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
145	Volume VI, Part A, IIC-01	4.00.00, Notes-6	18 of 33	For measurement of level of tanks/vessels/sumps containing oil (except applications defined under Note-1(iv) above), chemicals or water, Ultrasonic type level transmitters shall be provided.	For water services, DP type level measurements shall also be acceptable as per standard proven industrial practice. Kindly, confirm this understanding.	Bidder to refer Amendment in this regard.
146	Volume VI, Part A, IIC-01	6.02.00	19 of 33	All electric actuators, pneumatic control valves, Junction Boxes, Solenoid boxes and Local control panels which are not installed inside covered building, suitable canopy shall be provided and design of canopy shall be approved by Employer during detailed engineering	Electric actuators and pneumatic control valve positioners are mounted on the valve assembly. Canopy is not applicable for valves installed in pipeline. Further, positioners are having IP65 ingress protection class. Kindly, confirm this understanding.	Bidder to comply with specification requirement.
147	Volume VI, Part A, IIC-01	7.03.00	21 of 33	Separate cables are to be provided for dual / triple redundant instruments used for protection of Unit and HT drives. These cables are also to be laid in separate routes to the extent feasible.	For triple redundant instruments (say A, B, C) used for protection of Unit and HT drives, 1st cable will contain signals for 2 instruments (say A & B) and 2nd cable will contain signal for the 3rd instrument (say C). Also, partitioned or separate trays or conduits within trays can be considered as separate route. Kindly, confirm this understanding.	Bidder's proposal is not acceptable. Bidder to comply with specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
148	Volume VI, Part A, IIC-01	7.06.00	21 of 33	Heat resistant cables (instrumentation / control, as applicable) shall be provided from field to local JB's for hot area applications like Main Turbine, Oil systems and HP/LP BP areas.	<p>For services where instrument head/ transmitter is located in normal temperature area (i.e. below transmitter design temperature), heat resistant cables are not applicable.</p> <p>For example, the devices of Main Turbine, Oil systems and HP/LP BP areas will be placed in areas where ambient temperature is below 50 Deg. C, hence Heat Resistant cable is not envisaged.</p> <p>Kindly, confirm this understanding.</p>	Specification requirement is clear. Bidder to comply with specification requirement.
149	Volume VI, Part A, IIC-01, Appendix-1	2.01.04	2 of 7	Ten (10) percent spare relays of each type and rating mounted and wired in relay cabinets. All contacts of relays shall be terminated in terminal blocks of relay cabinets. In each of the relay cabinets 10 % spare terminal blocks shall be provided so that additional relays can be mounted and wired.	<p>As per Volume VI, Part A, IIC-01, interposing relays are part of SWGR/ MCC. Spares clause are not applicable for these relays which are not part of DDCMIS panels.</p> <p>Kindly, confirm this understanding.</p>	As per referred clause, it is applicable for relays mounted in the relay cabinets. Accordingly Bidder to comply with specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
150	Volume VI, Part A, IIC-01, Appendix-1	3.01.00	3 of 7	The stream-wise process redundancy is to be maintained That is, if there are more than one main equipment (e.g. in A/B/C/D streams) in a process block, these are to be allocated to different FGs (unless allowed explicitly).	In order to increase the availability of a process system, it is recommended that the complete process system shall be assigned to a single controller (which are dual hot redundant), instead of splitting the system in multiple controllers connected via data highway as that will increase the overall probability of failure of the process system due to increased number of elements in the overall process system. For example, entire condensate system (i.e. both CEPs, suction tank and piping instrumentation, discharge header system) shall be assigned to same DDCMIS dual hot redundant controller, instead of breaking the condensate system into 3 controllers. Kindly, confirm this understanding.	Bidder to comply with specification requirement.
151	Volume VI, Part A, IIC-01, Appendix-1	4.00.00	6 of 7	PLC based Control Systems: Air Conditioning & Ventilation System for Service Building	HVAC can have OEM's proprietary microprocessor based control system like DDC. Kindly, confirm this understanding.	Bidder to refer Amendment in this regard.Further, for details related to control of AC and Ventilation system please refer to the clause 2.03.01 (b) of IIC-01, Part-A of the Technical Specification.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
152	Volume VI, Part A, IIC-01, Appendix-I	E	11 of 15	Deaerator: pH, Dissolved Oxygen	DO analyzer will be provided at deaerator outlet. pH analyzer is provided at Economizer inlet (i.e. deaerator outlet BFP discharge water), and hence it is not required at deaerator outlet. Kindly, confirm this understanding.	This table specifies the minimum requirement of SWAS analysers which needs to be provided by the bidder. Bidder to comply with specification requirement.
153	Volume VI, Part B, IIIC-03	1.09.00	1 of 5	Level switches Drip legs employing conductivity type probes	Per ASME TDP-1, either level switches or level transmitters are acceptable. Kindly, confirm this understanding.	Bidder to refer Note (1) under Cl. 4.00.00, IIC-01, PART-A of specification in this regard.
154	Volume VI, Part B, IIIC-04	13.01.00	17 of 30	Flanged weld neck or D & D/2 with 3 pairs of tapping (as applicable). Root valves to be provided in all the tappings. However for flow elements in CPU, DM & PT plant- 2 Pairs of Tappings shall be provided as minimum.	Same process taping point shall be shared for redundant DP measurements on orifice in pipelines with ≤ 2 " diameter due to non-availability of space for proper oriented taps. Kindly, confirm this understanding.	Bidder to comply with specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
155	Volume VI, Part B, IIIC-07	5.01.00	9 of 14	Between a) field and DCS (for ungrouped signals) and b) field JB and DCS (for grouped signals), cables of 4 pair or its multiples shall be used.	Direct cable from instrument to DCS can be 2 pair cable (1st pair for instrument and 2nd pair as spare) meeting contract requirement for spare cores/ conductors. Kindly, confirm this understanding.	Specification requirement is clear and shall be met by Bidder. Bidder to also refer specification clause 5.00.00 (note-1), sub section IIIC-07, section-VI, part-B, page 8 of 14: As per this clause spare cores shall be provided when the numbers of pairs in cables are more than four pairs. So as per specification spare cores are not applicable upto 4 pair instrumentation cables.
156	Volume VI, Part B, IIIC-08	1.02.03	1 of 6	Thus for cavitation/flashing service, only valve with anti-cavitation trim shall be provided	Anti-cavitation trims are not applicable for flashing services. Rather, hardened trims are applicable. Kindly, confirm this understanding.	Bidder's understanding is correct. However, valve and trim material shall be as per specification requirements.
157	Volume VI, Part B, IIIC-08	3.00.00	2 of 6	Non-corrosive, non-flashing and noncavitation service except DM water: 316SS stellited with stellited faced guide posts and bushings	For Non-corrosive, non-flashing, and non- cavitation service, and which are far from cavitation zone, SS316 trim material shall suffice, and stellited coating is not required. Kindly, confirm this understanding.	Bidder to comply with specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
158	Volume VI, Part B, IIIC-08	5.00.00	3 of 6	The travel time of the pneumatic actuators shall not exceed 10 seconds	Travel time shall be as per the process control requirements. For slow moving processes, control valve travel times of 20sec shall also be acceptable. Kindly, confirm this understanding.	Bidder to comply with specification requirement.
159	Volume VI, Part B, IIIC-13	2.03.00	1 of 9	The above panels shall be physically separate from each other and shall be mounted in the air-conditioned SWAS room located at 0.0m level.	Sample conditioning panel & chiller of SWAS is wet panel, and it does not need air conditioning ambient. Hence air conditioning will not be provided for them. Glass partition shall be provided between the wet panel and dry panel. Kindly, confirm this understanding.	Bidder's understanding is not correct. Bidder to comply with specification requirement.
160	Volume VI, Part B, IIIC-13	2.05.00	2 of 9	PC-based operator station, with color inkjet printer for monitoring & alarming (Hooked up to station wide LAN of the DDCMIS system) (for PC specification, refer in Sub-Section: DDCMIS) shall be provided by the Bidder.	Display is available in all the analyzers for monitoring SWAS measurements. Also, each sample's pressure/ temperature/ flow gauges are available for local monitoring. OWS in local is not recommended from operation management stand. Kindly, confirm this understanding.	Bidder's understanding is not correct. Bidder to comply with specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
161	Volume VI, Part B, IIIC-13	2.10.00	4 of 9	The sample shut off valves, blow down valves and pressure reducing valves shall have stellite spindle tip and shall be suitable for an operating pressure of 400bars and an operating temperature of 400°C. These shall be of Dr. Thiedig make or equivalent.	Sample shut-off valve, blow down valves and pressure reducing valves design shall be suitable for the corresponding sample's design pressure & temperature, and not necessarily for 400Bar/400°C for every sample. Kindly, confirm this understanding.	Bidder's to refer Amendment in this regard.
162	Volume VI, Part B, IIIC-13	4.01.00, 4.02.00, 4.05.00	8 of 9	All sample piping shall be 3/4" NB seamless type of material ASTM A213 TP 316 H, conforming to ANSI B36.19. All fittings shall be socket welding type and of material ASTMA182 F316H conforming to ANSI B 16.11	Sample piping material shall be suitable for the corresponding sample's design pressure & temperature. SS316H is not used above 500°C applications. The material of the sample pipe shall be same as that of main process pipe or equivalent. Also, inside SWAS panel, tubing shall be acceptable instead of piping as a standard proven practice in all the SWAS panels. Kindly, confirm this understanding.	Bidder to comply with specification requirement.
163	Volume VI, Part B, IIIC-6	5.00.00	2 of 4	All transmitters, switches etc. in Boiler Turbine Generator measurements (except for all fuel oil applications) shall be suitably grouped together and mounted inside (i) local instruments enclosures in case of open areas of the plant like boiler area, etc. and (ii) In local instrument racks in case of covered areas like Turbine/Generator area	In case of open areas, Local Instrument Racks with canopy/sunshade shall be acceptable for all instruments having IP65 or higher ingress protection class. Kindly, confirm this understanding.	Bidder's understanding is not correct. Bidder to comply with specification requirement.

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164	Volume VI, Part B, IIIC-6	5.01.00	2 of 4	Integral JB shall be provided with each Enclosure and Rack.	TBs inside enclosure/ racks are not applicable as each instrument head has a dedicated cable entry, and this would reduce a un-necessary break junction point in the cable circuit. Kindly, confirm this understanding.	Bidder to comply with specification requirement.
165	Volume VI, Part E, 9. C&I	0000-110-POI-A-022, 24	-	Oil Service	Steam tracing is not applicable for this project site ambient. Kindly, confirm this understanding.	Bidder's understanding is correct.
166	Volume VI, Part E, 9. C&I	0000-110-POI-A-022, 23	-	Air Service	Vent connection in air service hook-up of pressure instruments is not applicable. Kindly, confirm this understanding.	Bidder to comply with specification requirement.
167	Volume VI, Part E, 9. C&I	0000-110-POI-A-031, 32	-	Level instrument	Vent connection in upper impulse line of level instrument connection is not applicable as the upper impulse line is connected to the tank for natural venting. Vent connection shall be required only if a local high point is created in the level instrument chamber. Kindly, confirm this understanding.	Bidder to comply with specification requirement.
168	Volume VI, Part E, 9. C&I	0000-110-POI-A-065	-	4 Pair cable for RTD	Triad cable is standard proven practice for connecting RTDs, and same shall be acceptable. Kindly, confirm this understanding.	Bidder's proposal is not acceptable. Bidder to comply with specification requirement.

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169	Volume VI, Part A, IIC-01, Appendix-I	HMI Contract Quantities	A	OWS Nos: 1, CPU Regeneration Area Control Room	OWS in local is not recommended from operation management stand. Alternatively, one GIU can be provided. Kindly, confirm this understanding.	Bidder's proposal is not acceptable. Bidder to comply with specification requirement.
170	VI / A / ESSENTIAL DATA	10 OF 10	1.05.00	Unified HMIPIS implemented on DDCMIS envisaged for this package.	Make of the DDCMIS shall be as per approved sub-vendor list.	Bidder's understanding regarding make of DDCMIS is correct. However in the referred point . Bidder shall be required to specify the DDCMIS on which Unified HMI (if applicable) shall be implemented.
171	VI / A / ESSENTIAL DATA	10 OF 10	1.08.00	The Bidder shall submit the supporting document, justifying/ substantiating data filled in for the various requirement indicated in above mentioned clauses of essential data requirement.	Bidder shall try to fill the Essential Data accurately to the extent possible based on past project experience and data available at this stage.	Bidder to comply with specification requirement.
172	VI / A / II-C	22 OF 33	8.02.00	Microprocessor based (4-20mA HART) electronic positioners with remote positioner units to be provided for burner-tilt and SADC application. However, pneumatic positioners are also acceptable for high temperature and dust prone applications like Buner tilt and SADC.	We understand that Systems/Applications mentioned in this clause are not applicable for this Tender. Kindly confirm.	Bidder's understanding is correct.

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173	VI / A / II-C	1 OF 33	1.01.00	The requirements of statutory Authorities (e.g. MOEF, Inspector of Factories, IBR, TAC, CPCB/SPCB/CERC etc with regard to various plant areas like main plant etc.) shall be complied even if not actually spelt out.	Bidder scope shall be limited to systems/quantities mentioned under various chapters; Any additional system/quantity required to meet various statutory guidelines shall have suitable time & cost application.	Bidder to comply with specification requirement.
174	VI / A / II-C	4 OF 33	1.11.02 F	The actuators shall be fully compatible with the valves being provided in this package. Further, 20 Nos. configuration/ diagnostic tool (if applicable) for non-intrusive actuators and 20 nos. configuration/ diagnostic tool (if applicable) for all fieldbus compatible devices shall be provided for complete package.	The number of Configuration/Diagnostic Tools mentioned are on very higher side;NTPC may please review.	Considering no. of devices, this quantity is correct. Accordingly Bidder to comply with specification requirement.
175	VI / A / II-C	8 OF 33	2.04.02	In addition to operation of complete TG C&I system from the HMI of STG C&I DDCMIS, unit TG DDCMIS including TG Standalone DDCMIS shall also be interfaced with the SG C&I DDCMIS (being procured by Employer under separate package) at control system level for operation & monitoring of unit TG DDCMIS and TG Standalone DDCMIS drives from the HMI of SG C&I DDCMIS, in order to realize a single Unified HMI interface for the entire main plant in the Unit Control room.	Bidder shall consider the necessary DCS hardware/software for implementation of TG DCS supplied by Bidder; Also Bidder shall provide inputs / coordination for implementation of unified DCS.	Specification requirement is clear and Bidder to comply with specification requirement. Bidder to also refer clause no. 2.04.03, SUB-SECTION-IIC, Part-A of Specification in this regard.
176				Scope of C&I Lab, Public Addressal System, CEMS, CCTV and AAQMS	Bidder understands that mentioned systems are not in our scope. Kindly Confirm	Bidder's understanding is correct.

<p align="right">KHURJA</p> <p>SUPER THERMAL POWER PROJECT (2X 660 MW)TURBINE GENERATOR AND ASSOCIATED PACKAGES Bid Document No.: THDC/RKSH/CC-9915-371</p>	<p align="center">CLARIFICATION NO. THDC/RKSH/CC-9915-371-CLRF-03</p>	<p align="right">PAGE 69 OF 95</p>
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CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
177	APPENDIX - I TO SUB-SECTION IIC-01 CONTRACT QUANTITIES OTHER THAN DDCMIS ITEM		11 of 15 & 12 of 15	E. CONTRACT QUANTITIES FOR SWAS Table: SWAS-II	The Quantities of SWAS Analysers mentioned in the clause E and the table: SWAS II do not match. Kindly review the same.	Bidder to refer Amendment in this regard.
178	TECHNICAL SPECIFICATION SECTION-VI, PART-A MANDATORY SPARES		17 OF 59 & 19 OF 59	Spares for MDBFP and TDBP Accessories: 11b) BFP Recirculation Valve spares (TDBFP) 13.) BFP Recirculation Valve spares (MDBFP)	Since Accessories for TDBFP & MDBFP recirculation valves are already included in Mandatory Spares List, Complete Valve Assemblies are not required and hence shall not be considered.	Bidder to comply with technical specification requirements. Have to supply the complete valve assemblies also.
	TECHNICAL SPECIFICATION SECTION-VI, PART-A MANDATORY SPARES		PAGE 11 OF 59	1) Turbine Driven Boiler Feed Pump 1.5 Recirculation control valve complete assemblies : 2 Set (Requirement for two Unit) 2) Motor Driven Boiler Feed Pump 2.5 Recirculation control valve complete assemblies 1 Set (Requirement for one Unit)		

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
179	SECTION – VI, PART-A SUB-SECTION-D-1	1.00.0	1 of 4	2. Site clearance including cutting of trees of girth (circumference measured at a height of 1 m above ground level) less than 30 centimeters.	Bidder understands that site grading is not in Bidder's scope. Therefore, site clearance including cutting of trees of girth is not envisaged. Please confirm.	Site levelling is excluded from the scope of the Bidder. However, Site clearance including cutting of trees of girth (circumference measured at a height of 1 m above ground level) less than 30 centimeters and micro levelling thereafter shall be in Bidder's scope.
180	SECTION – VI, PART-A SUB-SECTION-D-1	1.00.0	1 of 4	a. Approach road for buildings included in this package.	Bidder understands that all main roads including patrol road and peripheral roads including drains around the STG island are not in Bidder's scope. Only approach roads from building to Main road shall be in scope. In this regard, Owner is requested to provide layout of road and drains with scope demarcation.	Approach road including drains for buildings included in this package shall be in Bidder's scope.
181	SECTION – VI, PART-A SUB-SECTION-D-1	1.00.0	1 of 4	b. RCC Storm water drainage system till nearest trunk storm water drains.	Please provide the invert and cross section of nearest trunk storm water drains. Also, please provide the terminal points of such drains.	Details shall be provided at detailed engineering stage.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
182	SECTION – VI, PART-A SUB-SECTION-D-1	1.00.0	1 of 4	c. Separate RCC drainage network with GI grating cover and sump pit for plant effluents for all buildings and facilities in Bidder's scope including floor wash from main plant building area & transformer yard area.	Bidder understands that Separate RCC drainage network with GI grating cover and sump pit for plant effluents are envisaged only within Main Power House building. No other such drain is envisaged.	All the plant effluents pertaining to facilities/ buildings/ structures in bidder's scope have to be ascertained by the bidder, and accordingly, separate drainage network shall be provided.
183	SECTION – VI, PART-A SUB-SECTION-D-1	1.00.0	2 of 4	8. Civil, Structural works for pipe /cable /duct supporting structures, trestles and foundations, trenches, culverts, duct banks, pedestals, hume pipe culverts, buried pipes, racks, culverts across rail tracks for pipes/ drains/ sewers and any other facility and thrust blocks etc. associated with all systems covered under the scope	Please clarify the scope / terminal points clearly marked on the General Layout Plan which shall be in Bidder's scope.	Bidder is requested refer tender drawing 9915-999-POM-F-006 with regards to scope of pipe/cable galleries. For FDPS, Bidder is requested to refer separate drawing being issued as amendment. Drains/culverts/sewers in TG area is in the scope of TG package
184	SECTION – VI, PART-A SUB-SECTION-D-1 SECTION – VI, PART-D ECC	1.00.0 36.05.00 point(m)	2 of 4 23 of 58	9. Landscaping Development of suitable <u>landscape & green belt areas</u> and rainwater harvesting within the plant premises. Bidder shall plan to develop the landscape & green belt areas and rainwater harvesting from the start of the project itself.	a) It is Bidder's understanding that scope for landscaping is limited to Service Building only. Please confirm. b) Greenbelt is excluded from Bidder's scope of work. Please confirm.	a) Comprehensive landscape development in the plant area under the scope of this package shall be in Bidder's scope. Bidder is requested to refer amendment to Technical Specification in this regard. b) Confirmed

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
185	SECTION – VI, PART-B SUB-SECTION-D-01	3.02.00	5 OF 142	g) Perspective views of main power house, Service Building and Control Room interiors shall be submitted in Hard Copy in Laminated A-1 Size (Two Numbers) and Soft copy of AutoCAD / Revit drafted views. A panoramic bird's eye view of Overall plant shall be submitted in laminated A-1 Size hardcopy (Two Numbers) and soft copy in AutoCAD.	Bidder shall be allowed to submit soft copies of perspective views in other 3d Formats equivalent to AutoCAD / Revit.	Bidder is requested to adhere to the provisions of Bid Documents.
186	SECTION – VI, PART-B SUB-SECTION-D-01	5.01.00, j)	8 of 142	Development of rain water harvesting scheme for the project and obtaining approval of the scheme from Central Ground Water Board is in Bidder's Scope.	<p>a) Owner to clarify whether rainwater harvesting is included in Bidder's scope or not?</p> <p>b) In case rain water harvesting is included, then Bidder's scope should be limited to the facilities included in this package. Hence "Development of rain water harvesting scheme for the project and obtaining approval of the scheme from Central Ground Water Board is deemed to be excluded from Bidder's scope of work. Please confirm.</p>	Rain water harvesting for the buildings covered in this package is under bidder scope of works and obtaining approval of the scheme from Central Ground Water Board is also in Bidder's Scope.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
187	SECTION – VI, PART-B SUB-SECTION-D-01	5.02.01 (iii)	11 OF 142	Light weight aerated concrete <u>panels with Single Skin Metal Panel cladding</u> shall be provided in exterior of UPS Battery room area and Control Equipment Room area. All internal side of Aerated concrete panel and columns in air-conditioned areas in MPH shall be encased with Aluminium Composite panel cladding from inside	Bidder proposes to use Light weight <u>aerated concrete blocks</u> with single skin metal cladding as external cladding for UPS Battery room area and Control Equipment Room area. Internal walls shall be aerated panels.	Bidder is requested to adhere to the provisions of Bid Documents.
188	SECTION – VI, PART-B SUB-SECTION-D-01	5.02.01 (iii)	11 OF 142	The external vertical face (herein stated as 'C' row) facing (& adjacent to) the Boiler area shall be completely covered upto the Deaerator floor level with vertical cladding comprising 3.0m high brick wall on ground floor followed by either single skin metal sheeting with runners or <u>brick wall sandwiched with single skin metal sheeting</u> on external face (for all floors requiring 4 hours of fire rating e.g. cable spreader room, ventilation/ air washer room, AHU Rooms and air conditioned areas)	Bidder understands that brick wall (if provided) shall be attached with single MS sheeting on external face only.	Bidder is requested to refer amendment to Technical Specification
189	SECTION – VI, PART-B SUB-SECTION-D-01	5.02.01 (iii)	11 OF 142	All stairs in BC Bay lift lobby Area shall be in RCC. Stainless steel railing shall be provided at TG floor level for all cut-outs/ openings, walkways, cut-outs at lower level that are visible from TG floor level and stairs near lift lobby. M.S. railing shall be provided for all other locations.	Bidder understands that Stainless steel railing shall be provided around the cut outs / openings and walkways at Operating floor only as per clause 9.02.01(a) on page 70 of 142. Please confirm	Bidder is requested to adhere to the provisions of Bid Documents.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
190	SECTION – VI, PART-B SUB-SECTION-D-01	5.02.01 (iii)	12 OF 142	Internal steel columns in <u>Air Conditioned Area of Main Power House Building</u> shall be encased with Aluminium Composite Paneling up to false ceiling.	Bidder understands that the referred clause is applicable only for CCR and CER. Please confirm.	Bidder is requested to refer amendment to Technical Specification
191	SECTION – VI, PART-B SUB-SECTION-D-01	5.03.01.07	17 OF 142	Minimum thickness of foundation slab / raft and base slab of all liquid retaining <u>tanks / pits shall not be less than 250 mm.</u> Minimum thickness of all elements of RCC liquid retaining / conveying structures (except effluent drains, launders and aerator waste slab) <u>shall be 200mm.</u> Effluent drains (depth more than 500mm), aerator waste slab and launders shall have minimum element thickness of 150mm.	Please clarify the contradiction of foundation slab / raft and base slab thickness of Liquid Retaining Structures as 250mm or 200mm. Bidder proposes that foundation slab/ raft, wall and base slab thicknesses to be considered as per design/ codal references. Please confirm.	Provisions of Specification are clear. Bidder is requested to adhere.
192	SECTION – VI, PART-B SUB-SECTION-D-01	5.03.02	17 OF 142	Acid / Alkali Resistant Treatment Neutralization Pit: The walls shall be provided with one coat of bitumen primer, followed by 18 mm thick bitumastic layer, 115 mm thick Acid Resistant (A.R.) bricks, 6 mm thick under bed of potassium silicate mortar, pointing the joints of bricks with acid / alkali resistant epoxy / furane mortar upto a depth of 20 mm and bitumastic	Bidder proposes to replace 18 mm thick bitumastic layer with 2 mm thk epoxy screed for the enclosed portion of the pits to avoid health hazard based on previous project experience.	Bidder is requested to adhere to the provisions of Bid Documents.
193	SECTION – VI, PART-B SUB-SECTION-D-01	5.06.03	22 of 142	Patrol Roads	Patrol roads are excluded from Bidder's scope of work.	Bidder's understanding is correct.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
194	SECTION – VI, PART-B SUB-SECTION-D-01	6.04.08	38 of 142	All structural steel members in switchyard (excluding fencing and gate) shall be hot dip galvanised as specified elsewhere.	Switchyard is excluded from Bidder's scope of work.	Switchyard is excluded from Bidder's scope. Bidder is requested to refer Amendment to Technical Specification in this regard.
195	SECTION – VI, PART-B SUB-SECTION-D-01	7.01.00	39 of 142	Onus of correct assessment/ interpretation and understanding of the existing subsoil condition / data is on the Bidder. Bidder may refer topographical survey drawing for variation in existing ground level (EGL) and FGL. As per topographical survey drawing, NGL is varying from RL(+) 191.5m to RL(+) 193.5m and FGL is RL(+) 194.0 i.e. there may be filling of 0.5m to 2.5m.	Area Grading is excluded from Bidder's scope. Owner shall provide encumbrance free, levelled and graded land (at FGL, +194 m) to Bidder, on or before the NTP.	Site levelling is excluded from the scope of the Bidder. However, Site clearance including cutting of trees of girth (circumference measured at a height of 1 m above ground level) less than 30 centimeters and micro levelling thereafter shall be in Bidder's scope.
196	SECTION – VI, PART-B SUB-SECTION-D-01	7.02.02	41 of 142	Offsite buildings & structures, CPU, Transformer yard area (except transformer foundations) and all other structures which are not founded on pile foundation are to be placed on open foundation and if the depth of foundation is less than 5.0m below the EGL than the ground improvement shall be done using stone columns as per clause 7.02.04	Owner is requested to revisit the foundation criteria including requirement of soil improvement based on further soil investigation reports at pre-bid / detail engineering stage. Bidder proposes the requirement of soil improvement for various structures to be decided based on approved soil investigation report.	Bidder is requested to adhere to the provisions of bid documents.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
197	SECTION – VI, PART-B SUB-SECTION-D-01	7.02.03	42 of 142	Following structures are to be placed on pile foundation: Main Power house including Control room, TGs, Service Building, Transformer foundations, Pipe cable gallery, any other heavily loaded structure etc.	Type of foundation (open/pile) shall be decided by Bidder in consultation with the Owner based on approved geotechnical investigation, to be carried out during detail engineering.	Bidder is requested to refer the amendment to technical specifications in this regard.
198	SECTION – VI, PART-B SUB-SECTION-D-01	7.02.03 7.02.04	42 of 142 45 of 142	Offsite buildings & structures, CPU, Transformer yard area (except transformer foundations) and all other structures which are not founded on pile foundation are to be placed on open foundation and if the depth of foundation is less than 5.0m below the EGL <u>than the ground improvement shall be done using stone columns as per clause 7.02.04</u> <u>Ground Improvement below structures/facilities using stone columns:</u>	Bidder understands that alternative type of soil improvement, other than stone columns, can be considered subject to Owner's approval. Please confirm.	Bidder is requested to adhere to the provisions of bid documents.
199	SECTION – VI, PART-B SUB-SECTION-D-01	7.02.03 5.02.03	42 of 142 14 of 142	Following structures are to be placed on <u>pile foundation</u> : Main Power house including Control room, TGs, Service Building, Transformer foundations, <u>Pipe cable gallery, any other heavily loaded structure etc.</u> The foundation for Pipe-Cable gallery trestles shall comprise RCC pedestals with footings. <u>The footing base shall rest on virgin soil.</u> In case virgin soil depth is high, the gap shall be filled with PCC (M10 grade). The grade of concrete for RCC footing & pedestals shall be M25.	Contradiction in clause. The type of foundation (open/pile) for Pipe / Cable gallery shall be suitably decided by Bidder based on geotechnical investigation, to be carried out during detail engineering.	Bidder is requested to refer the amendment to technical specifications in this regard.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
200	SECTION – VI, PART-B SUB-SECTION-D-01	7.02.03 5.08.00	42 of 142 24 of 142	<p>Following structures are to be placed <u>on pile foundation</u>: Main Power house including Control room, TGs, Service Building, <u>Transformer foundations</u>, Pipe cable gallery, any other heavily loaded structure etc.</p> <p>Foundations of transformers shall be designed for seismic and wind loads in addition to other applicable loads. <u>RCC block foundations shall be provided for the main transformer.</u></p>	<p>Contradiction in clause. The type of foundations for transformer, either pile foundation / Block foundation shall be suitably decided by Bidder based on geotechnical investigation, to be carried out during detail engineering.</p>	Bidder is requested to refer the amendment to technical specifications in this regard.
201	SECTION – VI, PART-B SUB-SECTION-D-01	7.02.04	46 of 142	<p>Stone column installation procedure submitted by the Bidder shall be approved by the Engineer..... 1 Stone Columns". iii) Case:1 Ground improvement without piling provision after it Dia of column (D) = 900mm Spacing = 3D (Triangular pattern) Depth of ground improvement (d) = 6m</p> <p>Ground improvement with stone column shall be carried out minimum d/2 distance beyond the footprint of buildings(minimum 2 rows beyond the building footprint), where d is the depth of improvement.</p>	<p>Bidder understands that design of stone columns (dia and depth) mentioned in the specification are indicative and are subject to change based on Geotechnical Investigation data during detail engineering including Ground improvement methodology (vibrofloatation or Equivalent) and required allowable bearing pressure. Please confirm.</p>	Bidder is requested to adhere to the provisions of bid documents.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
202	SECTION – VI, PART-B SUB-SECTION-D-01	7.02.05	47 of 142	Ground Improvement below roads & drains: In order to mitigate liquefaction below roads & drains, ground improvement by dynamic compaction or any other method can be done.	Bidder understands that requirement of ground improvement below roads and drains is not mandatory. The same shall be carried out if required, on the basis of detail soil investigation, post award stage. Please confirm Bidder's understanding.	Bidder is requested to adhere to the provisions of bid documents.
203	SECTION – VI, PART-B SUB-SECTION-D-01	8.01.02.7	52 of 142	In Main plant area wherever fire water pipe trenches are envisaged, these trenches shall be of RCC and provided with precast RCC cover flush with finished level of paving in that area.	a) Bidder's scope of work pertaining to Fire water pipe trenches shall be limited to TG and Transformer yard area. b) Additionally, Owner to earmark in the plot plan, the battery limit of various common facilities like fire water pipe trenches, sewage/sanitary lines, rain water harvesting and landscape development.	a) For scope of civil works related to FDPS system, kindly refer FDPS layout drawing. Tender drawing to be issued as amendment by PE_mech PU group. b) For Terminal points (Battery Limits) of Fire water pipes trenches refer point a) above. Sewerage system including Sewerage Treatment Plant(s) for buildings in TG package is in Bidder's scope. For rainwater harvesting, refer reply at S.No, 186 above. For landscaping, refer reply at S.No, 184 above.
204	SECTION – VI, PART-B SUB-SECTION-D-01	8.04.00	58 OF 142	CULVERTS /RACKS ACROSS RAIL TRACKS	Bidder understands that any work related to racks and culverts over rail tracks are not included in Bidder's scope.	For scope of work, Bidder is requested to refer Part-A Sub Section D-1 of Technical Specification

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
205	SECTION – VI, PART-B SUB-SECTION-D-01	9.04.08	74 OF 142	For pathway, chequered and designed concrete tiles minimum 22 mm thick, 200x200 mm size conforming to IS: 13801 of approved shade and colour shall be used. <u>1000 wide pathways shall be provided for maintenance on rooftops of all buildings.</u>	Chequered concrete tile path way will be provided along the parapet wall and for equipment access placed on terrace.	Bidder is requested to refer amendment to Technical Specification
206	SECTION – VI, PART-B SUB-SECTION-D-01	9.06.06 9.06.02	76 OF 142 75 of 142	Top surface of sloped R.C.C. slab shall be finished with 15mm thick cement plaster (1:4). Over the finished surface <u>elastomeric membrane</u> shall be laid. Roof of all buildings having RCC framework shall have cast-in-situ RCC slab. Such roof shall be provided with roof water proofing treatment using <u>high solid content liquid applied elastomeric water proofing membrane</u> with separate wearing course as per ASTM - C-836 & 898. Thickness of the membrane shall be 1.5mm (min.).	Contradiction in clause. Please confirm which clause to be followed for roof water proofing either 9.06.06 or 9.06.02?	Bidder is requested to refer amendment to Technical Specification

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
207	SECTION – VI, PART-B SUB-SECTION-D-01	9.06.05	75 OF 142	Roof of the specific buildings shall conform to minimum 3 star GRIHA Rating shall have Over-deck insulation of minimum 40 mm thick impervious sprayed close cell free rigid Polyurethane foam confirming to IS: 12432 –III, with density of foam 40 TO 45 KG/cum.Over-deck insulation with 40 mm thk polyurethane foam with density of 40-45 kg/cum shall be fixed over a coat of polyurethane primer applied @ 6 to 8 sq.m/ litre, laid over cement screed, laid in slope above the cleaned roof top. 400g polythene sheet shall be laid over polyurethane spray and provided with a wearing course of 40 mm thick cement screed1:2:4(1 cement:2 coarse sand:4 stone aggregate 20 mm nominal size) in chequered rough finish, in panels of 2.5mx2.5m and embedding with 24 G wire netting and sealing the joints with polymerized mastic. Heat resistant tiles of (300mm x300mmx20 mm) with SRI (Solar Refractive Index) > 78, Solar reflection > 0.70 and initial emittance > 0.75 on sloped screed surface of terrace, laid on 20 mm thick cement sand mortar in the ratio of 1:4 (1cement : 4 coarse sand) shall be provide on terraces of GRIHA rated buildings . The joints in the tiles has to be grouted with mix of white cement and marble powder in ratio of 1:1. The surface shall be rubbed and polished up to three cuts complete. Skirting up to 150 mm along the parapet walls shall be provided in the same manner.	Water proofing membrane is not mentioned in this section. Owner to specify the same.	Bidder is requested to refer amendment to Technical Specification

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
208	SECTION – VI, PART-B SUB-SECTION-D-01	9.08.07	81 OF 142	Polycarbonate Sheets The polycarbonate sheet to be used for cladding and glazing purpose in conveyor galleries, Transfer points & pump houses shall have toughed profile to match with the metal cladding profile. Minimum 3.0mm thick fire retardant and UV resistant polycarbonate clean sheet of approved make shall be used	The referred clause is not applicable for this package. Bidder understands that polycarbonate sheets are not envisaged for this project.	Confirmed
209	SECTION – VI, PART-B SUB-SECTION-D-01	9.12.05	85 OF 142	For main power house building glazing, 6mm thk <u>clear</u> <u>reflective</u> toughened glass shall be provided.	Please clarify whether glass shall be clear or reflective?	Bidder is requested to refer amendment to Technical Specification
210	SECTION – VI, PART-B SUB-SECTION-D-01	9.12.06	86 OF 142	The glass to be used should be from the manufacturers of glass like Saint Gobain (India) or Asahi (India) or equivalent. The glass should be free from distortion and thermal stress. For CER & Control room, Fire resistant glass partition shall be provided. The fire glass panels shall be min 11mm thick clear, toughened, interlayered 120 minute fire rated for both integrity & radiation control (EW120) with <u>min 15 minute full insulation (EI15)</u> , non wired toughened glass complying to BS476 Part22 or (EN-1634-1 :1999). The glass shall be complied to Class 2B2 Category of Impact Resistance to as per EN 12600 safety Glazing Material.	Terminology of 15 min full insulation is not clear. However Bidder understands that internal glass partition within CER and CCR shall be single glazed with 11 mm thk fire rated glass partition. Please confirm.	Bidder is requested to refer amendment to Technical Specification

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
211	SECTION – VI, PART-B SUB-SECTION-D-01	TABLE B	96 OF 142	1. All wall and roof areas above false ceiling shall be plastered.	a) Ceiling/Slabs above False ceiling area can be no plaster zone as no finishing is required. Please confirm. b) Also for areas having AAC block wall above False ceiling, plaster is not required, as they will not be visible. Hence no finishing is envisaged. Please confirm.	Bidder is requested to refer amendment to Technical Specification
212	SECTION – VI, PART-B SUB-SECTION-D-01	Table-B	94 of 142 92 of 142	Interior finishing schedule - Main power house Building v) Passages and general circulation areas. <u>18mm thick polished Marble Stone/ granite stone.</u> i) General circulation and movement areas 18mm thk. Polished granite honed finish combination as per design stone / marble stone/ <u>Vitrified Ceramic tiles.</u>	Contradiction in clause. Owner to confirm which clause to be followed.	Bidder is requested to refer amendment to Technical Specification
213	SECTION – VI, PART-B SUB-SECTION-D-01	Table-B 6.04.03	90 of 142 37 of 142	h) M.S. Grating / <u>Chequered plate</u> <u>Epoxy</u> - 150 Micron Painting Of Steel Surfaces (Other Than Those Embedded In Concrete)	Contradiction in clause. Owner to confirm which clause to be followed for painting of Chequered plate.	Bidder is requested to refer amendment to Technical Specification

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
214	SECTION – VI, PART-B SUB-SECTION-D-01	Table-B 6.04.05	90 of 142 38 of 142	h) M.S. Grating / Chequered plate Epoxy - 150 Micron All gratings shall be blast cleaned to Sa 2 ½ finish or cleaned by acid pickling as per ISO 8501-1 and shall be hot dip galvanized at the rate of 610 g/Sq.m.	Contradiction in clause. Owner to confirm which clause to be followed for painting of Gratings.	Bidder is requested to refer amendment to Technical Specification
215		-	-	General	a) Please provide borehole location plan for the borelogs indicated in the tender document. b) Additional bore hole details to be shared with bidder.	The co-ordinates mentioned in the provided bore logs may be referred for location. The available data has been furnished in the tender documents.
216	SECTION – VI, PART-A SUB-SECTION-D-01	2.02.00	3 of 4	The following are in the Bidder's scope of work pertaining to construction facilities in this package. 1. Construction Water Construction water shall be arranged during all stages of construction	As Bidder's scope is limited to STGI package, Owner is requested to provide construction water at least at one point inside the plant boundary. Please confirm.	Bidder is requested to adhere to the provisions of Bid Documents.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
217	SECTION – VI, PART-D, ECC	36.05.00 point (l)	23 of 58	Compliance to all safety requirements as specified in this document. Bidders shall establish a safety centre at the start of the project itself. It shall have a 24X7 manned safety control room in addition to a permanent safety equipment display room, separate training / lecture hall with AV facilities for safety training, store room with adequate stock of specified safety equipment, a first aid room and other amenities. Bidder shall install 25 Nos. CCTV cameras at all strategic locations in the plant area which shall be linked to the safety control room.	Compliance to all safety requirements as specified in this document. Bidders shall establish a safety centre at the start of the project itself. It shall have a 24X7 manned safety control room in addition to a permanent safety equipment display room, separate training / lecture hall with AV facilities for safety training, store room with adequate stock of specified safety equipment, a first aid room and other amenities. Bidder shall install 25 Nos. CCTV cameras at all strategic locations in the plant area in a phased manner as per the work demand which shall be linked to the safety control room.	Noted
218	SECTION – VI, PART-D, ECC	36.05.00 point (m)	23 of 58	Compliance to all environment and other conditions stipulated by the concerned statutory authorities while according clearance / NOC (No objection certificate) to the project. Bidder shall ensure adequate sprinkling of water by deploying water tankers to prevent the fugitive dust nuisance during construction.	Bidder shall ensure adequate sprinkling of water by deploying water tankers to prevent the fugitive dust nuisance during construction limited to bidder's scope of work. Since bidders are unaware of NOC conditions, please specify If any other requirements.	Bidder to comply with specification requirement.

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
219	SECTION – VI, PART-D, ECC	36.05.00 point (o)	24 of 58	.....In case the progress on site management plan is unsatisfactory, Employer may withhold up to 1% of the monthly running bill (for civil and site erection works) till such time the required progress is demonstrated. Incase in the opinion of Employer, bidder's actions on site management aspects is not adequate, Employer may get the relevant work executed through a separate agency and deduct the expenses incurred from Bidder's bill along with overheads @10 %.	This shall be as per Section IV; General conditions of contract (GCC) . Bidder requests to remove separate commercial clause in this section.	Bidder to comply with specification requirement.
220	SECTION – VI, PART-D, ECC	38.02.00	24 of 58	The Employer shall have a lien on such goods for any sum or sums which may at any time be due or owing to him by the Contractor, under, in respect of or by reasons of the Contract. After giving a fifteen (15) days notice in writing of his intention to do so, the Employer shall be at liberty to sell and dispose off any such goods, in such manner as he shall think fit including public auction or private treaty and to apply the proceeds in or towards the satisfaction of such sum or sums due as aforesaid.	This shall be as per Section IV; General conditions of contract (GCC) . Bidder requests to remove separate commercial clause in this section.	Bidder to comply with specification requirement.

<p align="right">KHURJA</p> <p>SUPER THERMAL POWER PROJECT (2X 660 MW)TURBINE GENERATOR AND ASSOCIATED PACKAGES Bid Document No.: THDC/RKSH/CC-9915-371</p>	<p align="center">CLARIFICATION NO. THDC/RKSH/CC-9915-371-CLRF-03</p>	<p align="center">PAGE 86 OF 95</p>
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CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
221	TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC. NO.: THDC/RKSH/C-9915-371 SUB-SECTION-A-01 OPERATING CAPABILITY OF PLANT	1.02.00	PAGE 2 OF 3	(i) The unit shall be capable of increasing the load by activating the condensate throttling, to meet the load fluctuations (whenever required). Necessary measurements & logics shall be provided for the implementation of the same.	Bidder request owner to allow alternative system as an option to condensate throttling system to meet the load requirement.	Bidder to comply specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
222	TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.: THDC/RKSH/CC-9915-371 FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	1.01.02	PAGE 5 OF 20	<p>Acceptable Shortfall Limit with LD</p> <p>For Increase in the Guaranteed Turbine Cycle heat rate in Kcal/Kwhr at 660MW under rated steam conditions at 77 mmHg(abs) condenser pressure with zero make up</p> <p>(+) 1% of the Guaranteed turbine cycle heat rate.</p> <p>For Increase in the Guaranteed Turbine Cycle Heat rate in Kcal/Kwhr under turbine throttle main steam pressure of 150 Kg/cm2(abs) and with rated steam temperature at 77 mmHg(abs) condenser pressure and zero make up at 363 MW</p> <p>(+) 1% of the Guaranteed turbine cycle heat rate.</p>	Bidder request owner to modify the limit of shortfall limit with LD for Heat rate guarantee from +1% to +2.5% in line with practice followed by major state utilities and other public sector utilities.	Please refer amendment in this regard.
223	SUB-SECTION-A-3 TURBINE GENERATOR AND AUXILIARIES	2.01.01	1 OF 10	HP turbine shall be of double casing design. Separate HP, separate IP and two separate LP cylinders OR combined HPIP and two separate LP cylinders shall be provided. HP inner cylinder, IP cylinder and LP cylinders shall be horizontally/vertically split as per standard practice of turbine manufacturer.	Bidder understands that bidder can decide the number of LP cylinders to be provided. Owner is requested to confirm.	Specification requirement are clear. Bidder to comply specification requirement.
	SUB-SECTION-A-3 TURBINE GENERATOR AND AUXILIARIES	1.01.01	1 OF 92	The steam turbine shall be tandem compound, single reheat, regenerative, condensing, multicylinder design with separate HP, separate IP and separate LP casings OR combined casings for HP-IP and separate LP casings, directly coupled with generator suitable for indoor installation.		
<p align="right">KHURJA</p> <p>SUPER THERMAL POWER PROJECT (2X 660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES Bid Document No.: THDC/RKSH/CC-9915-371</p>				CLARIFICATION NO. THDC/RKSH/CC-9915-371-CLRF-03		PAGE 88 OF 95

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
224	TECHNICAL SPECIFICATION SECTION – VI, PART-B SUB-SECTION-D-01 CIVIL WORKS	5.07.02 Civil Works for Fire Detection & Protection System in Ground Floor/ Paving	PAGE 24 OF 142	At road/rail/ drain crossings of fire water pipes, the fire water pipes shall be provided with minimum 200mm thick PCC encasement all around the pipe.	Since, Hydrant and Spray system is not in bidder scope for this tender/package, hence, bidder understands that PCC encasement for fire water pipes at road/rail/drain crossing is not applicable for this tender. Please confirm bidder's understanding.	Bidder to refer the scope and tender drg being issued as an amendment in this regard.
225	SECTION – VI, PART-B SUB-SECTION-D-01	8.01.02.7	52 of 142	In Main plant area wherever fire water pipe trenches are envisaged, these trenches shall be of RCC and provided with precast RCC cover flush with finished level of paving in that area.	Since, Hydrant and Spray system is not in bidder scope for this tender/package, hence, any civil works for fire water piping shall not be in bidder's scope. Please confirm.	Bidder to comply specification requirement. Further bidder to refer the tender drg. being Issued as an amendment in this regard.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
226	TECHNICAL SPECIFICATION SECTION – VI, PART-B SUB-SECTION-D-01 CIVIL WORKS	5.07.02 Civil Works for Fire Detection & Protection System in Ground Floor/ Paving	PAGE 24 OF 142	Each of the outdoor deluge valve and accessories shall be provided with housing comprising of Brick wall and RCC roof.	Since, Hydrant and Spray system is not in bidder scope for this tender/package, hence, bidder understands that referred clause for deluge valve and accessories is not applicable for this tender/package. Owner to please confirm.	Bidder's understanding is correct that LP Dosing system is excluded from bidder's scope. Noted.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
227	TECHNICAL SPECIFICATION SECTION – VI, PART-A	2.04.00 TERMINAL POINTS & EXCLUSIONS	Page 2 of 6	Bidder to provide required Stub connections in condensate, Boiler fill and feed water pipelines for connection of Boiler Feed water chemical dosing (both AVT & Oxygenated treatment) system piping by SG vendor	Due to non clarity , bidder understands that the LP dosing system and equipments is excluded from bidder's scope.	Bidder's understanding is correct that LP Dosing system is excluded from bidder's scope. Noted.
	TECHNICAL SPECIFICATION SECTION – VI, PART-E	9915-999-POM-A-010 & 9915-999-POM-A-009 Flow Diagram	Page 22 of 23	Only stub connections for O2 and Ammonia dosing system are shown for TG package scope	Bidder will considered stub connections in line with referred flow diagram 9915-999-POM-A-010 & 9915-999-POM-A-009.	
	TECHNICAL SPECIFICATION SECTION – VI, PART-B	1.08.03 SUB-SECTION E-1 STEAM TURBINE GENERATOR	-	(a) Pumps of chemical doing system shall be performance tested as per relevant international codes. (b) In case of diaphragm type of pumps, the life cycle test shall be done on pumps. If this test is already conducted for same model in earlier projects of NTPC, then TCs for same shall be reviewed. (c) Dosing skid shall be subjected to leakage test and functional test.	Please confirm bidder's understanding.	

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

228	SECTION – VI, PART-B; SUB SECTION-A-2	1.02.00 (h) (4)	2 OF 12	<p>For each transformer a pit shall be provided all around at a distance of 1.5 m (minimum) from transformer outer edge. A sump pit shall be provided for each pit. A common oil retention pit per unit shall be provided to hold oil quantity of the largest transformer (by volume) & 10 minutes of water quantity of HVV spray system for the largest transformer. Sump pit of individual transformer shall be connected to common oil retention pit of that unit.</p> <p>The oil soak pit, if provided, shall be filled with gravel of size 40mm. The volume of the soak pit shall be sufficient to store complete oil of the transformer/reactor along with 10 minutes of fire water considering only 40% of the volume as available voids between gravel filling. However, in case separate Oil-water Separation pit is provided for a group of transformers/reactors, oil soak pit of volume equivalent to one-third (1/3) the oil volume of each transformer/reactor shall be provided around respective transformer/reactor. The oil soak pit shall also be provided with a sump at the corner to allow drainage of water/oil from the soak pit. The Oil-water Separation pit, in such cases, shall be designed for an effective capacity of complete oil of one transformer having highest volume of oil along with 10 minutes of fire water. There shall be one Oil-water Separation pit for each generation unit in transformer yard area.</p>	Two different philosophies have been indicated in the referred clauses. Bidder understands that either of the philosophies may be adopted during detail design. Please confirm.	Provisions of technical specification at 5.08.00 provides for two options that may be adopted for i) individual transformers (for which individual soak pit to store complete oil along with 10 minutes firewater to be provided) at offsite areas ; ii) Group of transformers (for which soak pit of 1/3 oil volume of individual transformer along with one separate oil-water separation pit to be provided) like in transformer yard area. Options may be adopted as per location/numbers and capacity of transformers. However, Clause 1.02.00(h)4 specifies the requirement for a group of transformers. Moreover, " Common oil retention pit" means ' Oil- Water separation pit' as mentioned in Clause 5.08.00.
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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
229	SECTION – VI, PART-B; SUB-SECTION-D-01	5.02.01(iii)	11 of 142	In front of the power transformers, RCC fire barrier wall shall be provided as per functional requirement in lieu of brick wall at A-row. The above mentioned RCC wall shall be attached with single skin metal sheet on external face.	Bidder shall be given the option of locating the RCC fire wall either around the transformers or along A row based on the layout and functional requirement.	Bidder is requested to adhere to provisions of technical specification
230	SECTION – VI, PART-B; SUB-SECTION-D-01	5.03.01.06	17 of 142	Minimum Reinforcement in all elements of liquid retaining / conveying structures shall be 0.24 % of cross sectional area. Minimum tensile Reinforcement in each direction for all foundation slabs / rafts shall be 0.2% of cross sectional area.	Min. reinforcement requirements shall govern by IS 456 / IS 3370 as the case may be.	Bidder is requested to adhere to provisions of technical specification
231	SECTION – VI, PART-B; SUB-SECTION-D-01	5.06.02	22 of 142	All access roads to all buildings / facilities / structures, road approaches / connections, access roads to liquid fuel storage areas and other equipment areas where access is necessary from inspection, operation and maintenance point of view and all roads inside the switchyard shall be single lane roads.	Bidder understands that roads around Fuel storage areas and Switchyard are not in Bidder's scope.	Bidder is requested to refer amendment to Technical Specification
232	SECTION – VI, PART-B; SUB-SECTION-D-01	6.03.13.c	33 of 142	All trestles shall be provided with continuous walkway of minimum 600mm width with hand-rails and toe-guards all along the length of the trestle along with approach ladders near roads, passageways, etc.	Bidder understands that this walkway shall be provided for trestles supporting cable trays only.	Walkway of minimum width 600mm shall be provided along the Cable Trays supporting floor of the pipe/cable galleries. Bidder is requested to refer clause 5.02.03 of Part B Sub Section D-01 of Technical Specification

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
233	SECTION – VI, PART-B; SUB-SECTION-D-02	7.02.04	46 of 142	Method of Installation & Technical compliance - Dia of column (D) = 900mm	Understood that installation of stone column can be done either by vibro floatation or rammed technique. Considering subsoil conditions at site, achieving 900mm dia. stone column by rammed technique throughout the improvement depth seems quite difficult. Owner is requested to review method of installation.	Bidder has option of carrying out ground improvement either by vibrofloatation without water jetting or by rammed method. Bidder is requested to adhere to provisions of technical specification
234	SECTION – VI, PART-B; SUB-SECTION-D-03	7.02.04	46 of 142	Method of Installation & Technical compliance - Depth of ground improvement (d) = 6m	As per treatment scheme proposed, depth of treatment shall be 6m below EGL. However, it is understood that subsoil below 5m to 6m reflects medium dense to dense sand (Field N~14 to 23). If soil is denser to penetrate during rammed method of installation, Is it ok to terminate column by considering set criteria before 6m depth? Kindly confirm.	Bidder is requested to adhere to provisionsg of technical specification

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Sr. No.	Section / Part / Chapter / Volume	Clause No.	Page No.	Bid specification	Bidder's Query	Employer Clarification
235	SECTION – VI, PART-B; SUB-SECTION-D-05	7.02.04	46 of 142	Method of Installation & Technical compliance - Case:2 Ground improvement with piling provision after it Dia of column (D) = 900mm Spacing = 4D (Rectangular pattern) Depth of ground improvement (d) = 6m	Case 2: In case of ground improvement with piling option, the sequence of installation (piling & ground improvement) shall be different for both installation methods to avoid installed pile damage and avoid penetration issues. Please clarify the same.	Sequence may be decided by contractor based on the method of ground improvement opted.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
1	VI Part A	A-1 Provenness	Format		Format for filling the details of Provenness	Bidder request owner to remove these formats for bought out items for filling provenness details for, as bidder shall submit these details during execution.	Bidder to comply specification requirements.
2	G	Technical Datasheet			Elaborate list of data to be filled in datasheet	Bidder requests that only Essential Data may be asked for submission along with the bid. The elaborate datasheet as per part G of tender specification may be asked for submission only during contract execution stage and not at tender stage.	Bidder to comply specification requirements.
3	SECTION -VI, PART-A	Mandatory Spares	3	59 of 59	In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities generally in line with the approach followed in the above list.	<p>Bidder request customer to clarify that following note shall not be applicable to spare requirement where there is option of "if applicable" or "as applicable" in spare requirement itself as mentioned and if the functionally equivalent spare is already offered at some other place. This shall prevent duplicity in spares offering.</p> <p>Bidder requests customer to accept bidder's proposal.</p>	Refer amendment in this regard.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
4	Section VI, A	A-2, General	1.03.00	1 of 3	<p>First Fill of Consumable, Oils & Lubricants All the first fill and one Year's topping requirements of consumable such as greases, oil, lubricants, servo fluids/control fluids, gases (excluding H2, CO2 and N2 for Generator) and essential chemicals etc. which will be required to put the equipment covered under the scope of specifications,</p> <p>.....Bidder shall also supply a quantity not less than 10% of the full charge of each variety of lubricants, servo fluids, gases, chemical etc. (as detailed above) used which is expected to be utilized during the first year of operation.</p>	<p>Bidder understands that 10% of full charge is for the purpose of utilization during first year of operation, accordingly we request to modify the clause as below:</p> <p>.....Bidder shall also supply a quantity not less than 10% of the full charge of each variety of lubricants, servo fluids, gases, chemical etc. (as detailed above) used which is expected to be utilized during the first year of operation.</p> <p>Bidder further clarifies that consumables like ion exchange resins, filter media considered only for first fill and no one year's topping requirements of such consumables.</p>	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
5	VI Part A	Functional Guarantees & Liquidated Damages	1.01.02 (IV)	6 of 20	For deficiency in Average Condenser pressure in mm Hg(abs) measured at 300mm above top row of condenser tube at 693 MW, 0% makeup , design CW temperature and design CW flow.	There is a discrepancy in the Make up water (%) for design case & guarantee case as mentioned, please clarify which is to be considered.	Bidder to comply the specification requirement. For Condenser design 3% make up shall be considered while for Guarantee condenser pressure 0% make up shall be considered.
	VI Part B	A-3	2.02.00 (a)	33 of 92	The Condenser shall be designed for heat load corresponding to valve wide open (VWO) condition, 3% makeup and guaranteed condenser pressure and conditions given at Annexure-II of this sub-section		
	VI Part B	A-3	1.22.01	22 of 92	d) 693 MW output at 0% make-up , design CW temperature and CW flow (CONDENSER PRESSURE GUARANTEE CONDITION		
6	VI	A	1.03.01	41/100	<p>Noise</p> <p>All the plant, equipment and systems covered under this specification shall perform continuously without exceeding the noise level over the entire range of output and operating frequency specified in General Technical Requirement, Part-C Section-VI of the technical specifications.</p> <p>Noise level measurement shall be carried out using applicable and internationally acceptable standards. The measurement shall be carried out with a calibrated integrating sound level meter meeting the requirement of IEC 61672-1 and IEC 61672-2 (latest edition).</p> <p>Sound pressure shall be measured all around the equipment at a distance of 1.0 m</p>	<p>Bidder would like to clarify in below mentioned statement.</p> <p>The measurement shall be carried out with a calibrated integrating sound level meter class 1 meeting the requirement of IEC61672-1:2002 and IEC61260:1995 or BS-5969 or IS:9779.</p> <p>Sound pressure level shall be measured all around the equipment at a distance of 1m from the vertical projected plan of the equipment as a whole (this shall include coupling, gear box, motor etc.) at a height of 1.5 m from floor level. Microphone positions shall be at horizontal separations of not</p>	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
					<p>horizontally from the nearest surface of any equipment/ machine and at a height of 1.5 m above the floor level in elevation.</p> <p>A minimum of 6 points around each equipment shall be covered for measurement. Additional measurement points shall be considered based on the applicable standards and the size of the equipment. The measurement shall be done with slow response on the A - weighting scale. The average of A-weighted sound pressure level measurements expressed in decibels to a reference of 0.0002 micro bar shall not exceed the guaranteed value. Corrections for background noise shall be considered in line with the applicable standards. All the necessary data for determining these corrections, in line with the applicable standards, shall be collected during the tests.</p>	<p>more than 1.5m around the equipment.</p> <p>The measurement shall be done with slow or impulse response, as the case may be on the A-weighting scale. The average of the A-weighted sound pressure level measurements expressed in decibels to a reference of 0.0002 micro bar shall not exceed the guaranteed value indicated in the specification.</p> <p>The tests shall be carried out with the equipment operating at near rated speed & load Correction for background noise will be considered Inline with ISO standard 3746 (2010) . Noise level measurement shall be recorded as per format at Appendix-VI.</p>	

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
7		A	2.03.08.02	88/100	<p>Noise level measurement shall be done around the specified equipment location in the following manner. The measurement shall be carried out with a calibrated integrating sound level meter meeting the requirements of IEC-651 or BS-5969 or IS:9779. Sound pressure level shall be measured all around the equipment at a distance of 1m from the vertical projected plan of the equipment as a whole (this shall include coupling, gear box, motor etc.) at a height of 1.5 m from floor level. Microphone positions shall be at horizontal separations of not more than 1.5m around the equipment.</p> <p>The measurement shall be done with slow or impulse response, as the case may be on the A-weighting scale. The average of the A-weighted sound pressure level measurements expressed in decibels to a reference of 0.0002 micro bar shall not exceed the guaranteed value indicated in the specification.</p> <p>The tests shall be carried out with the equipments operating at near rated speed & load Correction for background noise will be considered Inline with IS:4758. Noise level measurement shall be recorded as per format at Appendix-VI.</p>	As per above	Bidder to comply specification requirements.
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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
8	Part C		30.00.00	51/91	<p><u>NOISE LEVEL</u></p> <p>The equivalent 'A' weighted sound pressure level measured at a height of 1.5 m above floor level in elevation and at a distance of one (1) metre horizontally from the nearest surface of any equipment/machine, furnished and installed under these specifications, expressed in decibels to a reference of 0.0002 microbar, shall not exceed 85 dBA except for</p> <p>i) Safety valves and associated vent pipes for which it shall not exceed 105 dBA-115 dBA.</p> <p>ii) Regulating drain valves in which case it shall be limited to 90 dBA-115 dBA.</p> <p>iii) Mill noise which will be limited to 85-90 dBA.</p> <p>iv)TG unit in which case it shall not exceed 90 dBA.</p> <p>v) For HP-LP bypass valves and other intermittantly operating control valves, the noise level shall be within the limit of 90 dBA.</p> <p>vi)For BFP Motor Noise level shall be with in the limit of 90 dBA.</p>	<p>Bidder would like propose the following near field noise guarantee</p> <p>The equivalent 'A' weighted surface sound pressure level measured at a height of 1.5 m above floor level in elevation and at a distance of one (1) metre horizontally from the nearest surface of any equipment/machine, furnished and installed under these specifications, expressed in decibels to a reference of 0.0002 microbar, shall not exceed 85dBA except for</p> <p>i) Safety valves and associated vent pipes for which it shall not exceed 105 dBA-115dBA.</p> <p>ii) Regulating drain valves in which case it shall be limited to 90 dBA-115dBA.</p> <p>iii)TG unit in which case it shall not exceed 90dBA.</p> <p>iv) For HP-LP bypass valves and other intermittently operating control valves, the noise level shall be within the limit of 100-115dBA.</p> <p>v) For BFP Motor Noise level shall be with in the limit of 90dBA.</p>	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
9	VI Part A	Functional Guarantees & Liquidated Damages	1.00.01 (g)	2 of 20	The instruments to be used for process control shall also be used for PG test. Minimum number of instruments to be used for PG test has been identified in respective P&IDs with accuracy class meeting the code requirement. All instruments required for performance testing shall be of the type and accuracy required by the ASME PTC code. Prior to the start of the initial operation, the contractor shall get these instruments calibrated in an independent test Institute approved by the Employer. All test instrumentation, Personal computer(s), necessary server and required interface, software for on line computation of test results & report as required for PG tests shall be supplied by the contractor and shall be retained by the Employer.	Proposed data acquisition for both DCS and PG test data logger will increase the uncertainties, which cannot be estimated. This is not as per PTC 6 code. Bidder proposes to have separate PG test instruments and their data logging system as per PTC 6 code. Please accept.	Please refer amendment in this regard.
10	VI Part A	Functional Guarantees & Liquidated Damages	1.01.02	5 of 20	For Increase in the Guaranteed Turbine Cycle heat rate in Kcal/Kwhr at 660MW under rated steam conditions at 77 mmHg(abs) condenser pressure with zero make up Acceptable Shortfall Limit with LD (+) 1% of the Guaranteed turbine cycle heat rate Upper Limiting Value 1795 Kcal/Kwhr Applicable for 55% TMCR guarantee case as well	+1% limit on guaranteed HR during PG test demonstration can be above the limit specified (1795 kcal/kWh) by 1%. Please confirm. Acceptable shortfall limit is quite low and previous project specifications had it at 2.5%. Bidder proposes to keep it at 2.5%.	Specified limits for Turbine cycle heat rate guarantee is exclusive of specified shortfall limits. Regarding acceptable shortfall limit for heat rate please refer amendment.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
11	VI Part A	Functional Guarantees & Liquidated Damages	1.01.02	18 of 20	All the necessary instruments (in duplicate) required for the tests shall be furnished by the contractor so as to meet the accuracies specified in the codes.	Duplicate in not clear. Bidder proposes instrumentation as per requirement of test code. Please confirm	Please refer amendment in this regard.
12	VI Part A	Functional Guarantees & Liquidated Damages	1.01.02	18 of 20	These calibrations shall be performed in the presence of the Employer.	Contractor shall inform 7 days in advance to the employer about calibration, however cost of witnessing the test shall be borne by employer. In case, employer is not able to join the witness in stipulated notice period then contractor shall carry out the calibration in approved lab it shall be considered approved.	Bidder to comply specification requirements.
13	VI Part B	A-01 OPERATING CAPABILITY OF PLANT	1.02.00 (i)	2 of 3	The unit shall be capable of increasing the load by activating the condensate throttling, to meet the load fluctuations (whenever required). Necessary measurements & logics shall be provided for the implementation of the same.	Owner to please confirm the load increase requirement.	This shall be finalised during detail engineering.
14	VI Part B	A-01 OPERATING CAPABILITY OF PLANT	1.02.00 (i)	2 of 3	HP-LP bypass operation under rated steam conditions with bypass valve open to full capacity and turbine on house load (40MW).	Due to excessive ventilation at this condition, bidder proposes to keep this operation for maximum 30 minutes duration.	Bidder to comply specification requirements.
15	VI Part B	A-3 TURBINE GENERATOR AND AUXILIARIES	1.01.03 (a)	3 of 92	other features : The employer intends to provide a steam generator for each unit having Boiler maximum continuous rating (BMCR) of 102% of the turbine VWO steam flow requirement subject to a minimum of 2580 Tonnes/hr.	BMCR Steam flow requirement 2580 Tonnes/hr seems a typo. Error, bidder request employer to look in to & provide a specific value for this tender.	Refer amendment in this regard

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
16	VI Part B	A-3 TURBINE GENERATOR AND AUXILIARIES	1.22.01 (j)	27 of 92	198 MW output under turbine throttle inlet steam conditions corresponding to pure sliding pressure operation at condenser pressure of 77 mm Hg (abs) with 0% & 3% make-up.	As per Clause 1.02.00 (b), A-01 OPERATING CAPABILITY OF PLANT, Section VI, part B, Sliding pressure operation is from rated pressure to 40% of rated pressure. Bidder understand loads below 40% TMCR are with constant pressure operation. Please confirm	Bidder to comply specification requirements.
17	VI Part B	A-3 TURBINE GENERATOR AND AUXILIARIES	1.22.01 (t)	28 of 92	Steam generator output corresponding to BMCR flow under rated steam conditions, turbine in parallel operation with HP-LP bypass with by pass open to full capacity.	Bidder request to limit the steam generator flow to match boiler design thermal load capacity.	Bidder to comply specification requirements.
18	B	VI, Part B Sub section A4 EQUIPMENT COOLING WATER SYSTEM	1.01.00	11 of 20	The capacity of each pump shall be designed considering minimum 20 % of the TMCR Condition condensate flow and head to suit the system requirement	Bidder request that the capacity of each pump shall be designed considering minimum 12% of the condensate flow to deaerator at VWO, 1% make-up condition and head to suit the system requirement. Owner to please accept.	Bidder to comply specification requirements.
19	B	VI, Part B Sub section A3 TURBINE GENERATOR AND AUXILIARIES	1.21.00 (g)	25 of 92	...the emergency make-up shall be sized for 5% BMCR, 10% BMCR and 15% BMCR for minimum / normal /maximum flow respectively.		
20	B	VI, Part B Sub section A3 TURBINE GENERATOR AND AUXILIARIES	1.21.00(h)	25 of 92	Low Load Feed Control valve (0 to 30% BMCR capacity range) in Feed regulating station (FRS) for feed water flow control , downstream of BFPs, shall be sized with maintaining a differential pressure (DP) of 5kg/cm2(abs) during unit startup upto 30% BMCR Load.	Low Load Feed Control valve (0 to 30% BMCR capacity range) in Feed regulating station (FRS) for feed water flow control , downstream of BFPs,shall be sized with maintaining a differential pressure (DP) of 7kg/cm2(abs) during unit startup upto 30% BMCR Load.This is as per bidder practices.Owner to please accept.	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
21	B	VI, Part B Sub section A3 TURBINE GENERATOR AND AUXILIARIES	5.02.00 (m)	51 of 92	Minimum feed water storage tank capacity shall be based on 6 (six) minutes of BMCR flow (approx.) between normal operating level and low-low level with a filling factor of 0.66.	With the given specification requirements, the size of feed water tank shall be very big. Bidder thus requests to amend the requirement of filling factor from 0.66 to 0.75.	Bidder to comply specification requirements.
22	B	VI, Part B Sub section A3 TURBINE GENERATOR AND AUXILIARIES	5.02.00 (m)	52 of 92	...bidder shall carry out the transient analysis of BFP suction system considering following conditions: (c)De-aerator at low-low level ,	...bidder shall carry out the transient analysis of BFP suction system considering following conditions: (c)De-aerator at low level ,	Bidder to comply specification requirements.
23	B	VI, Part B Sub section A3 TURBINE GENERATOR AND AUXILIARIES	5.03.02 (a)	53 of 92	The design pressure of HP heaters' tube side shall not be less than maximum of the following: i) 1.05 times the maximum operating pressure (including BMCR condition) at BFP discharge. (ii) Pressure required at BFP discharge under lowest spring loaded safety valve on boiler separator blowing condition. (iii) Design pressure as required by IBR/ ASME.	The design pressure of feedwater discharge piping system downstream first isolation valve shall not be less than maximum of the following: (i) 1.05 times the operating pressure corresponds to BMCR condition at BFP discharge. (ii) Design pressure of the boiler economiser + level difference between heaters and economiser + piping pressure drop between heater and the economiser inlet. Please accept.	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
24	B	VI, Part B Sub section A3 TURBINE GENERATOR AND AUXILIARIES	6.01.00(f) (i) 4.	55 of 92	Emergency point: Two Turbine driven boiler feed pumps to be capable of generating the discharge pressure not less than steam generator highest safety valve set pressure corresponding to 105% of boiler maximum continuous rating(at 0% make up).	Emergency point: Two Turbine driven boiler feed pumps to be capable of generating the discharge pressure not less than steam generator highest safety valve set pressure corresponding to 100% of boiler maximum continuous rating (at 0% make up).	Bidder to comply specification requirements.
25	B	VI, Part B Sub section A4 EQUIPMENT COOLING WATER SYSTEM	1.01.00 (n)	12 of 20	Pump re-circulation : To be sized for a flow of about 30% - 50% of respective pump capacity.	Pump re-circulation : To be sized as per pump minimum flow specified by pump supplier or 30% of pump capacity whichever is higher.Please confirm.	Bidder to comply specification requirements.
26	Part-E	VI	9915-999-P0M-A-004	Main steam, Hot reheat & Cold reheat system P&ID	Main steam, Hot reheat & Cold reheat steam line drains are connecting to condenser flash tank.	Steam drain classification and sink destination including desuperheating shall be as per OEM standard protection philosophy. Please confirm	Bidder to comply specification requirements.
27	Part-E	VI	9915-999-P0M-A-006	Auxiliary steam system P&ID	Turbine wet steam washing is shown	Turbine wet steam washing is not applicable for the offered turbine. Employer to accept the same.	Bidder to comply specification requirements.
28	Part-E	VI	9915-999-P0M-A-009	Condensate P&ID			
29	Part-E	VI	9915-999-P0M-A-009	Condensate P&ID	Contaminated condensate line with isolation valve is shown from condensate line.	The contaminated condensate line is not applicable for bidder's design philosophy and hence not provided.Employer to confirm.	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
30	Part-E	VI	9915-999-P0M-A-009	Condensate P&ID	Individual condensate side bypass is shown for LPH1 and LPH2	Bidder clarifies that for the offered duplex heater, group bypass is provided as per proven design. Employer to accept the same.	Bidder to comply specification requirements.
31	Part-E	VI	9915-999-P0M-A-009	Condensate P&ID	PH Conductivity is shown after LPH2.	As sampling is already provided after CPU, hence additional PH conductivity analyser after LPH2 is not applicable. Employer to confirm.	Bidder to comply specification requirements.
32	Part-E	VI	9915-999-P0M-A-009	Condensate P&ID	Normal make-up and emergency make-up is shown in both the condensers shell.	Bidder clarifies that, as per standard and proven practice of bidder, make-up (normal and emergency) is provided on one condenser shell only. Employer to confirm	Bidder to comply specification requirements.
33	Part-E	VI	9915-999-P0M-A-009	Condensate P&ID	CEP suction is shown from both condenser shells including a header.	The CEP suction arrangement would be provided from any of the HP or LP side of hotwell and shall be decided during detail engineering as per the arrangement and Hotwell design. Forming a header as shown in tender drawing would deteriorate the NPSH at CEP suction and thus could damage the pump. Employer to give flexibility of design to be confirmed during detailed engineering.	Bidder to comply specification requirements.
34	Part-E	VI	9915-999-P0M-A-009	Condensate P&ID	Each condenser shell hotwell is reflected as divided hotwell	As Hotwells are provided below each condenser shell, hence divided hotwell is not applicable. Employer to confirm.	Bidder to comply specification requirements.
35	Part-E	VI	9915-999-P0M-A-009	Condensate P&ID	Flow measurement is reflected in the Condenser emergency make-up line.	Monitoring of WSC emergency make up flow to condenser is not required and thus flow orifices and transmitters shall not be provided by the bidder for emergency makeup lines. Employer to confirm.	Bidder to follow tender P&ID requirement.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
36	Part-E	VI	0000-110-POI-G-001	KKS Code guideline	KKS Code guideline	Also bidder clarifies that, KKS shall be as per bidder's standard KKS tagging philosophy.	Only general guidelines for KKS coding are indicated in this section. Bidder's standard KKS coding philosophy may be followed.
37	Part-E	VI	9915-999-P0M-A-009	Condensate P&ID		It is observed that from CEP discharge line, sampling line is shown going to SWAS wherein necessary parameters shall be measured and additionally/duplicate analyzers are also shown (pH,DO2, SA, CE, etc) on same line. Bidder proposes to provide sampling line at CEP discharge only as per OEM standard practice meeting the requirement as mentioned in Part B Appendix-I to subsection IIC-01 Contract Quantities for SWAS. Please confirm the acceptance of the same	The sampling line shown at CEP discharge in the tender P&ID is for manual grab sampling whereas the analysers shown shall be connected to SWAS
38	B	VI	APPENDIX - I TO SUB-SECTION - IIC-01 CONTRACT QUANTITIES OTHER THAN DDCMI S ITEM	11 of 15	CONTRACT QUANTITIES FOR SWAS		
39	Part-E	VI	9915-999-P0M-A-005	HP and LP bypass system P&ID	For HP bypass valve, orifice is shown separately downstream of the HP bypass valve	Employer to note that external orifice may not be required and HP bypass valve offer shall be as per supplier design. Please confirm.	Bidder to comply specification requirements.
40	Part-E	VI	9915-999-P0M-A-005	HP and LP bypass system P&ID	HP & LP BYPASS SYSTEM P&ID	HP & LP bypass warmup (including HP bypass spray) arrangement shall be as per Bidder's standard practice.Please confirm	This shall be discussed during detail engineering.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
41	Part-E	VI	9915-999-P0M-A-005	HP and LP bypass system P&ID	<u>Note-5</u> Bidder to provide suitable warming arrangement for HP & LP bypass pipings and valves as per its standard & proven practice.	HP & LP bypass warmup (including HP bypass spray) arrangement shall be as per Bidder's standard practice. Please confirm	This shall be discussed during detail engineering.
42	Part-E	VI	9915-999-P0M-A-011	Heater vent and drain P&ID	For condenser mounted LPHs, control valve is shown in the heater drain lines.	For condenser mounted LPH drains (Including LPH2), bidder may alternatively offer u-loop designed drain (common normal and emergency drain) as per his standard and proven design. Employer to confirm.	Bidder to comply specification requirements.
43	Part-E	VI	9915-999-P0M-A-011	Heater vent and drain P&ID	Deaerator vent is shown as released to atmosphere.	Alternatively bidder proposes to connect the deaerator vents to Condenser as per bidder's standard practice. Further one line open to atmosphere shall also be provided for venting during start-up (AVT).	This shall be discussed during detail engineering.
44	Part-E	VI	9915-999-P0M-A-011	Heater vent and drain P&ID	Control valves (eg. in HP Heater drip connection to HP flash tank) are shown with water sealing arrangement to meet the vacuum service requirement.	Bidder proposes to provide such control valves with deep gland packing as per control valve manufacturer's standard practice. Please confirm the acceptance of the same.	The same shall be discussed and decided during detailed engineering.
45	Part-E	VI	9915-999-P0M-A-007	Extracti on steam P&ID for heaters	Alloy steel piping shall be provided in deaerator pegging steam header downstream of NRV in Aux. steam line & CRH steam line to Deaerator	Pipe material shall be selected as mentioned in Tender specification (Part B, Section-VI, Clause no.1.04.00, Pg 3 of 23) . Please confirm the acceptance of the same.	Please refer amendment in this regard.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
46	Part-E	VI	9915-999-P0M-A-007	Extraction steam P&ID for heaters	Flowmeter + FT is shown in IP extraction to Deaerator	As per Bidder's standard practice, permanent Flow measurement on the extraction line to Deaerator is not required for any control / operation and same shall not be provided. Also, it is not recommended to provide the flow measurement as it impacts the performance of the cycle. Employer to confirm.	Bidder to comply specification requirement.
47	Part-E	VI	All applicable P&IDs	All applicable P&IDs	Stand pipe is shown for radar type Level instrument also.	Wherever bidder offers radar type of level instrument, stand pipe is not required. Employer to confirm.	Bidder to follow tender P&ID requirement. Bidder to also refer section "Mounting" under Clause No. 2.02.00, IIC-04, Part-B of specifications
48	SECTION – VI, Part-B	SUB-SECTION- IIC-06	1.01.02	1 OF 4	Two root valves are to be used wherever pressure is more than 40 Kg/cm ² or Temp>280 oC	Bidder request to update the requirement as 'two root valves are to be used wherever pressure is more than 40 Kg/cm ² or Temp>350 oC' as per general industry practice.	Bidder to follow specification requirement.
49	Part-E	VI	9915-110-P0M-A-015A	Proposed scheme for plant effluent separation in TG area	Sumps and sump pumps as shown in the drawing.	The number of sumps and sump pumps shall be optimized as per the arrangement and layout availability during the detail engineering. Request employer to accept the same.	Bidder to comply specification requirement.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
50	E		9915-999-POM-A-012	Sheet 1 of 1	STEAM DRAIN SYSTEM P&ID i) High pressure (HP) flash tank ii) Low pressure (LP) flash tank iii) Atmospheric flash tank	Bidder provides flash box concept as mentioned below as per bidder's standard practice. - Turbine internal drain flash box - Auxiliary drain flash box: - Liquid drain flash box The same configuration is being provided for recently executed super critical projects. Please confirm the acceptance.	This shall be discussed during detail engineering.
51	E	-	9915-999-POM-A-012	Sheet 1 of 1	STEAM DRAIN SYSTEM P&ID 1) Level gauge are shown on flash tanks 2) Spray line shown in flash tanks	1) As per bidder's offer, condenser flash box shall be provided, which is installed at an higher elevation with respect to maximum possible hotwell level thus no flashed condensate retention is possible in flash box. Hence no level gauge/level transmitter is envisaged. Please confirm the acceptance. 2) As per bidder's offer, spray line for liquid drain flash box is not required as only liquid drains (with no considerable flashing to vapor) are routed to liquid drain flash box. Hence the same is not envisaged. Please confirm the acceptance.	1. Bidder to follow specification requirement. 2. Bidder to comply specification requirements.
52	B	VI	1.20.00 (h)	23 of 23	Provide separate oil system with 100% redundant pumps, motors, accumulators and control cubicles etc. for both HP and LP bypass systems.	Alternatively if layout permits, combined oil system for HP & LP bypass valves as per vendor's proven design can also be provided. Please confirm the acceptance.	Bidder to comply specification requirements.
53	E	-	9915-999-POM-A-011	Sheet 1 of 1	Two stand pipes are shown for HP and LP heaters (Except for LPH#1 & 2)	No. of standpipes to be provided for HP & LP heater shall be as per bidder's proven design. Please confirm the acceptance.	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
54	Part-E	VI	9915-999-P0M-A-010	Feed water P&ID	Safety valve has been reflected in each HPH water box for group bypass option.	In case double string HPH with group bypass option is offered, for HPH water side safety, single relief valve is sufficient of each string. Employer to confirm.	Bidder to comply specification requirements.
55	VI,Part-B	SUB SECTION-A-2 LAYOUT REQUIREMENTS	1.02.0 0,a	2 OF 12	....One separate offsite control room adjacent to main CCR at operating floor in control tower to be provided for operation and monitoring of Ash handling system and Water system. So the HMI of AHP and Water system is to be located in this control room while control panels for these system shall be located near process area.	Bidder would like to clarify that in case of Coalescer type, bidder therefore requester to amend the specification accordingly as : " MOT centrifuge motor (as applicable) "	Specification requirements are clear and bidder to follow specification requirement.
56	VI,Part-B	SUB SECTION-A-2 LAYOUT REQUIREMENTS	1.02.0 0,B,ii)	2 OF 12	ii) Offsite control room adjacent to main CCR at operating floor.		
57	VI,Part-B	SUB SECTION-A-2 LAYOUT REQUIREMENTS	1.03.0 0	5 of 12	Area of unloading bays , Minimum Three (3) nos. of maintenance bays (one number at the start of first unit and two nos. between both units) shall be provided in TG building. Width of maintenance bay shall be 10.5M (minimum). Further additional bays may be provided as per system/layout requirements	Bidder understand to provide min. three (3) numbers of maintenance bays each of width 10.5 meters minimum. However location of maintenance bays can be decided as per bidder's discretion. Please confirm Bidder understanding.	One no. of maintenance bay to be provided at the start of the first unit. Further, bidder may decide the location of other two nos. of maintenance bays ensuring min. 10.5m approach of EOT crane in those two bays.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
58	VI,Part-B	SUB SECTION-A-2 LAYOUT REQUIREMENTS	1.03.0 0,33	10 of 12	Routing of pipes and cables is not permitted as cantilever to TG building outside A Row. These shall be suitably routed within TG building.	Bidder understands that 2 sets requirement is for 2 units. Please confirm.	Bidder clarification is not clear. However, Bidder to note that the option of routing out side the A row on the cantilever structure is for the tie bus duct and DG sandwich bus ducts.
59	VI,Part-B	SUB SECTION-A-2 LAYOUT REQUIREMENTS	1.03.0 0,25	8 of 12	The bidder has flexibility to route tie Bus ducts and DG Sandwich Bus ducts in side TG hall below operating floor level or mezzanine floor level or outside A -row on cantilever structure. The bus ducts shall be routed with minimum bends. In case Busducts are routed outside A-row on cantilever structure, the bidder shall provide walkway of 600 mm wide and 2100 mm clear height for maintenance.	Bidder understands that 2 sets requirement is for 2 units. Please confirm.	
60	Pipe and Cable Trestle Layout	Drawing no. 9915-999-POM-F-006	-	-	Rack/canti structure is shown in drawing		
61	VI,Part-B	SUB SECTION-A-2 LAYOUT REQUIREMENTS	1.06.0 0	12 OF 12	2 CCR + CER at Operating Floor Area Min. 1434 (12 m x 56.5 m + 21m x36m) , Space for both units.Cable Vault of equal area shall also be provided	a) As per Clause no 1.06.00,2, Min. area for CCR+CER shall be 1434 M^2. Kindly confirm Area required for separate offsite control room for operation and monitoring of Ash handling system and Water System is	a) Confirmed. For better clarity please refer tender drawing no.9915-999-POM-F-002

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
62	VI,Part-B	SUB SECTION-A-2 LAYOUT REQUIREMENTS	1.02.00,a	2 OF 12	....One separate offsite control room adjacent to main CCR at operating floor in control tower to be provided for operation and monitoring of Ash handling system and Water system. So the HMI of AHP and Water system is to be located in this control room while control panels for these system shall be located near process area.	included in above mentioned area (i.e.1434 M^2) or Not. b) Kindly Provide Area required for offsite control room for operation and monitoring of Ash handling system and Water System c) Bidder requested to provide Min area required for Unitised Prog. Room, Conference Room,C&I Eng. ENCL, SHIFT I/C ENCL,etc.	....One separate offsite control room adjacent to main CCR at operating floor in control tower to be provided for operation and monitoring of Ash handling system and Water system. So the HMI of AHP and Water system is to be located in this control room while control panels for these system shall be located near process area.
63	VI,Part-B	SUB SECTION-A-2 LAYOUT REQUIREMENTS	1.02.00,B,ii)	2 OF 12	ii) Offsite control room adjacent to main CCR at operating floor.		
64	VI,Part-A	SUB-SECTION-A-2 GENERAL	1.07.01	3 OF 3	Contractor shall prepare the model of all the facilities located in TG building (including all owners facilities) and the facilities in this package in an integrated & intelligent 3D software solution using rule-based, data centric 3D Design software. Contractor shall make a presentation on 3D model every 3 months from LOA to enable NTPC to review the progress of engineering. After the completion of engineering of respective area i.e. TG building, the corresponding complete 3D review model shall be handed over to the employer for its reference.	Bidder will provide 3D review model which include walk-through animation to owner for their reference. Owner to please accept.	Bidder to refer the ammendment in this regard.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
65	VI,Part-C	GENERAL TECHNICAL REQUIREMENTS (GTR)	8.03.04,C	15 OF 89	Contractor shall prepare the model of all the facilities located in TG building (including all facilities), and any other facility located in TG building area in an integrated & intelligent 3D software solution using rule-based, data centric 3D Design software with equipment drawings, data sheets, intelligent P&ID correlated with intelligent 3D Model, BOQ, schematics and logic diagramsetc. attached to the respective equipment / systems in the aforesaid 3D model....		
66	SECTION – VI, PART-B	SUB-SECTION IIIC-19 ELECTRIC ACTUATORS	2.11.00	3 of 4	SIL CERTIFICATION: All actuators shall be certified for SIL 2 or better.	We understand that SIL certification is required for valves (actuators) which are part of Master Fuel Trip Sub group of BMS and not applicable for actuators coming in TG scope. Please confirm	Bidder to follow specification requirement.
67	SECTION-VI, PART-A	A-3	2.01.05	2 OF 10	In case free standing blades for last stage and/or last but one stage of low pressure (LP) turbines are offered,	Bidder requests customer to clarify that on-line blade vibration monitoring system for LP Turbine is to be offered only in case of free standing blades and not to be offered for snubbed blades.	Bidder to comply specification requirements.
68	SECTION-VI, PART-A	A-3	2.02.05	3 OF 10	Steam turbine governing and protection system shall be complete with electro hydraulic governor with suitable back up as per standard practice of the manufacturer.	As per Bidder's design governing function of Turbine shall be taken care by the TG Controller. Please accept the same.	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
69	SECTION VI, PART-A	A-3	13.00.00	9 OF 10	<p>The set of maintenance and repair tools including all special tools and tackles used during the installation, commissioning, testing, calibration, modification and maintenance shall be handed over to the employer.</p> <p>In addition, one set of all special tools and tackles required for the installation, commissioning, testing, calibration, modification and maintenance of equipment(s)/ system shall also be supplied. These tools and tackles shall not be used for erection/commissioning purposes and shall be in new condition, when handed over to the Employer. These tools and tackles shall be separately packed and brought to site. A list of all such special tools and tackles shall be submitted along with the offer.</p>	Bidder proposes to supply one set of special tools & tackles for the plant. However during Erection & commissioning activities these supplied special tools and tackles will be used by the bidder and same will be handed over to the Purchaser. In case, any special tool and tackle is damaged, same shall be replaced with new one.	Bidder to comply specification requirements.
70	SECTION VI, PART-A	Mandatory Spares	15.1	7 of 59	Turbo generator rotor complete with stand	<p>Bidder request customer to clarify whether complete pedestal assembly with bearings is to be considered against mentioned clause or pedestal with Generator rotor only is to be provided.</p> <p>Further bearings for generator and exciter are already requested under Cl. IX (1) and (2) with group B mandatory Spares and hence complete requirement of pedestal assembly shall create duplicacy in spare requirement.</p> <p>Bidder therefore requests customer to remove requirement of pedestals from the mentioned spare requirement.</p>	Refer ammendment in this regard

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
71	SECTION N-VI, PART-A	Mandatory Spares	11 (iii)	14 of 59	All DC Motor : 1 no of each type & rating	Bidder would like to clarify that DC motor for DC EOP against spare requested in Cl. A, I. 10 of Group A mandatory spares already. So bidder shall not offer DC EOP motor against clause 11 (III). Bidder recommends customer to propose a general amendment accordingly for all spare motor requirement not to be offered in case of duplicacy in complete spare list requirement.	Bidder to comply specification requirement.
72	SECTION N-VI, PART-A	Mandatory Spares	19.4 (h)	25 of 59	MOT centrifuge motor	Bidder would like to clarify that in case of Coalescer type, bidder therefore requester to amend the specification accordingly as : " MOT centrifuge motor (as applicable) "	Refer ammendment in this regard
73	SECTION N-VI, PART-A	Mandatory Spares	30	10 of 59	Turbine Cylinders drain valves (complete replacement for an unit)	Bidder requests customer to clarify that actuators for drain valves are not to be offered against the mentioned spare requirement.	Specification requirement is clear in this regard. Bidder to comply specification requirements.
74	SECTION N-VI, PART-A	Mandatory Spares	34	10 of 59	Electro-hydraulic convertor assembly of Main turbine Governing system	Bidder would like to clarify that mentioned spare requirement has already been requested under Cl. I of Group B Mandatory Spares for Control and Instrumentation spares. Bidder therefore requests customer to amend the specification accordingly to avoid duplicacy.	Bidder to comply specification requirements.
75	SECTION N-VI, PART-A	Mandatory Spares	General		Spare Quantity requirement : 2 sets (Requirement for two Unit)	Bidder understands that 2 sets requirement is for 2 units. Please confirm.	The requirement is for 2 sets of total population of both the units.
76	SECTION N-VI, PART-A	Mandatory Spares	3	59 of 59	In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities generally in line with the approach followed in the above list.	Bidder request customer to clarify that following note shall not be applicable to spare requirement where there is option of "if applicable" or "as applicable" in spare requirement itself as mentioned and if the functionally equivalent spare is already offered at some other place. This shall prevent duplicacy in spares offering. Bidder requests customer to accept bidder's	Refer ammendment in this regard

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
						proposal.	
77	SECTION N-VI, PART-B	A-01	1.05.00	3 OF 3	Bidder shall furnish, within 6 (six) months from the date of placement of award / during detail engineering, following details: 3. Creep-Fatigue interaction curve for materials 5. Material data used for determining the fatigue and creep damage. 6. Code used for determining fatigue and creep along with details of its validation.	Bidder informs customer that data as requested under Sr. No. 3, 5 and 6 are proprietary and cannot be shared. Further bidder shall provided other requested documents as required in specification. Bidder request customer to accept bidder's proposal.	Bidder to comply specification requirements.
78	SECTION N-VI, PART-B	A-3	1.02.00	6 OF 92	Material Requirement The proposal shall include the schedule of materials used in turbine construction indicating chemical composition and designation of materials	Bidders Turbine component material have been established after stringent qualification process and are already proven. To respect the confidentiality bidder shall share the material details to the extent possible during execution only.	Bidder to comply specification requirements.
79	PART B	VI	1.18.00	20 of 92	(ii) Electric oil heater to heat oil to temperature not more than 65°C with possibility to cut heater elements in steps.	As per our standard practice and Vendor clarification, Oil heaters are not required in Lube oil purifier system since we are providing Coalescer type purifier. Also we are providing Tank oil heater which shall serve the purpose.	Refer amendment in this regard
80	PART A	VI	Mandatory Spares	16 of 59	Duplex filter for Jacking oil system consisting of filter elements / cartridges, O-rings, gaskets except housing	This is not applicable as per bidder's standard design since suction for JOP is coming from AOP discharge which is already passing through Lube oil filter.	Refer amendment in this regard
81	PART A	VI	Mandatory Spares	16 of 59	Jacking oil pump pressure relief valve	This is not applicable as per bidder's standard design since Pressure relief valve is integral part of pump. Spare Jacking Oil Pump is already	Refer amendment in this regard

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
						covered under Group A (a-8).	
82	PART A	VI	Mandatory Spares	10 of 59	Control fluid vapour exhauster with motor	As per our standard Design, Vapour exhauster is not required in control fluid system.	Refer amendment in this regard
83	SECTION-VI, PART-B	A-3	1.05.00 (C)	9 of 92	Ensure static & dynamic balancing of composite rotor and blade assembly.	There is a discrepancy that Bidder informs customer that in line with specification requirement against clause 1.01.03 (b) (3), Sub Section E-08, part B, only dynamic balancing shall be performed on Steam Turbine rotors. Bidder requests customer to amend the specification requirement in Sub Section A-08 accordingly.	Bidder to comply specification requirements.
84	VI	B-01	6.00.00	10 of 40	15) Generator Instrumentation A) Resistance temperature detectors (RTD) f) Interface: All the above temperature measurement devices shall be connected to DDCMIS.	As per our proven practice all the temperature measurement devices shall be connected to TG C&I part of DDCMIS through a Remote I/O panel. Bidder request to accept same.	Bidder to comply with specification requirement.
85	VI	B-01	6.00.00	10 of 40	15) Generator Instrumentation C) Rotor winding Temperature measurement and monitoring To be monitored in DDCMIS	4-20 mA transducer shall be provided to Station DDCMIS. Bidder request Owner to accept the same.	Bidder to comply with specification requirement.
86	VI	B-01	6.00.00	10 of 40	15) Generator Instrumentation D) On line water temperature Monitoring for Individual stator winding bars (Applicable for water system): Complete with all software and hardware required to detect any abnormalities in the temperature at any given generator operating point and shall be sensitive to generator loads, header flows, pressure, etc. This shall be	As per our proven practice all the temperature measurement devices shall be connected to TG C&I part of DDCMIS through a Remote I/O panel. Bidder request to accept same.	Bidder to comply with specification requirement.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
					realised in DDCMIS.		
87	VI	B-01	7.00.00	12 of 40	GAS SYSTEM (FOR HYDROGEN & WATER COOLED MACHINES) 7) Driers: Drier shall be provided with stainless steel piping.	As per Bidder standard practice SS piping within Hydrogen drier circuit and copper piping in the Refrigerant circuit has been offered. Please confirm.	Bidder's clarification is in order.
88	VI	B-01	7.00.00	14 of 40	GAS SYSTEM (FOR HYDROGEN & WATER COOLED MACHINES) 15) Portable gas analyser	Two gas analysers working in redundant mode with local display are provided on gas unit skid, also the same signals is displayed on Control cubicle panel at (located at 0.0 m) where supervision can be done during purging process. Hence Technically there is no need for additional Portable gas analyser and as per bidders standard practice Portable analyser is not offered. Bidder request customer to accept same.	Bidder to comply specification requirements.
89	VI	B-01	8.00.00	14 of 40	SEAL OIL SYSTEM (FOR H ₂ / WATER COOLED MACHINES) d) Emergency condition During short time emergency which may arise due to non availability of both AC & DC pumps, unit may be tripped and seal oil supply for such coasting down period shall be from a suitable arrangement from lubrication oil system or a damper tank. Alternatively, standard and proven practice of bidder regarding connection between seal oil system and lubrication oil system/	Bidder want to bring in note that, bidder standard and proven practice to provide triple sealing circuit with 2X100% AC and 1 X100 % DC Motor which has sufficient redundancy. Hence Damper tank is not required. Bidder request owner to accept same	Bidder to comply specification requirements.
KHURJA SUPER THERMAL POWER PROJECT (2X 660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES Bid Document No.: THDC/RKSH/CC-9915-371					CLARIFICATION NO. THDC/RKSH/CC-9915-371-CLRF-03		PAGE 25 OF 96

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
					damper tank shall also be accepted.		
90	VI	B-01	10.04.00	21 of 40	<p>10.00.00 GENERATOR EXCITATION SYSTEM Interface</p> <p>The necessary inputs and interface equipment shall be provided with Generator Excitation and Automatic Voltage Regulator for hooking up with Turbine Automatic Run up system, Electro Hydraulic Governing System and DCS for operation and control. The minimum indicative list of signals required for interfacing with DCS is enclosed at Annexure-I. Signal interface (Hardwired/Soft) shall be finalized during detailed engineering.</p>	Bidder want to clarify that all signal between AVR and TGDCS are soft signals. Bidder is requested to clarify if there is any interface between AVR and main DCS.	Specification requirement are clear at CI 10.04.00 Sub-Section B-01. Signal interface shall be finalized during detailed engineering.
91	VI	B-01	10.05.03	22 of 40	<p>10.00.00 GENERATOR EXCITATION SYSTEM</p> <p>10.05.00 Equipment design & sizing criteria Margin</p> <p>Each excitation system channel shall be designed to continuously carry currents of at least 10% above the field current</p>	<p>Bidder wants to clarify that MCR rating for generator is considered 660 MW.</p> <p>Bidder request to mention equivalent IEC standard (with applicable clause) for VDE 530-3.</p>	Specification requirement are clear at CI 10.05.03 Sub-Section B-01. MCR rating details shall be as per associated turbine details/rating.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
					requirement at generator MCR condition and higher currents for short time duty. Short time duty as mentioned above shall be on MCR base as per clause 1.14 of part III in VDE 530.		
92	VI	B-01	10.06.00	22 of 40	10.00.00 GENERATOR EXCITATION SYSTEM 10.06.00 Voltage regulator The excitation system shall be designed in such a manner that due to any fault in AVR firing circuit pulse transformer, rectifying elements in any channel etc. excitation system shall be available with its full capacity.	The firing circuit is linked with Power circuit i.e. thyristor cubicles and not control circuit. Hence, failure of firing pulse transformer will lead to non-operation of corresponding converter bridge. However with N+2 configuration in event of failure of pulse transformer (part of converter bridge) system shall be available with full capacity.	Bidder's clarification is in order.
93	VI	B-01	10.06.00	24 of 40	10.06.05 Technical features: e) Power system stabiliser (PSS): PSS shall be suitable for damping the various modes of electro-mechanical oscillations at all frequencies in the range of 0.2 to 3 Hz under varying generator loading and power system network configurations. PSS shall be adaptive to varying operating conditions with features to compute optimum stabilising signal along with suitable scheme for identifying external reactance of the generator. Facility for remote manual switch off-on along with indication shall be incorporated.	As per OEM Bidders proven practice is to provide PSS 2A/2B type. Bidder request to clarify "Automatic supervision" ,as requirement is not clear.	Technical feature requirements for PSS are clear at CI 10.06.00 Sub Section B-01. Please refer amendment in this regard.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
					Automatic supervision and blocking/switch off facility along with indications, etc. shall also be provided.		
94	VI	B-01	10.06.00	25 of 40	<p>10.00.00 GENERATOR EXCITATION SYSTEM</p> <p>10.06.05 Technical features:</p> <p>j) Follow up</p> <p>In order to avoid a sudden change in generator voltage when voltage regulation is transferred from 'Main' to 'Standby', or 'Auto' to 'Manual', a suitable arrangement shall be provided to follow up changes in 'Auto' mode along with follow up indication in Unit Control Room (UCR). An alarm and visual indication shall be provided to indicate change over from Auto channel-1 to Auto channel-2 or 'Auto' to 'Manual'.</p>	Follow-up indication is not available as per bidder's standard proven practice. Indication is provided in TG MMI.	Bidder to comply specification requirements.
95	VI	B-01	11.00.00	27 of 40	<p>FEATURES OF STATIC EXCITATION SYSTEM (If applicable)</p> <p>11.02.00 Rectifier Transformer</p> <p>a) Type Indoor, epoxy moulded dry type, 3 phase step down transformer with Thermal Class 155 (F) insulation complete with flanges and terminal lugs for connection to the generator terminals through isolated phase</p>	Bidder request customer to note that ,Transformer is normal air cooled dry type as per bidder's standard and proven practice instead of Forced cooling. Kindly confirm.	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
					bus ducts. The transformer shall conform to IEC- 60076-11. Transformer shall be provided with fans/blowers for forced air cooling however all tests and performance shall correspond to air natural cooling. Fans/Blowers (AF cooling) shall have Manual and Auto control.		
96	VI	B-01	11.00.00	27 of 40	FEATURES OF STATIC EXCITATION SYSTEM (If applicable) 11.02.00 Rectifier Transformer b) Temperature rise: 70 deg.C over an ambient temperature of 50 deg.C.	As per bidders standard & proven practice, Excitation transformer temperature rise is 90°C over an ambient temperature of 50°C. Please confirm	Bidder to comply specification requirements
97	VI	B-01	11.00.00	27 of 40	FEATURES OF STATIC EXCITATION SYSTEM (If applicable) 11.02.00 Rectifier Transformer e) Protection A set of CTs (12 nos) shall be provided in the primary and secondary of rectifier transformer for overload, metering and transformer differential protection. These CT parameters shall be finalized during detail engineering as per protection scheme. Hot spot temperature measurement in each limb of the transformer alongwith indication as well as alarm and trip contacts shall be provided.	Bidder want to clarify following: i) Total 4 CTs for each Phase ii) 1 CT at HV and 1 CT at LV for differential Protection iii) 1 CT at HV for overload protection iv) 1 CT at HV for measuring purpose Please confirm.	CT arrangement to be finalized during detailed engineering.
98	VI	B-01	11.00.00	28 of 40	FEATURES OF STATIC EXCITATION SYSTEM (If applicable)	Thyristor pulse voltage shall be as per OEM standard practice. Please confirm.	Please refer amendment in this regard.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
					11.05.00 Pulse Transformer There shall be a pulse transformer between the individual gates of the parallel connected thyristors and between the main current circuit and the control circuit. Their amplitudes shall be depending upon the trigger characteristics, approximately +3 to +20V peak against cathode.		
99	VI	B-01	13.00.00	34 of 40	STABILITY STUDIES The Contractor shall be required to carry out the detailed computer studies considering single machine with infinite bus so as to confirm the suitability of the Turbine generator and its excitation system in the grid for maintaining the power system stability under dynamic and transient conditions and tune the PSS parameters at site for all the machines. The data and worst possible conditions pertaining to Employer's system shall be discussed and finalised between Employer and the Contractor, in accordance with the system modeling techniques and depth of modeling. The Contractor shall furnish the details of simulation technique and method which he proposes to use for this purpose.	Bidder request customer to clarify the all kind simulations and study required for PSS study.	This shall be finalized during detailed engineering.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
100	B	A-3	4.01.00,ii	42 OF 92	Type test(s) to be conducted: CEP Suction Strainer	Bidder requested Customer to kindly remove the requirement of the type test for CEP suction strainers as over a period of project execution it has been established that strainers are adequately sized (minimum 5 times area) and then actual pressure drop recorded in strainers is far less than the guarantee value. Also the complete process of coordinating with CWPRS, getting the date and actually conducting the type test, results in unnecessary delay in project schedule and huge cost towards the type test of these strainers.	Bidder to comply specification requirements.
101	B	A-3	4.02.00, s	46 OF 92	The pump internals to be capable of being lifted out of casing after removal of motor and disconnecting discharge flange but not disturbing the discharge piping.	Bidder would like to clarify that the clause is applicable for vertical drip pump only. For horizontal type drip pump this clause is not applicable. Customer to confirm.	Bidder understanding is correct.
102	B	A-3	4.02.00, k	45 OF 92	Bottom of motor to be above zero meter by suitably considering the pit level and motor stool dimensions	Keeping the motor above zero meter level increases the overall shaft length of the Drip pump (If Vertical configuration is provided). Higher shaft length results in risk of higher vibration and shaft instability. Hence Bidder proposes that Drip pump motor bottom can be located below zero meter. Customer is requested to accept the proposal.	Bidder to comply specification requirements.
103	B	A-3	5.02.00, o	52 OF 92	The deaerator shall be designed such that maximum oxygen content shall be 0.005 cc/litre at Deaerator outlet measured as per ASTM D5543-09 or Indigo Carmine method at all operating conditions.	Bidder understand that Max. oxygen content at deaerator outlet shall be determined by Rhodazine D method (Developed by CHEMetrics, Inc), govern by ASTM D 5543-09 OR Indigo Carmine method govern by ASTM D 888-87. Customer to confirm the same.	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
104	B	A-3	6.01.00, u	58 OF 92	(u) Efficiency Preferably not more than 83% (hot). However, if higher efficiency is selected then the drive power requirement shall be determined with 83% efficiency only.	Bidder would like to request Customer to accept drive power requirement determined with actual pump efficiency.	Bidder to comply specification requirements.
105	B	A-3	6.08.06, b	66 OF 92	Turning Gear b) Turning gear shall be so arranged that drive gear is engaged manually by means of external lever while turbine is at rest. When steam is admitted to the turbine and its speed reaches beyond turning speed, its gear shall automatically disengage and latch in a disengaged position.	Bidder would like to clarify that the turning gear shall automatically engage and dis-engage. There is no feature for manual engagement of the turning gear when the turbine is at rest. The same is inline with the standard practice of all drive turbine OEMs. Bidder request owner to kindly accept the same.	Bidder to comply specification requirements.
106	B	A-3	6.08.07, a	66 OF 92	(a) Each drive turbine shall be provided with a complete lubricating oil system which shall provide lube oil for drive turbine, main pump, booster pump and couplings and shall also cater the control oil of governing system and turning gear oil requirements.	Alternatively bidder would like to offer separate high pressure control oil skid for the operation of the BFPT stop and control valve. Further the supply lube oil skid shall be different from the control oil skid. The complete lube oil skid and control oil skid shall be inline with the standard practice of the Bidder. Bidder request owner to kindly accept the proposal.	Bidder to comply specification requirements.
107	B	A-3	6.08.09	68 OF 92	Codes Design of drive turbines generally in accordance with API 612 and 614 except as modified here in and proven practice of the manufacturer and also generally followed in thermal power plants and testing in accordance with ASME PTC-6.	Bidder would like to clarify that the design of the drive turbines shall be in accordance with API or IEC or other standards as per manufacturers proven design. Please confirm.	Bidder to comply specification requirements.
108	B	A-3	1.10.02, c	14 OF 92	Two nos. modulating type control valves shall be provided, one discharging Surplus steam to condenser and other one for supplying extra steam to gland sealing header from steam source to maintain sealing steam header	In case of externally sealed BFP drive turbine, only one control valve shall be provided to maintain the sealing steam header pressure. Control valve for discharging surplus steam to condenser is not applicable for externally sealed	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
					pressure at a preset value.	turbine. Please accept.	
109	B	A-3	6.10.00, iii	70 OF 92	Dry running withstand capability test on one BFP and preferably with corresponding BP.	Bidder proposes that this type test requirement may please be relaxed, as over a period of mutple projects we have never seen any marks on the pump impeller casing etc after doing the dry running test. However forcibly running the pump in dry condition is not advisable unless otherwise required in case of any emergency for which the pump OEMs are already giving the confirmations. Customer may put dry running as optional and needs to be done only in case high vibration are observed while doing the pump performance testing.	Bidder to comply specification requirements.
110	B	A-3	13.01.03	85 OF 92	The Employer reserves the right to waive conducting of any or allof the specified type tests under this contract, in which case the type test charges shall not be payable for the type tests waived by the Employer.	Bidder would like to request customer to delete this clause.	Bidder to comply specification requirements.
111	B	A-3	13.01.03	85 OF 92	These reports should be for the tests conducted on the equipment same (model / type /size / rating) to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.	Bidder would like to clarify that for the same pump model (type & size), the flow, head and rating may vary. If the specfic rating of the pump fits in same model type test report of the previously conducted test shall be accepted. Customer to confirm.	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
112	B	IIIC-03	3.00.00	4 OF 5	TDBFP RELATED CONTROL & INSTRUMENTATION SYSTEM/EQUIPMENTS	<p>Bidder would like to clarify that the complete set of instrumentation for Boiler feed pumps, booster pumps, gear boxes, hydraulic coupling, motor, drive turbine and all associated accessories shall be as per standard and proven practice of the respective OEMs.</p> <p>The instrumentation requirements as defined in the technical specification clause no. 3.00.00 may please be relaxed considering the OEMs standard practice.</p> <p>Bidder request owner to kindly consider the same.</p>	Bidder to refer Cl. No. 3.01.00, SUB-SECTION-IIIC-03, TG RELATED CONTROL AND INSTRUMENTATION SYSTEM, Part-B and Cl. No. 1.01.03, ANNEXURE IIIC-02B, TG C&I CONTROL SYSTEM, Part-B of Specification in this regard.
113	B	IIIC-08	2.05.00	2 OF 6	Plug shall be of one-piece construction cast, forged or machined from solid bar stock. Plug shall be screwed and pinned to valve stems or shall be integral with the valve stems.	For the given high temperature range, the valve plug has to be with two piece construction. Customer is requested to accept the same.	Bidder to follow specification requirement.
114	B	IIIC-08	3.00.00, 2	2 OF 6	For Severe flashing/cavitation services: Body MOC: Alloy steel ASTM-A217 Gr. WC9 Trim MOC: 440 C	Customer to please note that 440C trim material is not possible for valve sizes > 6" due to its high brittleness. Hence Bidder proposes CA6NM Nitrided Trim material for valve sizes > 6" and 440C trim material for valve size <= 6". Customer is requested to accept the proposal.	Bidder to follow specification requirement.
115	B	IIIC-10	3.00.00, 24	8 OF 9	Control Valve CV test per ISA 75.02	Customer To please note that Control valve CV test shall be as per Valve suppliers proven & standard practice, for which various project references will be submitted to Owner during DDE. Customer is requested to accept.	Bidder to follow specification requirement.
116	VI, A	TERMINAL POINTS & EXCLUSIONS	5.01.00	2 of 6	Normal make-up	Request NTPC to provide TP pressure for normal make-up water.	Available Pressure shall be finalised during Detail Engg.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
117	VI, A	TERMINAL POINTS & EXCLUSIONS	5.02.00	2 of 6	Service water system	Request NTPC to provide TP pressure for service water system.	Available Pressure shall be finalised during Detail Engg.
118	VI, A	TERMINAL POINTS & EXCLUSIONS	6.00.00	3 of 6	Instrument air system	Request NTPC to provide TP pressure for instrument air system.	Available Pressure at TP Point will be around 8 Kg/cm2
119	VI, A	TERMINAL POINTS & EXCLUSIONS	6.00.00	3 of 6	Service air system	Request NTPC to provide TP pressure for service air system.	Available Pressure at TP Point will be around 8 Kg/cm2
120	VI/ PART-E VI/ PART-A VI/ PART-A	Plant Water Scheme & TP Details A-5 A-5	9915-999-POM-A-037 2.04.00 l 2.04.00 h	Sheet 1 of 1 2 of 2 2 of 2	TP 31: CPU regeneration waste to CW channel: Location as indicated in 9915-999-POM-F-006 : TP-A TP 20: CPU Neutralisation Pit effluent : Location as indicated in 9915-999-POM-F-006 : TP-A Complete Waste water collection pit and disposal system up to CW channel near CW Pump House along with piping, valves, fittings, Resin transfer waste water disposal pumps (2x100%) etc. Complete Effluent transfer system up to Ash slurry sump along with N-pit,	There is a discrepancy in TP details. With reference to tender drawing 9591-999-POM-A-037 (Plant water scheme & TP details), Bidder shall terminate CPU regeneration waste to CW channel and CPU Neutralisation Pit effluent at TP-A shown in Pipe & Cable Trestle Layout (9915-999-POM-F-006). Further piping shall be in client scope. Request NTPC to confirm the same.	In the referred clause No. 2.04.00 (h) & (i), page 2 of 2, Sub-section A-5 Part-A, the piping systems (incl. valves, fittings etc) upto respective Terminal points are in bidder's scope.
121	VI/ PART-E	P&ID Condensate Polishing Plant	9915-110-POM-A-001	Sheet 2 of 2	Analysers in regeneration vessels	Analysers for regeneration vessels shall be as per OEM practice for the specific regeneration process followed.	Bidder to follow specification requirement.
122	VI/ PART-A	II-C	9.02.00	22 of 33	01) Hydrogen Generation Plant: A) Independent Microprocessor/ PLC based control system as per manufacturer's	Hydrogen Generation Plant (HGP) Technical requirements are missing. NTPC requested to clarify either HGP is in scope of supply or	Hydrogen Generation Plant (HGP) is not included in the scope of this package. Please

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
					standard practice : 1 set	not.	refer Amendment in this regard.
123	VI/ PART-B	IIIC-09	1.00.00	1 of 10	CONTROL AND INSTRUMENTATION FOR HYDROGEN GENERATION PLANT		
124	VI/ PART-B	E-19	HYDROGEN GENERATION PLANT	1 of 1	QUALITY ASSURANCE: HYDROGEN GENERATION PLANT-TESTS		Hydrogen Generation Plant (HGP) is not included in the scope of this package.
125	VI/ PART-A	Mandatory Spares	11 iv)	14 of 59	ECW pump motor for TG auxiliaries -1 no	ACW Pumps and DMCW Pumps motor with motor bearing- 1no motor of each type and 1 Set brg of each type is already mentioned in mandatory spare list (Group A 16b, Page 7 of 59) .To avoid duplicity in the list, Bidder excluded ECW pump motor for TG auxiliaries (1 No.) from supply scope. Request NTPC to confirm.	Noted. Refer necessary amendment in this regard.
126	VI/ PART-B	A-02	1.03.00 (14)	6 of 12	Further for handling of owner's equipment/ panels/ Transformers bidder shall provide monorail beams in TG building.	Bidder requests NTPC to provide the list of monorails along with capacity and size required for employer supplied equipment in TG building.	Bidder to note that all equipment/panels/transformers of HT, LT switchgear and transformer of BMCC and its handling is under the scope of this package only, hence bidder to decide its number ,capacity and size. Same shall be submitted to owner during detailed engineering for approval.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
127	VI/PART-B	A-03	7.02.14	78 of 92	Each crane shall be controlled individually for all its motions from the control pendent panel.	Bidder understands that radio remote control is not required for EOT cranes of Boiler feed pump. Request NTPC to confirm.	Bidder understanding is not correct.Bidder to comply specification requirements.
128	VI/PART-B	A-03	7.06.00	80 OF 92	Power Supply (a) Incoming numbers: (i) Turbine Hall EOT Crane Contractor shall provide two (2) numbers 415 volts, 3 phase, 4 wire supply at operating floor near A-row column at centre of bay length. with a changeover switch in enclosure.	Bidder wants to clarify that Incoming Power supply for TG Hall EOT Crane shall be two (2) numbers 415 volts, 3 phase, 3/4 wire supply at operating floor near A-row column at centre of bay length. with a changeover switch in enclosure. Please confirm	Bidder's clarification is in order.
129	VI/PART-B	A-03	7.02.16	78 OF 92	The vertical deflection of crane girder shall not exceed 1/800 of the span. The girder shall be of box type and construction shall ensure non-accumulation of water/oil inside the box.	As per clause no. 20 of IS: 807 (2006), The maximum vertical deflection of the girder produced by the dead load. the weight of the trolley and the rated load shall not exceed 1/750 of the span of the crane (if the span of the cranes is more than 12 m), and 1/600 of the span (if the span of the crane is less than 12 m). Kindly accept the same.	Bidder to comply specification requirements.
130	VI/PART-B	A-03	7.01.00 (iv)	73 OF 92	(iv) Bridge structure (a) Vertical deflection caused by safe working load and weight of trolley in central position not to exceed 1/900 of the span.		
131	VI/PART-B	A-03	7.01.00	72 OF 92	(d) Total height of crane Top most level of crane w.r.t. the top of runway rail level shall be approximately 4.5m.	Bidder understands that Total height of crane Top most level of crane w.r.t. the top of runway rail level shall be considered based on OEM design and further minimum 75 mm clearance shall be kept as per IS 3177.	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
132	VI/PART-B	A-03	7.02.01	76 OF 92	If BFPs provided in BC Bay or are not accessible to TG hall EOT crane..... The capacity of each crane shall be 10% over and above the heaviest component/equipment (including lifting beam and slings etc., if provided) or 25 Tonne whichever is higher.	Bidder understands as , If BFPs provided in BC Bay or are not accessible to TG hall EOT crane..... The capacity of each crane shall be 10% over and above the heaviest component/equipment to be handled (including lifting beam and slings etc., if provided) or 25 Tonne whichever is higher. Please confirm	Bidder to comply specification requirements.
133	VI/PART-B	A-03	3.01.00 d)	2 OF 9	d) Motor operating through variable frequency drives shall be suitable for inverter duty with VPI insulation. Also these motors shall comply the requirements stipulated in IEC: 60034-18-41 and IEC: 60034-18-42 as applicable.	VPI Treatment / IGT is provided for motors which are to be driven by VFD. The purpose of both the methods is to strengthen the winding of the motor so that when it is driven by VFD it does not get damaged. In lower frame sizes up to 225, IGT is done & in frame sizes 250 & above VPI is done.	Reply to point (i) : Bidder to comply specification requirements
134	VI/PART-B	A-03	20.01.00	7 OF 12	VFD shall be used to drive three (3) phase squirrel cage inverter duty Induction motor with VPI insulation (Resin poor) suitable for VFD application. These motors shall be provided with insulated bearing on at least one side.	Please include IGT along with VPI treatment for motor. Insulated bearing are not required for motor frame size below 280 as per motor manufacturer recommendation. As per the recent executed projects bidder recommend to remove the same from the contract. Further insulated bearing for bearing bore size of 70 mm and above. This bore size covers motor frames of 280 and above only. Kindly accept.	Reply to point (ii) : Please refer amendment in this regard.
135	VI/PART-B	A-04	3.01.02	3 of 20	viii) Coupling -Spacer type	For Horizontal Centrifugal pump with Axially split type casing , spacer type coupling may not be offered by pump manufacturer as per their standard design. Bidder requests employer to accept other type of coupling as per standard design of pump manufacturer.	Bidder to comply specification requirements
KHURJA SUPER THERMAL POWER PROJECT (2X 660 MW)TURBINE GENERATOR AND ASSOCIATED PACKAGES Bid Document No.: THDC/RKSH/CC-9915-371					CLARIFICATION NO. THDC/RKSH/CC-9915-371-CLRF-03		PAGE 38 OF 96

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
136	VI/PART-B	A-04	3.01.02	3 of 20	xii) Pump characteristic : Non overloading type & stable	Bidder would like to clarify that pump characteristic shall be as per employer approved pump manufacturer's design.	Bidder to comply specification requirements
137	VI/PART-B	A-04	4.02.00	8 of 20	Design Secondary water inlet temperature : Not less than 36 deg. C	To optimise the design of ECW system ,design secondary water inlet temperature is considered same as design cooling water inlet temperature of main condenser. Bidder requests NTPC to confirm.	Bidder to comply specification requirements
138	VI/PART-B	A-06	2.15.01	14 of 21	The valves shall be designed for the design pressure/temperature of the system on which it is installed and in accordance with AWWA-C-504, EN-593 or any other approved equivalent standard latest edition. Fabricated steel (IS: 2062 GR. E-250B) butterfly valves instead of cast iron body valves are also acceptable for size above 300 mm nb diameter.	AWWA has issued AWWA C516 for designing Butterfly valves of sizes 2000 NB and above. Bidder would like to use the above code for butterfly valves. Please confirm.	Necessary Amendment for including " Part-B Technical Specifications for Low Pressure Piping / Chapter A6 " is being issued. Bidder to refer the same for these queries.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
139	VI/PART-B	A-07	1.00.00	1 of 3	Clear water will be routed to CW canal and contaminated water will be diverted to a plant drain sump. After oil skimming, contaminated water of this sump will be sent to waste service water sump.	Bidder understands that oil skimming of contaminated water and discharge of water to waste service water sump after oil skimming are in the scope of the Employer. Please confirm.	Technical Specification clearly indicate that for plant water/effluents generated from areas under this package, RCC pit/ sumps and associated submersible pumps, piping, fitting, valves etc., to discharge the effluent/ wash water/ blow downs etc. from RCC pit/ sump (included in bidder's scope) to Employer's Liquid Effluent Treatment (LET)/ Waste Service Water Sump (WSWS) (as applicable) are to be provided, supplied and installed by the bidder. Further, for oil contaminated water from areas under this package, suitable oil skimming arrangement shall be provided by the bidder.
140	Section VI, PART-B	SUB-SECTION-A-3	2.01.00 (b)	31 of 92	Provision of large box type screening structure with anti-vortex baffling at each hotwell connection to suction of condensate pumps.	Bidder proposes Anti-Vortex baffling at Hotwell connection of condensate pumps without any box type screening structure as per bidder standard practice. Request to accept the same.	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
141	Section VI, PART-B	SUB-SECTION-A-3	2.01.00 (e)	32 of 92	Provide suitable impingement guards or baffles on top row tubes. Similar guards for any steam or water connection to condenser. Other alternate arrangements to the satisfaction of Employer to protect top row of tubes shall also be considered.	Bidder would like to clarify that top rows of tubes shall be provided with extra thickened tubes instead of impingement guards or baffles please confirm.	Bidder to comply specification requirements.
142	Section VI, PART-B	SUB-SECTION-A-3	2.01.00 (h)	32 of 92	Tubes shall be welded type stainless steel as per ASTM-A-249-TP 316L	As per raw water analysis and percentage of chloride content Bidder proposes the ASTM-A-249-TP 304 condenser tube material. Request to accept the same.	Bidder to comply specification requirements.
143	Section VI, PART-B	SUB-SECTION-A-3	2.01.00 (h)	32 of 92	Tubes shall be.....and meeting the ASME specification for general requirements for carbon ferritic alloy and austenitic alloy steel tubes SA-450 and continuous without any circumferential joint suitable for intended duty with minimum wall thickness 22 BWG.	Bidder would like to clarify here tube wall thickness shall be average wall thickness 22 BWG (minimum).Tolerances shall be as per applicable codes. Please confirm.	Bidder to comply specification requirements.
144	Section VI, PART-B	SUB-SECTION-A-3	2.01.00 (h)	32 of 92	Corrosion allowance of minimum 3.2 mm for water boxes, tube plates and 1.6 mm for shell, hotwell and condenser neck.	Bidder request that total Corrosion allowance of tube plate including both shell and water side shall be 3.2mm. Please confirm.	Bidder to comply specification requirements.
145	Section VI, PART-B	SUB-SECTION-A-3	5.0 (e)	48 of 92	Easy for floor mounting and shell removal dismantling.	Bidder clarify that space for shell removal need not be envisaged for floor mounted heaters as heater's internals are not intended to be maintained in situ except for LP heaters in condenser neck. Please confirm.	Bidder to comply specification requirements.
146	Section VI, PART-B	SUB-SECTION-A-3	5.0 (p)	48 of 92	Corrosion allowance of 3.2 mm for each heater shell and water box.	For feed water heaters, corrosion allowance shall be 1.6 mm for shell, water box & nozzles as per manufacturer standard practice. HEI standard specify 0 mm corrosion allowance for plate thickness above 7 mm.	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
147	Section VI, PART-B	SUB-SECTION-A-3	5.01.00 (d)	49 of 92	Tubes shall be expanded hydraulically in tube sheet. Tube shall be cold bent for fabrication.	Bidder requests customer to give an alternate option of hydraulic or roller expansion of tubes also.	Bidder to comply specification requirements.
148	Section VI, PART-B	SUB-SECTION-A-3	5.01.00 (e)	49 of 92	Roller support for shell removal of all heaters except for LP heater in condenser neck and for LP heater in condenser neck roller support for heater channel during the tube bundle removal.	Roller support shall be provided however additional space for shell removal need not be envisaged for floor mounted heaters as heater's internals are not intended to be maintained in situ except for LP heater in condenser neck. Please Confirm	Bidder to comply specification requirements.
149	Section VI, PART-B	SUB-SECTION-A-3	5.01.00 (g)	49 of 92	Provision of shell attachments for supports of LPH in condenser neck and anti-flash baffles to protect the turbine from water ingress.	No condensate level maintained in the condenser neck mounted LPH's(Duplex type) shell, so there is no provision required for anti flash baffles to protect the turbine from water ingress.	Bidder to comply specification requirements.
150	Section VI, PART-B	SUB-SECTION-A-3	5.03.01 (a)	52 of 92	2X50% capacity HP heaters, horizontal and U-tube type with desuperheating, condensing and drain cooling sections.	Alternatively bidder proposes to offer 1x100% single HP Heater String with individual heater media operated with 3 Way valve bypass for optimized TG hall arrangement.	Bidder to comply specification requirements.
151	SECTION N – VI PART-B	SUB-SECTION B-0	3.11.00	6 OF 9	The battery shall be sized considering a minimum electrolyte temperature of 15 Deg C along with temperature correction factors as per relevant standard. An ageing factor of 1.25 shall be considered. The no. of cells, end cell voltage shall be considered based on the minimum and maximum voltage window and cable drop etc. as per system requirement.	We understand that aging factor 1.25 mentioned in the said clause is for Ni-Cad batteries. The aging factor for plante batteries shall be considered as 1.0 in line with IEEE 485. Owner may please confirm.	Ageing factor 1.25 shall be considered for both.
152	SECTION N – VI PART-B	SUB-SECTION B-0	3.11.00	6 OF 9	Nameplate ratings of DC motors shall be used in sizing.	Actual motor kW rating shall be considered for battery sizing instead of DC motor nameplate rating in order to avoid oversizing of battery. Please confirm.	Battery size has already been specified.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
153	SECTION – VI PART-B	SUB-SECTION-B-18	7.02.08	10 OF 13	Wooden racks for all the batteries shall be provided. These racks shall be made of good quality first class seasoned teak wood in line with CPWD specification. They shall be free standing type mounted on porcelain/hard rubber/PVC pads insulators/High impact plastic insulators.	Bidder propose to have MS racks alternative option to Wooden Racks as standard metal racks are epoxy coated, fully insulated and anti acidic, these are mechanically stronger and better than housing the cells on wooden racks sitting on a stand insulator.	MS racks shall be provided for Ni-Cd battery and Wooden racks shall be provided for Lead-Acid Battery as per the specification 3.02.07 & 7.02.08 respectively.
154	SECTION – VI PART-B	SUB-SECTION B-0	3.10.00	6 OF 9	Grounding and lightning protection for the entire power plant, switchyard and other areas or buildings covered in the specification shall be provided in accordance with IS 3043, IS 2309, IEEE 80 and IEEE 665.	Bidder understand that Grounding/Earthing for TG and other areas shall be provided in accordance with latest version of IEEE 80 , IS 3043 & IEEE 665 per guidelines laid. However, for Lightning protection as per recent regulations, IS 2309 has become obsolete. Hence Lightning protection shall be provided in accordance with new/latest version of IEC-62305 per guidelines laid. Owner to please confirm.	Bidder understanding is correct.
155	SECTION – VI PART-B	SUB-SECTION-B-05	8.04.00	21 OF 23	All the columns shall be earthed by nearby risers and earthmat grid spacing shall be maximum 10 X 10 mts..	Earth Mat grid spacing shall be decided based on soil ERT report keeping in view of maintaining step & touch potential within allowable limit. Owner to please confirm. Further MS rod diameter selection shall be based on earthing design calculation.	Bidder please note that the allowable maximum space of grid shall be 10x10M. If step & touch potential within allowable limit

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
156	SECTION – VI PART-B	SUB-SECTION-B-1	1.15.00	8 OF 15	The Bidder shall extend construction power supply from owners 11 kV Construction power ring main from maximum two locations.	Location of terminal point's where construction power shall be provided by owner required to be marked in tender GLP so that bidder can plan/estimate the construction power arrangement BOQ under main plant package. Bidder request owner to please confirm/provide the same .	Shall be informed during Detailed Engineering in transformer yard area
157	SECTION – VI PART-B	SUB-SECTION B-0	3.12.00	7 OF 9	The minimum size of DG shall be 1500 KVA. During Grid black-out condition, it shall be ensured that only the essential auxiliaries of all units are fed from Diesel generator & nonessential loads are automatically tripped.	1) Main plant DG KVA rating shall be decided during detailed engineering and based on Absorbed power load and diversity factor along with all emergency loads as per the process drives starting sequence including 10% margin shall be considered for DG sizing. Please confirm. 2) For Emergency DG set sizing , Bidder considered only emergency load power requirement for all essential auxiliaries loads applicable under main plant package scope. No Employer's load (emergency) requirement has been considered. Please confirm.	'Bidder shall provide DG set(s) with rating of 1500 KVA (minimum). Sizing of DG set of emergency supply system is excluded from bidders scope of work
158	SECTION – VI PART-B	SUB-SECTION-B-17	3.03.03	5 OF 21	Emergency DC lighting is to be provided, through self-contained DC emergency fixtures with four hours back-up duration, at strategic locations, in auxiliary/offsite buildings wherever DC supply system is not available. The fixtures shall be switched 'ON' automatically in case of failure of AC	Emergency DC lighting will be provided through self-contained DC emergency fixtures with Two (2) hours back-up duration as per manufacturer/OEM industry practice. Please confirm.	The Technical specification is clear bidder to comply Technical specification.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
					supply.		
159	SECTION – VI PART-B	SUB-SECTION-B-15	1.10.00	17 OF 36	Online moisture removal system (1 for each three phase bank) - For each GT:- Online DGA, conservator aircell rupture relay & CMS	Bidder understand that fittings (like DGA, CMS & monitoring system) shall only supplied for Generator transformers exclusively. Owner may please confirm.	Noted.Bidder to comply specification requirements.
160	SECTION – VI PART-B	SUB-SECTION-B-15	1.10.00	17 OF 36	For GT & Shunt Reactor:- -Regenerative Maintenance free Breather: Each GT & Shunt Reactor shall be equipped with Online non Carcinogenic regenerative type breather which shall regenerate silica gel automatically using moisture sensors, with suitable alarm/indication signal. OLTC conservator breather shall be provided with conventional non-carcinogenic indicating type breather.	For GT/Shunt Reactor, Bidder proposes conventional silica gel breather which also possess regenerative characteristics .	Bidder to comply specification requirements.
161	SECTION – VI PART-B	SUB-SECTION B-0	3.11.00	6 OF 9	The battery sizing shall be done based on different types of continuous and intermittent loads including motor starting (wherever applicable) under complete blackout condition, for the duration specified so as to meet the system requirement.	Bidder considers the starting sequence of DC motors as per product specific requirement for TG & SG accordingly same is considered while 220V DC battery sizing for main plant package.	Battery size has already been specified.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
162	SECTION – VI PART-B	SUB-SECTION-B-15	1.06.10	12 OF 36	M. Box/CCC/CMB shall be of stainless steel (SS-316 or better), at least 2.5 mm thick, dust and vermin proof provided with proper lighting and thermostatically controlled space heaters. The degree of protection shall be IP 55. Marshalling Box of all transformers shall be preferably Tank Mounted	Bidder understand that Common Marshalling Box of GT shall be seperately mounted and not tank mounted. For other marshalling boxes, the arrangement shall be as deemed suitable for supplier to ensure optimum dimensions and cooling of transformer.	Noted.Bidder to comply specification requirements.
163	SECTION – VI PART-B	SUB-SECTION-B-16	1.07.00	14 OF 36	For GT, the CMS processor will be installed at indoor location (Control Equipment Room) within a distance of 500 mtrs from transformer.	Bidder proposes that CMS module be installed on the tank or near the transformer to reduce interface cabling from cooler control/marshalling box. Such an arrangement has been executed in a past project. Request Qwner to kindly consider the same.	Bidder to comply specification requirements.
164	SECTION – VI PART-B	SUB-SECTION-B-15	1.06.02	7 OF 36	The GT Tank shall be Bell type, Shunt Reactor tank shall preferably be Bell type	Construction of tank ie. Bell type or conventional shall be as per Manufacturer standard/ proven design. Bidder request owner to consider the same.	Bidder to comply specification requirements.
165	SECTION – VI PART-B	SUB-SECTION-B-16(A)	3.00.00	4 OF 37	TECHNICAL PARAMETERS : 6.6 KV	Bidder understand that this is a standard technical specification . 6.6kV system volatge is not envisaged for this project as per the design philopshy and Single Line Diagram (SLD) . Please confirm our understanding.	Bidder's understanding is correct.

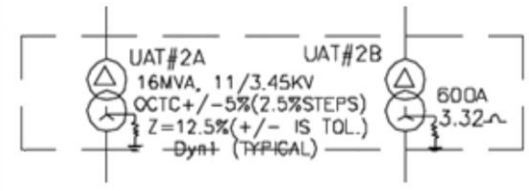
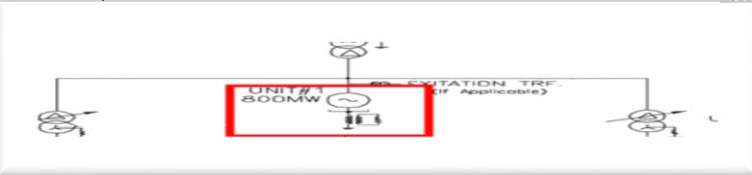
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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
166	SECTION – VI PART-B	SUB-SECTION-B-15	1.11.07	18 OF 36	ROUTINE / TYPE TESTS ON TRANSFORMERS : Oil leakage test on completely assembled transformer along with unit coolers/radiators (as per relevant clause of this sub section)	Customer may please note that Oil leakage test shall be performed on one transformer with radiators and pipework as assembled for type test and on remaining transformer the same shall be performed as assembled for routine test as per CBIP manual. The cooler units, pipe work, bushings etc. shall be separately oil leakage tested as per CBIP. Please confirm.	Bidder to comply specification requirements.
167	SECTION – VI, PART-A	MANDATORY SPARES	MANDATORY SPARES	56 OF 59	SUGGESTED LIST OF MANDATORY SPARES FOR DRY TYPE TRANSFORMER HV Bushing-1 No. LV Bushing-1 No. Neutral Bushing-1 No. Complete winding limb (HV and LV)- 1 No.	Bidder proposes and confirm the following mandatory spare requirement for DRY TYPE TRANSFORMER HV Bushing-1 No. LV Bushing-1 No. Neutral Bushing-1 No. Complete winding limb (HV and LV)-Not envisaged by Bidder.	Bidder to comply specification requirements.
168	SECTION – VI, PART-B	SUB-SECTION-B-15	1.01.00_ix)-b)	1 OF 36	<u>Generator Step up Transformer</u> b) Winding Temperature rise over an ambient of 50 deg C (irrespective of tap) 40 deg C	b) Winding Temperature rise over an ambient of 50 deg C (irrespective of tap) to be 55 deg C as per IEC -600076	Bidder to comply specification requirements.
169	SECTION – VI, PART-B	SUB-SECTION-B-15	1.01.00_ix)-a)	1 OF 36	<u>Generator Step up Transformer</u> a) Top Oil by Temperature rise over an ambient of 50 deg C (irrespective of tap) 35 deg C	a) Top Oil by Temperature rise over an ambient of 50 deg C (irrespective of tap) to be 50 deg C as per IEC -600076	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
170	SECTION – VI, PART-B	SUB-SECTION-B-15	1.11.07	19 OF 36	II) TYPE TEST (#) Short circuit test (special test) as per IEC 60076-5. In addition, For GT, ST & UT :- i) DGA & FRA shall also be conducted before & after S.C. test. ii) Physical inspection of transformer to be done before S.C. Test in presence of NTPC inspector and photographs to be taken for reference	Bidder shall submit calculation to prove the ability to withstand dynamic short circuit during detail engineering stage for GT & ST. Additionally test reports for similar rated transformer shall be submitted during detailed engineering for customer approval. Short circuit test shall not be performed physically on GT & ST.	Bidder to comply specification requirements.
171	Part E SLD	SLD	XXXX-371-999-POE-J-002	1 OF 1	Rating of Station Transformer : 120/60/60 MVA	Rating of ST (Station transformer) may be finalized based on sizing calculation in line with NTPC sizing criteria instead of specifying a minimum rating of 120 MVA. Owner may please confirm the same.	Bidder shall supply Station Transformer of rating as specified in SLD.
172	Part E SLD	SLD	XXXX-371-999-POE-J-002	1 OF 1		Rating of UT (Unit transformer) along with impedance values may be finalized based on sizing calculation in line with NTPC sizing criteria instead of specifying a minimum rating of 45 MVA. Owner may please confirm the same	Bidder shall supply UNnit Transformer of rating as specified in SLD.
173	SECTION – VI, PART-B	SUB-SECTION-B-15	1.01.00	1 OF 36	Station Trf. (ST) : Cooling : ONAN/ONAF(60/100%) (upto 130 MVA rating)	Station Transformer cooling should be ONAN/ONAF (80/100%) and not 60/100%. Owner to confirm.	Bidder to comply specification requirements.
174	SECTION – VI, PART-B	SUB-SECTION-B-15	1.07.00	14 OF 36	Various Output signals & indications from CMS shall be available in the NTPC required format (digital, analog, potential free etc).	Various Output signals & indications from CMS shall be OEM format. Please confirm.	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAU E NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
175	Part E SLD	SLD	XXXX-371-999-POE-J-002	1 OF 1		As per SLD document no. 1150-999-POE-J-002, It has been observed that UAT shown under dotted line indicating excluded from the STG Bidde scope. Bidder understand that same shall be part of STG package. Please confirm our understanding.	Bidder understanding is incorrect. UAT is not in the scope of supply of Bidder
176	PART-A,	SUB-SECTION-B-1 Annexure-A	Annexure-A	11 OF 15	Employer's Requirement which are under STG island Package " Above Employer's BOQ is tentative, which may vary during detailed Engineering. Final BOQ shall be provided during detailed Engineering "	Bidder understand that Employer's requirment mentioned under Annexure-A, Part-A, Subsection B-1 are not to exceed requirement for MV switchgear design under the scope of supply of STG package.	Bidder's understanding is correct.
177	Part E SLD	SLD	XXXX-371-999-POE-J-002	1 OF 1		Bidder understand that Generator output ng 800 MW erroneous mentioned in the D instead 660 MW. Please confirm.	Refer amendment in tender SLD

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
178	Part E SLD	SLD	XXXX-371-999-POE-J-002	1 of 1		<p>Items showing under dotted line excluded from TG bidder scope. Bidder understands that 11kV power supply feeder to Boiler service transformer shall be TG bidder scope. Please confirm.</p> <p>Bidder request NTPC to please clarify and confirm the following.</p> <ol style="list-style-type: none"> 1. As per scope demarcation, Boiler service transformer is in TG bidder scope and for the same transformer rating (dry type) of 2500kVA is fixed and not vary during detailed engineering . Please confirm. 2. Supply , laying and termination of 11 kV HT power cable to the input of the Boiler service transformer shall not be STG bidder scope. 3. Bidder understand that 415 V Boiler unit service switchgear shall not be in TG bidder scope. Accordingly , supply , laying and termination of 415V LT power cable to the 415V boiler service switchgear shall not be STG bidder scope. 	Bidder understanding is correct. Only Boiler Service transformer of specified type and rating , is in Bidders scope.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
179	Part E SLD	SLD	XXXX-371-999-POE-J-002	1 of 1	11kV Unit switchgear : 11 KV loads details for SG package required. 3.3kV Unit switchgear : 3.3 KV loads details for SG package required.	<p>Bidder understands that there are various SG package loads such as PA Fan, ID Fan, FD Fan, Mill motors e.t.c which are required to fed from 11 kV & 3.3 kV unit switchboard under the scope of STG Package.</p> <p>In view of the same , bidder request owner to please provide the HT consumer list applicable for SG package clearly indicating voltage, rating, type , shaft power, power factor, efficiency etc. for 11 kV & 3.3 kV unit switchgear design under the scope of STG package.</p>	Shall be provided during detailed engineering
180	Part E SLD	SLD	XXXX-371-999-POE-J-002	1 of 1		<p>As per SLD document no. XXX-999-POE-J-002, it has been observed that 220V DC loads of SG package required to fed from main plant 220V DCDB under the scope of STG package. In view of the same, Bidder request Owner to please provide the 220V DC loads of SG package so that same is considered for Main plant battery sizing.</p> <p>Furthermore, Bidder understands that 220V DC cable from 220V Main plant TG DCDB to 220V SG DCDB is not in STG bidder scope.</p>	Battery sizing is not in Bidders scope. Battery size has already been specified for main plant battery. Bidder understanding is correct Cable for SG DCDB is excluded from Bidders Scope.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
181	Part E SLD	SLD	XXXX-371-999-POE-J-002	1 of 1		<p>As per SLD document no. XXX-999-POE-J-002, Bidder requests Owner to please clarify & confirm the follolwing.</p> <p>1. As per SLD, Main plant DG KVA rating mentioned as 2000kVA. However, as per SECTION – VI/PART-B,/SUB-SECTION B-0/ clause no. 3.12.00 , the minimum size of DG shall be mentioned as 1500 KVA. Please clarify.</p> <p>2. Bidder observed that there are 415 V Emergency power requirement fo applicable for SG package which are required to be fed from 415V turbine unit emergency switchgear under the scope fof STG package.</p> <p>In view of the same , bidder request owner to please provide the 415V consumer list (Emegency) applicable for SG package clearly indicating voltage, rating, type , shaft power, power factor, efficiency etc. for 415V turbine unit emergency switchgear design under the scope of STG package.</p>	Refer amendment
182	SECTION – VI, PART-A`	SUB-SECTION-B-1	1.08.00 (20)	7 OF 15	Design and preparation of equipment layout for all HT, LT switchgear(Including BMCC), Transformer yard, DG set layout, all Busduct layout (including BMCC) etc. under his scope of area.	Bidder request owner to please arrange to provide the BMCC room area requirement along with BMCC room layout as same is required to housed in TG Building under the scope of STG package.	BMCC area has been indicated in the drg.9915-999-POC-F-001, 9915-999-POM-F-002 & layout chapter Part B Chapter A-2, Clause
KHURJA SUPER THERMAL POWER PROJECT (2X 660 MW)TURBINE GENERATOR AND ASSOCIATED PACKAGES Bid Document No.: THDC/RKSH/CC-9915-371					CLARIFICATION NO. THDC/RKSH/CC-9915-371-CLRF-03		PAGE 52 OF 96

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
							no. 1.06.00
183	SECTION – VI, PART-A`	SUB-SECTION-B-1	1.10.00	7 OF 15	<p>1) Design, engineering, preparation of layout drawing and installation of below ground, above ground earthing and lightning protection for the complete buildings and equipments in the Contractor's scope.</p> <p>2) Interconnection of Earthmats under the scope of Contractor.</p>	<p>1) Bidder requests owner to please provide the Soil ERT report for the underground earth mat design under the scope of STG package.</p> <p>2) Bidder understand that interconnection of STG package earth mat to earth mat of SG area and all other applicable area is excluded from STG bidder scope.</p>	<p>1. Soil ERT report is in bidder's scope.</p> <p>2. Earth mat of STG area and its interconnection with all other area is in bidder's scope.</p>
184	SECTION – VI, PART-B	SUB-SECTION-B-17	4.07.01	12 OF 21	Lighting Mast shall be of continuously tapered polygonal cross section hot dip galvanised. The Mast shall be of 30 M or suitable height.....	Bidder proposes to envisage Lighting cum Lightning Mast for all applicable areas covered under the scope of Bidder.	Lighting mast shall have lightning protection. Bidder to refer clause no. 3.08.00, sub-section B-0, Section VI, Part B of technical specification wherein requirement of lightning protection is clearly indicated. Bidder to comply with the requirement of technical specification.
185	SECTION – VI, PART-B	SUB-SECTION-B-05	3.10.01	7 OF 23	The welding receptacles shall be provided with RCCB/RCD of 30mA sensitivity having facility for manual testing/checking of operation of RCCB/RCD	Bidder clarifies that welding receptacles shall be provided with RCCB/RCD of 100mA sensitivity to avoid nuisance tripping.	The Technical specification is clear bidder to comply Technical specification.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
186	SECTION – VI, PART-B	SUB-SECTION-B-05	4.04.04	10 OF 23	Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every one metre.	Bidder inform that HV and LV Power single core cable shall be laid in trefoil formation with 2D gap (where 'D' is the diameter of cable) as per general industrial practice.	The Technical specification is clear bidder to comply Technical specification.
187	SECTION – VI, PART-B	SUB-SECTION-B-05	4.04.04	10 OF 23	Fibre Optical cable shall be laid in trenches/trays or as decided by Employer.	Bidder confirms that Fiber Optical cable shall be laid in GI conduits only.	As suggested by the Bidder the Fiber Optical cable shall be laid in GI conduits which in turn shall be laid in trays/trenches.
188	SECTION – VI, PART-B	SUB-SECTION-B-05	2.01.02	2 OF 23	In transformer yard cables shall be laid in overhead trestle. The main cable routes coming out from Main plant building and crossing the Transformer yard shall be laid in overhead trestles. In transformer yard, trestle height for rail/road crossing shall be suitable for movement of Generator Transformer with bushing.	Bidder clarifies that transformer yard cable shall be laid in overhead cable tray or trench based on system requirement and layout.	The Technical specification is clear bidder to comply Technical specification.
189	SECTION – VI, PART-B	SUB-SECTION-B-7	7.01.07	3 OF 11	Seal off bushing Shall be provided at the generator end of busducts, VT & SP cubicle, LA & VT cubicle and NG cubicle and Excitation Transformer Cubicle (incase it is provided).	Bidder understand that Seal off bushing shall be provided at the generator end of busducts. Same shall be envisaged in VT & SP cubicle or LA & VT cubicle, NG cubicle and Excitation Transformer Cubicle only if it is not considered in cubicles.	Bidder to comply specification requirements.
190	SECTION – VI, PART-B	SUB-SECTION-B-7	7.01.07	3 OF 11	Wall Frame Assembly : Shall be provided wherever bus-duct penetrates plant walls. Expansion bellows Neoprene or metallic expansion bellows shall be provided on enclosures for thermal expansion, vibrations and misalignment. To be provided at terminations and as required.	Bidder clarifies that gasketing as per OEM standard shall be provided.	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
191	SECTION – VI, PART-B	SUB-SECTION B-06	32.01.00	33 OF 62	Three phase Bus trunking system conforming to IEC 61439-6 / IS 8623 (Parts 1 & 2) shall be provided for connecting the Main and Standby DG sets to Unit Emergency Switchgears	Bidder clarifies that for DG set termination Three phase Bus trunking system conforming to IEC 61439-6 / IS 8623 (Parts 1 & 2) OR NSPBD shall be provided for connecting the Main and Standby DG sets to Unit Emergency Switchgears.	Technical specification is clear and shall be complied with.
192	SECTION – VI, PART-B	SUB-SECTION-B-7	7.01.01		Enclosure: Suitable covering shall be provided on the slit to allow escape of hydrogen and avoid dust entry inside the common chamber.	Bidder clarifies that suitable covering shall be provided on the slit to allow escape of hydrogen and avoid dust entry inside the common chamber or as per the suitable adapter box design as per OEM industrial practice in other NTPC previous projects.	Bidder to comply specification requirements.
193	SECTION – VI, PART-B	SUB-SECTION B-06	4.12.00©	11 OF 62	A full-height vertical cable alley of adequate width shall be provided for power and control cables. Cable alley shall have no exposed live parts and shall have no communication with busbar compartment. Cable terminations located in cable alley shall be designed to meet the Form 4b as per IEC 61439 for safety purpose	Bidder understands that Form 4b type construction shall be applicable for PMCC & MCC only. However, ACDB, MLDB, Welding DB etc. shall comply with Form 3b type construction.	Form 4b type construction shall be applicable for all switchboards(i.e..PCC,MCC ,ACDB,DCDB,MLDB,Welding DB)
194	SECTION – VI, PART-B	SUB-SECTION B-06	5.00.00	13 OF 62	PROTOTYPE PANELS In order to establish the compliance with the requirements of this technical specification, prototype panels shall be made and offered for the Employer's inspection and approval before the start of bulk manufacturing of panels for this project. The exact configuration of such prototype panels shall be finalized during detailed engineering.	Prototype panels are not envisaged since the Switchgear manufacturers shall be reputed make and shall furnish relevant type test reports for Owner approval. Owner to accept the same.	Prototype panels shall be made and offered for the Employer's inspection and approval before the start of bulk manufacturing of panels.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
195	SECTION – VI, PART-B	SUB-SECTION B-06	21.04.00	26 OF 62	<p>Ammeters provided for motor feeders (for motors of rating $\geq 30\text{kW}$ & $< 100\text{kW}$) shall have a compressed scale at the upper current region to cover the starting current up to 6.0 times the CT primary current.</p> <p>All motor feeders of rating $\geq 30\text{ kW}$ and $< 110\text{ kW}$ shall be provided with Multifunction Digital Energy Meter with communication facility to display the current, voltage, power factor, power energy related data locally as well as communicate these for remote metering/audit/analysis purposes.</p>	Bidder clarifies that separate Ammeters are not envisaged since MFM for motor feeder of rating $\geq 30\text{ kW}$ and $< 110\text{kW}$ shall be considered.. Owner to accept the same.	Please refer amendment.
196	SECTION – VI, PART-B	SUB-SECTION-B-14	4.10.00	3 OF 15	The DG set shall be capable of starting largest size of emergency 415 V drive (motor) having starting KVA/rated KW ratio of 8 (higher if starting current is more than 8) and starting power factor of 0.2 with terminal voltage drop being restricted to 15%. Generator loading before starting of this motor shall be considered as 50% of generator rating.	Bidder understands that DG set shall be capable of starting largest size of emergency 415 V drive (motor). However starting KVA/rated KW ratio and starting power factor shall be considered as per motor datasheet with terminal voltage drop being restricted to 15%	Bidder to comply technical requirement.
197	SECTION – VI, PART-B	SUB-SECTION-B-14	12.01.02	14 OF 15	<p>Load Test</p> <p>The engine shall be given test run for a period of at least 6 hours. The set shall be subjected to the maximum achievable load as decided by Project Manager without exceeding the specified DG set rating.</p>	Bidder clarifies that fuel supply for DG set during load test shall be free issued by Customer	It is in bidder's scope . I

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
198	SECTION – VI, PART-B	SUB-SECTION-B-14	8.02.00	8 OF 15	A day oil tank of 990 litres fuel capacity shall be provided, mounted on fabricated steel platform outside the acoustic enclosure. The tank shall be complete with level indicator marked in Litres, two nos. of level switches, filling inlet with removable screen, an outlet, a drain plug, an air vent and necessary piping.	Bidder proposes that as per standard design/practice , 990 ltrs capacity tank shall be floor-mounting type and no platform is not required to be considered. Please confirm.	Bidder to comply technical requirement.
199	SECTION – VI, PART-B	SUB-SECTION B-0	7.05.00	9 OF 9	Diesel generator shall also be kept ungrounded (earthing through PT).	Diesel generator solidly grounded is envisaged. Owner to confirm the same.	Bidder shall comply with requirement os technical specification
200	VI	B-3	2.10.00, C	3	Sequential marking of length of the cable in metres at every one metre -To be embossed / printed	Bidder proposes sequential marking shall be printed only. Kindly confirm.	Noted.
201	VI	B-3	2.14.01, C	3	Short Circuit Withstand Capacity: For a fuse protected circuit, cable should be sized to withstand the letout energy of the fuse.	Bdder proposes for fuse protected circuits, minimum 2.5 sq. mm conductor cross section shall be considered.	Bidder to comply technical requirement.
202	VI	B-4	2.14.02	3	All cables shall be armoured type.	Bidder proposes Un armoooured cables since, we are laying all cables in the cable trays; therefore we do not foresee the requirement of armoured cables for additional mechancial strength and protection.	Bidder to comply technical requirement.
203	VI	B-5	3.02.01	4	Cable tray support system shall be pre-fabricated out of single sheet as per enclosed tender drawings.	Bidder proposes MS angles and channel supports shall be fabricated at site based on design requirement.	Bidder to comply technical requirement.
204	SECTION – VI, PART-B	SUB-SECTION-B-17	10	7 OF 21	Lighting panels shall be powder coated with color shade RAL9002. Lighting panels shall have min. IP55 degree of protection	Bidder understands that the degree of protection of LP for outdoor shall be IP55 while for indoor LP shall be IP 42.	Bidder to comply technical requirement.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
205	SECTION – VI, PART-B	SUB-SECTION-B-17	10	8 OF 21	Programmable Digital Timer shall be Electronic Astronomical Almanac Time switch with battery back up of min. TEN years, 4 Digit LED display, 24 hours range, manual override facility, 10 Amp 3 relay output, with NO/NC Contacts suitable for operation on 240V single phase AC supply.	Conventional 24 hour timer or photocell shall be considered. Owner to accept the same.	Bidder to comply technical requirement.
206	SECTION – VI, PART-B	SUB-SECTION-B-17	4.12.00	13 OF 21	The sensors shall be recess mounted, programmable type suitable for lighting load of 6A with variable off delay settings. The detection area shall be minimum 5 metres for standard room height of 3mt.	The sensors shall be recess mounted, programmable type suitable for lighting load of 6A with variable off delay settings. The detection area shall be maximum 5 metres for standard room height of 3mt.	The intent is that the detection area shall be at least 5 m from sensor.
207	SECTION – VI, PART-B	SUB-SECTION-B-7	7.02.13	6 OF 11	Phase to phase : 100 mm (for 6.6KV)	Bidder clarifies that MV voltage level of 6.6KV is not applicable. Further 6.6KV is mentioned at other places too and shall not be applicable.	Noted
208	SECTION – VI, PART-B	SUB SECTION B-06	1.01.01	1 OF 62	For Main Plant (TG & SG areas) and Service Building, each Lighting DB shall have 1X100% transformer. For all other areas, each Lighting DB shall have 2X100% transformers.	Bidder clarifies that Lighting in other area apart from TG & SG area shall be fed from near by AC Main Lighting Distribution Board (MLDB) shall have 1X100% Transformers.	For other than SG & TG areas, each Lighting DB shall have 2X100% transformers.
209	SECTION – VI, PART-B	SUB-SECTION-B-17	4.00.00	8 OF 21	Lighting Panels shall be of following types: LP-1/LP-2/LP-3/LP-D1	Bidder clarifies that O/G feeder rating shall be considered inline with specification, However no of O/G feeders shall be decided based on fixtures as per area/building requirement. Accordingly the lighting transformer size shall be considered with due consideration to standardization.	The Technical specification is clear bidder to comply technical specification
210	SECTION – VI, PART-B	PART-B; SUB SECTION-A-14	2	Page 3 of 17	TECHNICAL SPECIFICATIONS III. String Monitoring Units	Bidder clarifies that String Monitoring Units are not applicable for String Inverters. Kindly Confirm.	String Monitoring units shall be applicable only if central PCU is provided

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
211	SECTION – VI, PART-B	PART-B; SUB SECTION-A-14	5.1	Page 5 of 17	CABLES AND CONNECTIONS The cables used in the system should be ISI marked PVC or XLPE insulated FRLS armored Copper/aluminum conductor. Cables of various sizes as per load requirement for connecting all the modules / arrays to Junction Boxes and from Junction Boxes to DC distribution box and from DC distribution box to inverter. Cables shall be armoured type if laid in switchyard area or directly buried	Bidder clarifies that all Power, Control and Instrumentation cables shall be secured in Cable trays and Medium duty rigid conduits hence Armouring on cables is not required. DC power cables from Module to inverter shall be Unarmoured as Standard industrial practice.	Bidder to comply with specification requirement.
212	SECTION N-VI, PART-B;	SUB SECTION-A-14	5.3	Page 5 of 17	CABLES AND CONNECTIONS Suitable rigid conduits shall be provided for cables connecting Solar PV array with Inverter.	Bidder clarifies that RGS conduits shall be of medium duty.	Bidder to Comply with provision of Bidding Documents
213	SECTION N-VI, PART-B;	SUB SECTION-A-14	6.6	Page 6 of 17	PCU / STRING INVERTOR Built-in meter at PCU / String Inverter and data logger to monitor plant performance through external computer shall be provided. Customized solar monitoring solutions available with Inverter manufacturer shall be preferred.	Bidder clarifies that the data logger shall be provided to monitor the plant performance however Commuter LAN, Internet and any other peripheral device shall not be in GEPSIPL scope of supply.	Condition outlined in the specification has to be met by bidder or its sub-vendor
214	SECTION N-VI, PART-B;	SUB SECTION-A-14	7	Page 7 of 17	TRANSFORMER If the output of the inverter matches to the switchgear voltage and suitable for directly connection to grid without galvanic isolation, the requirement of transformer may be ommited except Main Power House building, Switchyard building and Ash Slurry Pump house.	Bidder clarifies that transformer is shown in SLD appendix C for Buildings other than Main plant. Further GEPSIPL clarifies that isolation transformer shall be provided only for Main TG hall Solar roof top feeders, For Service building and other buildings isolation transformers shall not be used.	Isolation tranformer has to be supplied for the TG building and switchyard buiding(if appicable)

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
215	SECTION N-VI, PART-B;	SUB SECTION-A-14	7.7	Page 7 of 17	TRANSFORMER Suitable rain shed arrangement shall be provided to keep transformer under that arrangement	Bidder clarifies that Incase of transformer are housed inside the building rain shed arrangement shall not be provided.	The trasnformer shall be preferably indoor having IP-23. In case, it is outdoor, its enclosure shall be IP-42 with rain shed arrangement
216	SECTION N-VI, PART-B;	SUB SECTION-A-14	7.1	Page 8 of 17	TRANSFORMER In case the bidder is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in case the type test report(s) are not found to be meeting the specification requirements the bidder shall conduct all such tests under this contract at no additional cost to the employer and submit the test reports	Bidder clarifies that Type test reports for such small ratings of dry type transformers are generally not available with vendors, Hence incase on non-availability of Type test reports letter of successful operation from existing clients may be considered. Routine test/Factory acceptance tests shall be carried out on the transformer. Kindly accept.	Bidder to Comply with provision of Bidding Documents
217	SECTION N-VI, PART-B;	PART-B; SUB SECTION-A-14	10	Page 8 of 17	DATA MONITORING:	Bidder clarifies that All the required data in line with Contract shall be routed via Data logger of suitable type. This data can be accessed on dedicated computer system through internet as this is the most preferred data integration method used in industrial solar generation plants. Kindly accept.	Bidder to Comply with provision of Bidding Documents
218	SECTION N – VI, PART-A;	FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	1.01.05	PAGE 11 OF 20	The PG test will be conducted for durations in which irradiance level is greater than 750 W/m2 and the test will continue until a total horizontal radiation of 5 kWh/m2 has been achieved. The data will be recorded at 15 minute intervals for validating the PR values guaranteed by the contractor against the value mentioned in the above for that month. In case of destruction due to any component failure, entire test will be repeated.	Bidder clarifies that , PG test will be conducted on Shadow free building., PR shall be calculated with Temperature correction method.	Location of the PG Test shall be as per mutual cosent. Regarding temperature dependency of PR, bidder has to comply with the provisions of bidding documents.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
219	SECTION VI, PART-B;	SUB SECTION-A-14	14	Page 10 of 17	WARRANTY OF ROOFTOP SOLAR PV	Bidder clarifies that Warranty shall not be applicable for SPV modules installed under shadow area.	Provision of Bidding documents shall prevail
220	SECTION VI, PART-B;	SUB SECTION-A-14	Annexure B	Page 1 of 2	INDICATIVE SUPPORT ARRANGEMENT OF SOLAR PANEL ON ROOFS WITH METAL DECK SHUTTERING	Bidder clarifies that due to standard spacing on SPV modules and MMS design its not possible to align 100% foundation blocks at the center line of purlins. However, GEPSIPL will try to align the foundation blocs Centre line with purlins as much as practically possible.	Noted
221	SECTION VI, PART-A;	MANDATORY SPARES	4	PAGE 58 OF 59	MANDATORY SPARES FOR ROOF TOP SOLAR PV PCU / String Inverter cooling fan, if applicable - 5% of total population	Bidder clarifies that String inverters are IP 65 and comes with a warranty of 5 years. Replacement of any parts may void the warranty hence, cooling fan as a spare part will not be applicable.	Mentioned mandatory spares shall be sought if same is suggested by the OEM for periodic replacement
222	SECTION VI, PART-A;	MANDATORY SPARES	5	PAGE 58 OF 59	MANDATORY SPARES FOR ROOF TOP SOLAR PV Communication cards of PCU / String Inverter if applicable – 1 set	Bidder clarifies that String inverters are IP 65 and comes with a warranty of 5 years. Replacement of any parts may void the warranty hence, Communication card as a spare part will not be applicable.	Mentioned mandatory spares shall be sought if same is suggested by the OEM for periodic replacement
223	SECTION VI, PART-A;	MANDATORY SPARES	6	PAGE 58 OF 59	MANDATORY SPARES FOR ROOF TOP SOLAR PV DC side Surge Arrestor, if applicable	Bidder clarifies that String inverters are IP 65 and comes with a warranty of 5 years. Replacement of any parts may void the warranty hence, DC side surge arrestor as a spare part will not be applicable.	Mentioned mandatory spares shall be sought if same is suggested by the OEM for periodic replacement
224	SECTION VI, PART-A;	SECTION-VI, PART-A; MANDATORY SPARES	6	PAGE 58 OF 59	MANDATORY SPARES FOR ROOF TOP SOLAR PV Control card of PCU, if applicable – 1No	Bidder clarifies that String inverters are IP 65 and comes with a warranty of 5 years. Replacement of any parts may void the warranty hence, Control card as a spare part will not be applicable.	Control cards as mandatory spare shall be applicable for Central PCU only

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
225	SECTION – VI, PART-A;	SECTION-VI, PART-A; MANDATORY SPARES	7	PAGE 58 OF 59	MANDATORY SPARES FOR ROOF TOP SOLAR PV IGBT bank of PCU, if applicable – 1No	Bidder clarifies that String inverters are IP 65 and comes with a warranty of 5 years. Replacement of any parts may void the warranty hence, IGBT bank as a spare part will not be applicable.	Control cards as mandatory spare shall be applicable for Central PCU only
226	Part-B	VI, SUB-SECTION-D-01-CIVIL WORKS	7.5	12 OF 14	For assembly, testing and commissioning of DDCMIS, the DDCMIS supplier of BOPC&I-TG or its respective group company should have one or more works in India where from at least one DDCMIS has been engineered, assembled , tested and supplied for one unit of rating 200MW or above in a power station.	Bidder requests customer to relax the requirement " should have one or more works in India where from at least one DDCMIS has been engineered, assembled , tested and supplied for one unit of rating 200MW or above in a power station." which is limiting to few DDCMIS vendors only. Bidder requests customer to be open for all DDCMIS (both from Indian &Global) vendors.	Bidder to comply with specification requirement.
227	Part-B	VI, SUB-SECTION-D-01-CIVIL WORKS	2.04.04	9 OF 33	Cross HMI operation is applicable for this package through which drives in one HMI (DDCMIS) can be controlled from a different HMI (DDCMIS) through authorized access. Refer Part-B, subsection DDCMIS for details. Standalone HMI should be operated from Unit HMI through cross HMI operation.	Bidder recommends that Drives of offsite systems , will be operated through the respective DDCMIS only. Signals for monitoring purpose will be provided on Unified HMIPIS . Bidder recommends to avoid the Cross HMI Operation of drives to avoid the network loading and requests to remove the clause from Specification	Bidder to comply with specification requirement.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
228	Part-B	VI, SUB-SECTION-D-01-CIVIL WORKS	17.01.00	29 OF 33	Training:For Fieldbus based devices/systems, the contractor shall provide training to employer's personnel on following aspects of fieldbus (i) Hardware & Software features (ii) System design, diagnostic and testing (iii) maintenance, troubleshooting and fault analysis. This training shall be provided by certified training agencies offoundation fieldbus/ Profibus foundation and it shall be provided before approval of basic design and engineering document.	Bidder requests THDC to provide the number of personnel and Mandays details for training purpose	Please refer clause 13.00.00, Part-C in this regard.
229	Part-B	VI, SUB-SECTION-D-01-CIVIL WORKS	1.01.00	1 OF 7	(a) Authorization-to-ship-test Authorization-to-ship-test (ATST) or Factory Acceptance Test (FAT) (both terms have been used interchangeably) shall include all required tests to fully demonstrate to Employer's satisfaction that each equipment/subsystem/system as well as software modules furnished as per this specification as well as DDCMIS as a whole, fully meets the functional, parametric and other requirements of this specification and Employer's approved drawings/documents under all operating regimes. The procedure defined here is applicable for one DDCMIS system. Number of DDCMIS systems and their sub-systems shall be as defined in Part-A of technical specifications	Bidder request clarification on "demonstrate to Employer's satisfaction".Bidder requests the customer to provide the boundary limits of the tests to be performed in the Specification.	Bidder to comply with specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
230	Part-B	VI, SUB-SECTION-D-01-CIVIL WORKS	1.05.00	2 OF 3	Fieldbus cable (specifically used for Foundation Fieldbus/ Profibus PA and Profibus DP) shall be Individually shielded twisted pair, with round steel wired armour (SWA) complying to IEC 61158, Type A. The cable construction shall meet EN 50288-7 standard for physical properties and the outer sheath shall be of PVC-TM53 as per EN 50290-2-22. Continuous operating temperature of Fieldbus cable shall be minimum 90 Deg C	Bidder request THDC to provide the conductor size (AWG or Sq MM) for trunk and spur cables of Profibus PA, Profibus DP and Foundation fieldbus for segment calculations. Bidder requests to include 1SQMM(17Awg) for this purpose in this specification	Fieldbus cables are to be provided as per standards mentioned in the specification which clearly specify all the electrical and mechanical parameters of the cable. Accordingly, Bidder to comply with specification requirement.
231	Part-B	VI, SUB-SECTION-D-01-CIVIL WORKS	1.07.00	3 OF 3	During FAT suitable arrangement shall be made by Contractor to test Fieldbus modules including field devices as per approved FAT procedure.	Bidder clarifies that not all the fieldbus modules with all the field devices shall be tested during FAT, Please accept.	FAT shall be conducted as per approved FAT procedure by the Employer complying with the specification requirements.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
232	Part-B	VI, SUB-SECTION-D-01-CIVIL WORKS	16.00.00	28 OF 33	For erection and commissioning of above specified actuators, qualified and experienced engineers of actuator manufacturer shall be deputed at site. After successful commissioning of actuators, minimum one qualified and experienced engineer of main package supplier/ actuator manufacturer shall be continuously available at site up to COD (Commercial operation declaration) of complete plant, thereafter actuator service Engineer shall be deputed on call basis upto completion of facilities of the plant for troubleshooting and maintenance of actuators and proper interfacing with DDCMIS. Qualified and experienced engineers indicated above shall have expertise in all aspects of non-intrusive actuators along with fieldbus protocol and interfacing with DDCMIS	Bidder clarifies that Continuous Presence of Actuator expert Engineer is not required and Bidder shall arrange the required personnel on required basis.	Bidder to comply with specification requirement.
233	Part-B	VI, SUB-SECTION-D-1-CIVIL WORKS	3.04.00	6 OF 14	Bidder to ensure that minimum 100% cores are kept as spares in all types of optical fibre cables.	Bidder understands that 100% cores spare means consumed cores X 2, where unconsumed core is spare.	Bidder's understanding is correct.
234	SECTION – VI, PART-A	SUB-SECTION-D-1 CIVIL WORKS	18.02.01	32 OF 33	Contractor shall depute Technical Experts of the OAM /OEM/OES/ (Original Analyser Manufacturer/Original Equipment Manufacturer/Original Equipment supplier) for each of the above system at Site, who will be fully qualified to perform the required duties, supervision of maintenance, repair etc. for a period of six month. Employer will intimate the contractor two weeks advance	Bidder clarifies that the deputation of Technical Experts of the OAM /OEM/OES/ (Original Analyser Manufacturer/Original Equipment Manufacturer/Original Equipment supplier) will be as per the Bidder's discretion and will be as on required basis,Please accept the same.	Bidder to comply with specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
					notice for start of deputation period		
235	SECTION – VI, PART-A	SUB-SECTION-D-1 CIVIL WORKS	18.02.02	32 OF 33	After expiry of above six month period, Technical expert for each system shall visit site on monthly basis for monitoring the performance and rectify the problem (if any) for each system for the remaining warranty period and during entire AMC period. In the event of any malfunction/fault/failure in the system or any component thereof contractor shall depute Technical expert of respective system to reach site within 48hrs of call raised by site during the remaining warranty period and entire AMC period.	Bidder clarifies that After expiry of above six month period, Technical expert for each system will not visit site on monthly basis but as on required basis. And Technical expert of respective system to reach site within 48hrs of call raised by site only in case the unit is stopped and not started within 24hrs. Please accept the same	Bidder to comply with specification requirement.
236	SECTION – VI, PART-A	SUB-SECTION-D-1 CIVIL WORKS	2.01.00	3 OF 30	15. Certification SIL 2 or Better	Bidder clarifies that bidder will provide SIL 2 Complied transmitters and it will depend on the application requirement. Customer to confirm the same	Bidder to comply with specification requirement.
237	SECTION – VI, PART-B	SUB-SECTION-B-9 CONSTRUCTION POWER	15.00.00	20 OF 30	Rating of contacts :60 V DC, 6 VA (or more if required by DDCMIS)	Bidder requests customer, not to fix the Voltage rating at 60 VDC and it should be as per approved vendor list, vendor supplied & proven practice.	Bidder's proposal is not acceptable. Bidder to comply with specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
238	SECTION – VI, PART-D	ERECTION CONDITIONS OF CONTRACT (ECC)	18.00.00	21 OF 30	REVERSE ROTATION INDICATOR (RRI):The contact rating shall be 60VDC, 6VA (or more if required by Control system).	Bidder requests customer, not to fix the Voltage rating at 60 VDC and it should be as per approved vendor list ,vendor supplied & proven practice.	Bidder's proposal is not acceptable. Bidder to comply with specification requirement.
239	Sect-VI, Part-B	Sub-Sect-D-01	4.01.00	2 OF 5	Bidder shall ensure that various C&I instruments /equipment like vibration monitoring system, 4-20mA electronic transmitters / transducers, Temperature elements and other instruments/local devices etc. that are being furnished by the Bidder, are of the same make, series and family of hardware to the extent possible so as to ensure smooth and optimal maintenance, easy interchangeability and efficient spare parts management.For the instruments that are proposed to be connected to Bidder's Steam Turbine Generator integral controls and other Skid Mounted instruments, Bidder's standard and proven instruments are acceptable.	As different packages are supplied by different vendors, it is not feasible to have same make across all packages. The various instruments shall be supplied from approved suppliers and interfacing responsibility to DCS or other control system shall be ensured. bidder request to accept the same.	Bidder to comply with specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
240	Sect-VI, Part-B	Sub-Sect-D-01	9.02.00	22 OF 26	All licenses shall be valid for the continuous service life of the plant.	Bidder clarifies that Exception for the anti-virus licenses, which are to be renewed on a yearly basis, please accept.	The license for Anti-virus too shall be valid for continuous service life of plant. As indicated at Cl. No. 9.03.00 of SUB-SECTION-IIIC-02, DDCMIS, Part-B of technical specifications, the annual subscription charges for updates/upgrades of the Anti-virus shall be in the scope of the Bidder during Warranty and AMC period.
241	Sect-VI, Part-B	Sub-Sect-D-01	9.04.00	22 OF 26	DDCMIS supplier to periodically provide list of qualified operating system patches/ service packs and software patches of other third party software (like Office, Adobe etc. as applicable, except antivirus and IPS/IDS) for use on its system during the continuous service life of the plant, subject to availability of the same by the manufacturer of the software.	Bidder clarifies that Software corrections are provided until the end of the warranty period. After that period, GE will be available to propose a specific service agreement including the supply of software patches.	Bidder to comply with specification requirement.
242	Sect-VI, Part-B	Sub-Sect-D-01	13.01.00	23 OF 26	The Bidder shall provide an unlimited warranty on all equipment and software during the Defect liability period. This warranty shall include repair, replacement or correction of identified software or hardware discrepancies at no cost to Employer.	Bidder would like to clarify that the warranty should not cover bad use of the equipment, contrary to operation and maintenance procedures provided by GE.	Bidder to comply with specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
243	Sect-VI, Part-B	Sub-Sect-D-01	17.06.00	30 OF 33	The QSTGM shall i)participate in the Factory Acceptance test of the TG Control Systems. li)participate in critical Technical Co-ordination Meetings (TCMs) like Unit Control and Operation Meeting etc. The Contractor shall also depute QSTGM C&I expert to site during major activities like TG on barring gear, first synchronization, attainment of full load, commercial operation of the unit etc.	Bidder confirms to depute relevant experts to site as and when if found required for ensuring smooth commissioning of TG Integral C&I system. Requirement for deputation of the expert shall be discussed and agreed between Bidder and Customer on case to case basis.please accepct the same.	Bidder to comply with specification requirement.
244	Sect-VI, Part-B	Sub-Sect-D-01	E & Table: SWAS-II	12 OF 15	CONTRACT QUANTITIES FOR SWAS LIST OF ANALYSERS & Table: SWAS-II	Bidder would like to clarify that the Measurments given in the LIST OF ANALYSER &TABLE:SWAS-II are not matching with each other,please clarify which one needs to consider.	Bidder to refer Amendment in this regard.
245	Sect-VI, Part-B	Sub-Sect-D-01			Drive Philosophy	Bidder requested customer to provide the Drive Philosophy to calculate I/Os for the project.	The same shall be decided and agreed during detailed engineering.
246	Sect-VI, Part-B	Sub-Sect-D-01	2.03.01	7 OF 33	b. TG Stand-alone C&I system:- (b.) CER/CR/SWAS/Service Building/UPS/Battery Charger Room/ ESP Control Room etc. AC & Ventilation controls.	Bidder understand that for the mentioned area , bidder has to provide the AC & Ventilation controls only ,please clarify.	Bidder's is correct. Further , please refer to the clause 3.02 of Appendix-I to Sub Section II-C of the Technical Specification
247	Sect-VI, Part-B	Sub-Sect-D-01	C&I		KKS CODE GUIDELINES	Bidder like to clarify that KKS codes and tagging will provided as per OEM standard and proven practice.Please accepct the same.	Only general guidelines for KKS coding are indicated in this section. Bidder's standard KKS coding philosophy may be followed.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
248	Sect-VI, Part-B	Sub-Sect-D-01	E- CONT RACT QUAN TITIES FOR SWAS	11 OF 15	Deaerator Closed circuit CW (ECW-SG)	i)Bidder understand that Deaerator is Deaerator outlet only please confirm. ii)Bidder understand that Closed circuit CW (ECW-SG) sample is not part of TG scope of supply please confirm.	i) Bidder's understanding is correct. ii) Bidder's understanding is not correct. Bidder to provide sample piping from Employer's terminal point near the SG-ECW System.
249	Sect-VI, Part-B	Sub-Sect-D-01	2.01.0 1	2 OF 7	Over and above the equipment and accessories required to meet the fully implemented system as per specification requirements, DDCMIS shall have spare capacity and necessary hardware/ equipment/ accessories to meet following requirement for future expansion at site:	Bidder request customer to please define the system which need to be consider in future expansion.	Bidder's understanding is not correct. Bidder to go through the complete clause which clearly specifies the quantity of spares to be provisioned in order to meet the requirement of future expansion (whatever it may be) encountered at site.
250	Sect-VI, Part-B	Sub-Sect-D-01	8.1, 8.2, 8.3	13 of 14	8.0 PROVENNESS CRITERIA FOR CIVIL & STRUCTURAL WORKS 8.1 Bidder or its agency should have in past executed civil and structural works of 500 MW or higher capacity coalbased/Lignite based power plant including piling, Main power house building and Foundation for Turbo-generator. 8.2 Bidder can engage more than one agency, in case the Bidder itself is not able to meet the requirement at 8.1. The agency being engaged for a particular work should have in the past executed such works of 500 MW or higher capacity plant. 8.3 In case Bidder or its agency do not meet the requirements at 8.1 and the Bidder proposes to engage agency (ies) for civil &	Bidder requests Owner to split the Civil & Structural Works into three parts -Civil Works, Structural Fabrication works & Structural Erection Works; and provenness criteria as stated below: The Civil & Structural sub-contractor shall have the following qualifying requirements: For Civil Works (including Piling): a) He shall have experience in carrying out civil engineering works for Industrial buildings /equipment foundations / highrise buildings (3 storeys and more) etc., b) He should have executed not less than 20000 Cu.M of R.C.C work in a single agreement in a year. c) The work in Sl. Nos (a) & (b) should have been completed within the past 7 years, as on the original scheduled date of tender opening. d) Bidder to furnish necessary documentary evidence to prove the above requirements and get approval	Bidder's proposal is not acceptable .Further Bidder to refer amendment.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
					structural works on work volume basis, Bidder or its agency (ies) should have executed such works in the past and the annual rate of execution in the reference works should not be less than eighty percent (80%) of the asking rate of such works, (structural steel fabrication & erection and RCC) for which it is being engaged.	<p>from the Purchaser, prior to engaging them for civil works</p> <p>For Structural works:</p> <p>A) For Structural Fabrication works:</p> <p>a) He shall have experience in carrying out structural fabrication works for Industrial buildings /Power plant structures / highrise buildings etc.,</p> <p>b) Any structural steel Fabrication works of quantity not less than 5000 MT in a single agreement in a year.</p> <p>c) The work in Sl. Nos (a) & (b) should have been completed within the past 7 years, as on the original scheduled date of tender opening.</p> <p>d) Bidder to furnish necessary documentary evidence to prove the above requirements and get approval from the Purchaser, prior to engaging them for structural works.</p> <p>B) For Structural Erection works:</p> <p>a) He shall have experience in carrying out structural erection works for Industrial buildings / Power plant structures / highrise buildings etc.,</p> <p>b) Any structural steel Erection works of quantity not less than 5000 MT in a single agreement in a year.</p> <p>c) The work in Sl. Nos (a) & (b) should have been completed within the past 7 years, as on the original scheduled date of tender opening.</p> <p>d) Bidder to furnish necessary documentary evidence to prove the above requirements and get approval from the Purchaser, prior to engaging them for structural works.</p> <p>Please confirm acceptance.</p>	

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
251	Sect-VI, Part-B	Sub-Sect-D-01	1.00.00	1 of 4	4. Infrastructure Works c. Separate RCC drainage network with GI grating cover and sump pit for plant effluents for all buildings and facilities in Bidder's scope including floor wash water from main plant building area & transformer yard area.	Bidder proposes open RCC drain with sump pit for plant effluents for all buildings and facilities in Bidder's scope including floor wash water from main plant building area & transformer yard area and connected to the nearest main drainage network .	Bidder is requested to adhere to the provisions of Bid Documents
252	Sect-VI, Part-B	Sub-Sect-D-01	1.00.00	4 of 7	22. Landscaping	Bidder understand that Landscaping for Main Plant (STG Island) Area only is in the scope of bidder and rest of Plant area Landscaping & Plantation shall be done by the Owner.	Comprehensive landscape development to the plant area under the scope of this package shall be in Bidder's scope. Bidder is requested to refer amendment to Technical Specification in this regard.
253	Sect-VI, Part-B	Sub-Sect-D-01	3.03.00	5 of 142	e) All statutory clearance and permits from concerned local bodies/authorities, write-up on various statutory requirements and their compliance for various buildings, facilities, structures and systems, etc.	Bidder envisaged that, all required statutory clearance and permits from concerned local bodies/authorities shall be in the scope of Owner. However Bidder shall submit the required write-ups and Documents to Owner so as to facilitate the approval.	Bidder is requested to adhere to the provisions of Bid Documents
254	Sect-VI, Part-B	Sub-Sect-D-01	5.03.02	18 of 142	Alum/Lime Storage area and first floor of Chemical House : One coat of bitumen primer followed by 12mm thick bitumastic layer, 20 mm thick A.R. tiles, 6 mm thick underbed of potassium silicate mortar, 6mm thick pointing of joints of tiles with acid /alkali resistant epoxy /furane mortar up to a depth of 20 mm and bitumastic end sealing.	Bidder does not envisage Chemical House in the scope of STG package. Owner is requested to clarify on Bidder's understanding.	Chemical House is excluded from the scope of this package.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
255	Sect-VI, Part-B	Sub-Sect-D-01	5.03.02	18 of 142	Alum solution preparation tank: The wall shall be provided with one coat of bitumen primer followed by 12 mm thick bitumastic layer, 75 mm thick A.R. tiles, 6 mm thick underbed by potassium silicate mortar, pointing of joints of tiles with acid / alkali resistant epoxy / furane mortar upto a depth of 20 mm and bitumastic end sealing.	Bidder does not envisage Alum Solution Preparation Tank in the scope of STG package. Owner is requested to clarify on Bidder's understanding.	Alum Solution Preparation Tank is excluded from the scope of this package.
256	Sect-VI, Part-B	Sub-Sect-D-01	5.06.03	22 of 142	Patrol Roads	Bidder is not clear about the scope of Patrol Roads as part of STG area Package. Owner is requested to please clarify the scope of Patrol Roads in STG Package.	Patrol roads are excluded from the scope of this package
257	Sect-VI, Part-B	Sub-Sect-D-01	5.07.02	24 of 142	Fire Water pipes shall be provided with either RCC trench or buried underground as per requirement.	Bidder envisages only buried underground Fire Water pipes. Owner to clarify on Bidder's understanding.	For scope of civil works related to FDPS system, kindly refer FDPS layout drawing. Tender drawing to be issued as amendment
258	Sect-VI, Part-B	Sub-Sect-D-01	5.08.00	24 of 142	RCC Firewalls also be provided between the transformers wherever required.	Bidder envisage to provide RCC column and beam arrangement with 345 mm thk Brickwall in between.	Bidder is requested to adhere to the provisions of Bid Documents
259	Sect-VI, Part-B	Sub-Sect-D-01	6.04.01	36 of 142	All Steel structures shall be provided with painting as given in the specification. Further, painting system shall also meet the requirements of Corrosivity category C3 (durability High) as per ISO 12944.	Bidder does not envisage the Corrosivity Category-3 as the atmosphere in the project site is not corrosive.	Bidder is requested to adhere to the provisions of Bid Documents

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION N	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
260	Sect-VI, Part-B	Sub-Sect-D-01	7.01.00	39 of 142	Owner has carried out preliminary geotechnical investigation in the proposed area. Available bore logs of the area along with laboratory test results are enclosed at Annexure-I for Bidder's reference. The geotechnical investigation report of this area will be made available for the Bidder's study at the Owner's office, if required.	Bidder request Owner to please furnish the foundation recommendation part of the structures in the scope of STG package along with the chemical analysis part of soil and ground water.	Please refer clause no. 7.02.02 & 7.02.03 of technical specification for foundation recommendations. For chemical test results please refer amendment.
261	Sect-VI, Part-B	Sub-Sect-D-01	7.02.03	44 of 142	<p>Pile Foundation</p> <p>iv) The contractor shall furnish design of piles (in terms of rated capacity, length, diameter, termination criteria to locate the founding level for construction of pile in terms of measurable parameter, reinforcement for job as well as test piles, pile load test arrangement, locations of initial test piles etc.) for Engineer's approval.</p> <p>v) The piling work shall be carried out in accordance with IS:2911 (Relevant part) and accepted construction methodology. The construction methodology shall be submitted by the Contractor for Engineer's approval.</p>	<p>Bidder envisaged that Working Pile shall be carried out in Parallel with Test Pile as per Pile design and before getting final results of Test Pile and bidder will not wait for test result of Test Pile.</p> <p>However, In case, routine pile load test shows that the pile has not achieved the desired capacity or pile(s) have been rejected due to any other reason, then the Bidder shall install additional pile(s) as required and the pile cap design shall accordingly be reviewed and modified, if required.</p>	<p>Working piles can be installed only after obtaining the results of initial pile load test.</p>

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
262	Sect-VI, Part-B	Sub-Sect-D-01	8.04.00	58 of 142	<p>CULVERTS /RACKS ACROSS RAIL TRACKS</p> <p>Design of bridges/ culverts or any other structure crossing the Railway tracks shall be as per Railways/ RDSO guidelines/specifications for Dedicated Freight Corridor (DFC) 32.5 T loads. The Bidder shall obtain necessary approvals from Railways before start of construction work. Construction of these structures is to be done as per Railways guidelines. Any statutory and codal charges payable to Railways/ RDSO for approval & execution of the above crossings shall be borne by the Bidder. Engagement of approved Railway Consultant for the above work by the bidder would be at his own cost.</p>	Bidder envisaged that, all required statutory clearance and permits from concerned local bodies/authorities shall be in the scope of Owner. However Bidder shall submit the required write-ups and Documents to Owner so as to facilitate the approval.	Bidder is requested to adhere to the provisions of Bid Documents
263	Sect-VI, Part-B	Sub-Sect-D-01	2.01.00 - LABOUR & STAFF COLONY	3 of 4	Development of Bidders temporary staff colony and labour colony along with toilets & fencing etc. Land for staff and labour colony shall NOT be provided by the Owner	Bidder requested to Owner kindly provide the adequate land for labour colony inside the plant, further construction is in bidder scope.	Land shall be allotted by Project Incharge based on availability to the successful Bidders
264	Sect-VI, Part-B	Sub-Sect-D-01	2.02.00 - CONSTRUCTION FACILITIES	3 of 4	Repair & Maintenance Facilities by the Bidder	Bidder informed to owner - bidder not envisaged any Maintenance/repair facility for construction equipment, if required bidder manage Locally.	Bidder is requested to adhere to the provisions of Bid Documents

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
265	Sect-VI, Part-A	Sub-Sect-D1	2.02.00 - CONSTRUCTION FACILITIES	3 of 4	Providing all necessary fire-fighting devices/equipment/ fire tender etc. required during the project execution stage	Bidder not envisaged Fire tender is his scope. Requested to Owner help us from existing tender if required.	Bidder is requested to adhere to the provisions of Bid Documents
266	Sect-VI, Part-A	Sub-Sect-D-01	1.00.00 GENERAL	1 of 2	Power shall be made available to the bidder, at 11kV level from owners construction power ring mains. Bidder shall be fully responsible to make all his arrangement beyond these points for receiving & further distribution to meet all construction power requirements for the entire scope including the owner's construction power requirements indicated in Section-VI, Part-A Sub section –II B of the technical specification	Bidder requested to owner kindly mark/mention the location of " owner construction power ring mains " in Main GLP for better understanding.	Shall be finalised during detail engineering
267	SECTION – VIPART -B	SUB-SECTION - PRE-COM & COM	27.03.00 Water	13 of 58	Contractor shall make all arrangements himself for the supply of construction water as well as potable water for labour and other personnel at the worksite/colony	Bidder requested to Owner kindly provide the Water for construction activity at one point, further distribution is in bidder scope.	Bidder to comply specification requirement.
268	Sect-VI, Part-B	Sub-Sect-D-01	3.06.00	5 of 142	Design drawings of steel structures shall include the connection, joint & fastener details for Main columns, Beams & Bracings.	Bidder understand that the connection, joint & fastener details for Main columns, Beams & Bracing shall be provided in Design drawings for Information only ; and complete details shall be provided in Fabrication drawings.	Bidder is requested to adhere to the provisions of Bid Documents

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
269	Sect-VI, Part-B	Sub-Sect-D-01	3.07.00	5 of 142	As-built drawings with quantities of various items of work system wise, building wise, structure wise, etc. duly certified by Site after execution of work for information/record.	Bidder understand that quantities of major items of work mainly PCC , RCC and Reinforcement are to be provided in As-built drawings. Please confirm.	Bidder is requested to adhere to the provisions of Bid Documents. Bidder is also requested to refer amendment to Technical Specification in this regard.
270	Sect-VI, Part-B	Sub-Sect-D-01	3.08.00	5 of 142	One complete set of applicable standards, references, specifications, code of practice along with soft copy (wherever required with minimum 2 years license fee) to the Engineer for use at site.	Bidder will provide the applicable standards, references, specifications, code of practice soft copy (wherever required with minimum 2 years license fee) . Please confirm acceptance.	Provisions of Bid Documents are amply clear.
271	Sect-VI, Part-B	Sub-Sect-D-01	3.02.00	5 of 142	SUBMISSIONS g) Perspective views of main power house, Service Building and Control Room interiors shall be submitted in Hard Copy in Laminated A-1 Size (Two Numbers) and Soft copy of Autocad / Revit drafted views. A panoramic bird's eye view of Overall plant shall be submitted in laminated A-1 Size hardcopy (Two Numbers) and soft copy in AutoCAD.	Bidder understands that Bidder shall submit the Perspective Views of main power house, Service building and Control Room interiors only; and panoramic bird's eye view of Overall plant is excluded from Bidder's scope. Please confirm.	Confirmed
272	Sect-VI, Part-B	Sub-Sect-D-01	3.10.00	5 of 142	Commencement of fabrication and erection and construction shall be done after approval of the relevant documents and drawings. All drawings shall be of standard sizes (Metric System) and shall be made on AutoCAD.	Bidder understands that Fabrication Drawing shall not be under submission category and for Information only. Bidder will submit the drawings & documents as per MDL proposed by Bidder and approved by the Owner. Please confirm.	Fabrication drawings are not subject to review by Owner. Bidder is requested to refer amendment to Technical Specification in this regard.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
273	Sect-VI, Part-B	Sub-Sect-D-01	4.01.00	6 of 142	General Layout Plan b) Face of the buildings and facilities are located in such a way so as to have an offset of minimum 20m with respect to centre line of double lane road and 15 metre with respect to centre line of single lane road.	At some locations where availability of space is an issue then this requirement may not be the mandatory and same shall be jointly reviewed and allowed during execution stage.	Bidder is requested to adhere to the provisions of Bid Documents
274	Sect-VI, Part-B	Sub-Sect-D-01	5.01.00	8 of 142	Architectural Concepts & Design j) All the buildings and site development including landscaping shall be designed to take care of rain water harvesting & ground water recharging. Development of rain water harvesting scheme for the project and obtaining approval of the scheme from Central Ground Water Board is in Bidder's Scope.	Bidder understand that Rain Water harvesting required in all buildings only is in Bidder's scope. Further rain water harvesting system of entire Plant is the scope of Owner. Please confirm.	Rain water harvesting for the buildings covered in this package is under bidder scope of works and obtaining approval of the scheme from Central Ground Water Board is in Bidder's Scope.
275	Sect-VI, Part-B	Sub-Sect-D-01	5.02.01	10 of 142	Main Power House (I). Salient Features: The roof system in turbine bay shall comprise a structural steel girder (open web or solid web) for the entire bay width. The roofslab shall consist of 40mm thick (min.) RCC slab supported on profiled metal deck sheet. (II). Design Concept:The roof truss to column connection shall be bolted connection using high strength bolts (grade 8.8/ IS 1367). The roof truss of Turbine Hall shall be adequately braced in plan using Tie level and rafter level bracings.	Discrepancy has been found in Salient Features and Design Concept regarding Roof system for Turbine bay. Bidder propose to use Steel Roof truss system in turbine bay for entire bay width. Please confirm acceptance.	Bidder can provide either structural steel girder with open web or solid web .as stipulated in Technical Specification.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
276	Sect-VI, Part-B	Sub-Sect-D-01	5.02.01	10 of 142	<p>Main Power House (II). Design Concept: Common Control Room at operating floor shall have minimum 60% free space for movement, control room to be free of any auxiliary/stub columns other than the C-row central column with minimum depth as possible.</p> <p>Tender Drawing Nr. 9915-999-POM-F-002, Rev.A : Note No. 12- Size of C-row Column along Grid-14 shall be restricted to 1100mm inside the Control room area i.e. from El.17.0m to El.24.0m. Note No. 14- Columns in Control Tower shall be restricted to 1100mm x 1100mm after encasement.</p>	Bidder experience with similar Project, is that C-row columns (Star type configuration) in Control Tower area, can not be designed with 1100mm size restriction. However, considering the free space requirement, Bidder shall design C-row central column with minimum depth as possible. Please confirm acceptance.	Bidder is requested to adhere to the provisions of Bid Documents
277	Sect-VI, Part-B	Sub-Sect-D-01	5.02.02	13 of 142	Machine Foundations in STG Island Area Turbo- Generator (TG) foundation: Bidder has the option to choose either Alternative -1 or Alternative-2 based on his design philosophy and practice. However in case Alternative-2 is adopted by bidder, then the bidder has to furnish extended warranty of five years for satisfactory static and dynamic performance of the foundation system.	Bidder request to waive off the extended warranty clause of five years in case, Alternative-2 is adopted by Bidder (i.e conventional machine foundations). Please confirm acceptance.	Bidder is requested to adhere to the provisions of Bid Documents
278	Sect-VI, Part-B	Sub-Sect-D-01	5.02.02	13 of 142	Machine Foundations in STG Island Area TDBFP & MDBFP foundations: Bidder has the option to choose either Alternative -1 or Alternative-2 based on his design philosophy and practice. However in case Alternative-2 is adopted by bidder, then the bidder has to furnish extended warranty of five years for satisfactory static and dynamic performance of the foundation system.	Bidder request to waive off the extended warranty clause of five years in case, Alternative-2 is adopted by Bidder (i.e conventional machine foundations). Please confirm acceptance.	Bidder is requested to adhere to the provisions of Bid Documents
KHURJA SUPER THERMAL POWER PROJECT (2X 660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES Bid Document No.: THDC/RKSH/CC-9915-371					CLARIFICATION NO. THDC/RKSH/CC-9915-371-CLRF-03		PAGE 79 OF 96

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
279	Sect-VI, Part-B	Sub-Sect-D-01	5.03.0 1.06	17 of 142	CPU CIVIL WORKS Minimum tensile Reinforcement in each direction for all foundation slabs / rafts shall be 0.2% of cross sectional area.	Bidder understands that the this Minimum tensile Reinforcement is applicable only for foundation slab / raft and base slab of liquid retaining tanks / pits in CPU area. Please confirm.	Bidder's understanding is in order
280	Sect-VI, Part-B	Sub-Sect-D-01	5.03.0 1.07	17 of 142	CPU CIVIL WORKS Minimum thickness of foundation slab / raft and base slab of all liquid retaining tanks / pits shall not be less than 250 mm. Minimum thickness of all elements of RCC liquid retaining / conveying structures (except effluent drains, launders and aerator waste slab) shall be 200mm.	Bidder request that thickness of all elements of RCC liquid retaining / conveying structures shall be as per design requirement. However, minimum thickness shall not be less than 150mm. Please confirm.	Bidder is requested to adhere to the provisions of Bid Documents
281	Sect-VI, Part-B	Sub-Sect-D-01	6.03.1 0	32 of 142	a) Design of Foundation for TG, TDBFP, MDBFP Reinforcement Design Working stress method as per IS 456 shall be used for reinforcement design. The design shall be done for the worst load combination. Minimum reinforcement shall be provided as per IS 456 and IS2974 (Part-III), if the calculated reinforcement is less than the minimum.	Bidder proposed to use Limit State Design method for the design of the columns for the Turbogenerator foundation as the interaction design charts in Working Stress method are not available in code / SP16. Please confirm.	Bidder's proposal is acceptable. However, sample calculation for comparison of results with working stress method shall be made, and, if required, suitable enhancement shall be done.
282	Sect-VI, Part-B	Sub-Sect-D-01	6.03.2 4	36 of 142	Design Criteria for Foundation a) OPEN Foundations: The sizing of foundation, design criteria & clear cover shall conform to IS:1904, IS:456 and other relevant Indian codes. However minimum 0.12% of reinforcement shall be provided on the top face of the foundation concrete on either direction and minimum percentage of reinforcement at bottom face of foundation shall be same as that stipulated for beam as per IS:456	Bidder understands that minimum reinforcement on footing top face (if not required by design) shall be provided as per Cl. No. 26.5.2.1 of IS 456 : 2000 as $0.12\%/2=0.06\%$ On bottom face(tensile face), the minimum reinforcement shall be 0.12% in either direction. The clause of minimum reinforcement for beam shall not be applied for footing design, as same is designed as slab. Please confirm.	Bidder's understanding is not correct. Bidder is requested to adhere to the provisions of Bid Documents

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
283	Sect-VI, Part-B	Sub-Sect-D-01	6.03.24	36 of 142	Design Criteria for Foundation b) PILE Foundations: .....Structural design of pile cap and reinforcement shall conform to IS:2911 and IS:456. However minimum 0.12% of cross section of the pile cap shall be provided on the top face of the pile cap along two orthogonal directions and minimum percentage of reinforcement at bottom face of pile cap shall be same as that stipulated for beam as per IS:456	Bidder understands that minimum reinforcement on Pile cap top face (if not required by design) shall be provided as per Cl. No. 26.5.2.1 of IS 456 : 2000 as $0.12\%/2=0.06\%$ On bottom face(tensile face), the minimum reinforcement shall be 0.12% along two orthogonal directions. The clause of minimum reinforcement for beam shall not be applied for pilecap design, as same is designed as slab. Please confirm.	Bidder's understanding is not correct. Bidder is requested to adhere to the provisions of Bid Documents
284	Sect-VI, Part-B	Sub-Sect-D-01	6.04.09	38 of 142	For reinforced concrete work. i) The protection for concrete sub-structure shall be provided based on aggressiveness of the soil, chemical analysis of soil/sub-soil water and presence of harmful chemicals/salts. ii) The protection to super structure shall depend on exposure condition and degree of atmospheric corrosion. This shall require use of dense and durable concrete, control of water cement ratio, increase in clear cover, use of special type of cement and reinforcement, etc., coating of concrete surface, etc., Bidder shall furnish the details of corrosion protection measures.	Bidder request Owner to provide the minimum requirement of coating of concrete surface system for corrosion protection measures.	Bidder is requested to adhere to the provisions of bid documents. Bidder is also requested to refer Checmical analysis being issued as amendment.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
285	Sect-VI, Part-B	Sub-Sect-D-01	7.04.03	47 of 142	Backfilling in Main Power House and TG -Excavated earth between the excavation profile and the foundations, wherever backfilling is required, shall be backfilled with sand from founding level till finished ground level. .....Sand used for filling shall be natural sand/manufactured sand, and clean & well graded conforming to IS 383 with grading Zone I to III. Backfilling with sand shall be carried out in layers not exceeding 300 mm compacted thickness and each layer shall be compacted to minimum 80% of relative density.	Bidder request to allow backfilling around the foundation for Main Power House and TG, similar to Backfilling in other area, i.e. with approved material in layers not exceeding 300 mm compacted thickness (higher thickness of layers upto 500mm with heavy mechanical compacting equipment) and each layer shall be compacted to 90% of standard proctor density for cohesive soils and to 80% of relative density for non cohesive soils.	Bidder is requested to adhere to the provisions of bid documents.
286	Sect-VI, Part-B	Sub-Sect-D-01	8.02.03	56 of 142	a) Temperature Control of Concrete For top decks of TG & BFPs, the temperature of fresh concrete shall not exceed 25 deg C when placed. For maintaining the temperature of 25 deg C in the top decks of machine foundations, crushed ice shall be used in mixing water.	For top decks of TG & BFPs, Bidder request that the temperature of fresh concrete shall be permitted upto 38 deg C when placed, as per acceptable industry practice. However, for maintaining the temperature of 38 deg C in the top decks of machine foundations, crushed ice shall be used in mixing water.	Bidder is requested to adhere to the provisions of Bid Documents
287	Sect-VI, Part-B	Sub-Sect-D-01	8.06.00	59 of 142	GRATING All gratings shall be electroforged types. Minimum thickness of the grating shall be 40 mm for indoor installation and 32 mm for outdoor installation.	Bidder shall be permitted to choose 32mm thick or 40 thick grating based on Span & Loading on the grating. Please confirm	Thickness values specified are minimum for indoor and outdoor installations. Bidder is requested to adhere to the provisions of Bid Documents

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
288	Sect-VI, Part-B	Sub-Sect-D-01	8.07.00	60 of 142	FABRICATION & ERECTION OF STEEL STRUCTURES All steel structures shall be fabricated in factory, transported and erected at site. All factory-fabricated structures shall have bolted field connections.	Bidder request Owner to restrict the requirement of bolted field connections for main structures mainly building columns, Bracings & Frame Tie-beams only; and allow for welded field connections for all floor beams & secondary structure (like platforms, purlins, stairs, wall beams) connections with main structures. Bidder request Owner to permit the Site Fabrication of steel structure in case to case basis and site modification. Please confirm.	Bidder is requested to adhere to the provisions of Bid Documents
289	Sect-VI, Part-B	Sub-Sect-D-01	8.07.00	60 of 142	FABRICATION & ERECTION OF STEEL STRUCTURES Before dispatching the fabricated structural members to site, it shall be ensured that all parts in the assembly fit accurately together by carrying out pre-assembly of fabricated structural members having bolted field joints, in the factory.	Bidder understand that pre-assembly of fabricated structural members is limited to main frame fabricated structural members only. Please confirm.	Pre Assembly checks are required to avoid mismatches at site during erection. Bidder is requested to adhere to the provisions of Bid Documents
290	Sect-VI, Part-B	Sub-Sect-D-01	10.02.00	100 of 142	Aggregates b) Fine Aggregate Fine aggregate shall be hard, durable, clean and free from adherent coatings of organic matter and clay balls or pellets. Fine aggregate in concrete shall conform to IS: 383. For plaster, it shall conform to IS: 1542 and for masonry work to IS: 2116.	Bidder request Owner to also allow to use Crushed / Mechanical Sand meeting the of IS :383 , IS:1542 & IS:2116 for respective use of application. Please confirm.	Bidder is requested to adhere to the provisions of Bid Documents
291	Sect-VI, Part-B	Sub-Sect-D-01	10.03.00	101 of 142	Reinforcement Steel Reinforcement steel shall be of high strength deformed TMT steel bars of grade Fe-500/ Fe 500D and shall conform to IS 1786. However, minimum elongation shall be 14.5%.	Bidder shall use Fe500/ Fe 500D with minimum % elongation as per IS 1786 -2008. Please confirm.	Bidder is requested to adhere to the provisions of Bid Documents

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
292	Sect-VI, Part-B	Sub-Sect-D-01	ANNEXURE-E	137 of 142	CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT All structures and equipment shall be designed for seismic forces adopting the site specific seismic information provided in this document and using the other provisions in accordance with IS: 1893 (Part 1 to Part 4). Pending finalization of Part 5 of IS:1893, provisions of part 1 shall be read along with the relevant clauses of IS: 1893:1984, for embankments.	Bidder understands that : 1.) Latest Siesmic Code (IS:1893, Pt-I, Sixth Revision in December 2016, IS:1893, Pt-II August 2014, IS:1893, Pt-III August 2014, IS:1893, Pt-IV December 2015) and the latest Amendment thereof, shall be basis for Analysis & Design for All Steel & Concrete Structures. Please confirm. 2.) Since, Power plant structures are classified in Category-2 (as per Clause 8.1 & Table-6 of Latest Siesmic Code (IS:1893, Pt-IV: 2015, and the latest Amendment thereof), Linear Dynamic Analysis will be performed by Response spectrum analysis method. Time History Analysis Method (Non-linear time-history analysis) will not be performed for Power plant structures. Please confirm acceptance.	Bidder is requested to adhere to the provisions of Bid Documents
293	Sect-VI, Part-B	Sub-Sect-D-01	ANNEXURE-E	137 of 142	CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT Damping in Structures The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for: a) Steel structures : 2% b) Reinforced Concrete structures : 5% c) Reinforced Concrete Stacks : 3% d) Steel stacks : 2%	As per the stipulations contained in Latest Siesmic Code (IS:1893, Pt-IV: December 2015), The Material damping factor for Design Basis earthquake for Steel Structure is 5% as per Table-8. Please confirm acceptance.	Bidder is requested to adhere to the provisions of Bid Documents

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
294	Sect-VI, Part-A	Sub-Sect-D1	1.00.0	1 of 4	SCOPE OF CIVIL, STRUCTURAL & ARCHITECTURAL WORKS OF STG ISLAND PACKAGE: 2. Site clearance including cutting of trees of girth (circumference measured at a height of 1 m above ground level) less than 30 centimeters.	Initial site leveling & Area Grading works upto RL(+) 194.0m in the STG Island area, shall be carried out by Owner. Successful Bidder will only carry out, final micro leveling after graded area handover by Owner. Bidder envisage that final micro leveling is limited to +/- 250 mm only. Further, Site clearance including cutting of trees will not be in Bidder scope. Please confirm.	Site levelling is excluded from the scope of the Bidder. However, Site clearance including cutting of trees of girth (circumference measured at a height of 1 m above ground level) less than 30 centimeters and micro levelling thereafter shall be in Bidder's scope.
295	Sect-VI, Part-A	Sub-Sect-D-01	2.02.00	2 of 4	CONSTRUCTION FACILITIES	Bidder request to allocate the area in Plant Layout for stockpiling of the excavated earth suitable for use in backfilling at a later date. Bidder also request to allocate the dumping area for disposal of Bentonite slurry during Piling execution.	Land shall be allocated at detailed engineering stage
296	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM		PAGE 2 OF 17	Unit Start Up Start-up time (upto full load), and loading capabilities for the Turbine Generator together for cold start conditions (greater than 36 hours shutdown), warm start conditions (between 8 and 36 hours shutdown) and hot start conditions (less than 8 hours shutdown) as indicated by the Contractor in the offer and accepted by the EMPLOYER shall be demonstrated, ensuring that the various turbine operational parameters like vibration, absolute and differential expansion, eccentricity and steam-metal temperature	Bidder clarifies that except for steam turbine control system others are in the scope of the Customer. We can guarantee the time from turbine run-up upto synchronization only. Boiler must be in automatic mode & all equipment ready for the demonstration which is again Customer scope.	Bidder to comply specification requirements.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
					mismatch etc. are within design limits.		
297	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	2.00.00	PAGE 2 OF 17	The Contractor shall submit to the Employer, his testing / commissioning schedules for various equipments/ systems covered under the contract, for approval, at least 18 months before the actual commissioning of the equipment/ systems.	Bidder confirm to submit the commissioning inspection test plan showing the witness point for customer, one month after award of contract. But detail commissioning procedure for various systems shall be submitted 5 months (instead of 18 month) prior to start of system commissioning.	Bidder to comply specification requirements.
298	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.02.03 (II-d)	PAGE 4 OF 17	When one half of the condenser is isolated, condenser shall be capable of taking at least 60% T.G. load under EMCR conditions	Bidder clarifies that except for steam turbine control system others are in the scope of the Customer. Half of the condenser can be demonstrated by isolating one half of the condenser & increasing load upto 60%.	Bidder to comply specification requirements.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
299	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.02.03 (II-e)	PAGE 4 OF 17	The capacity of each vacuum pump in free dry air under standard conditions at a condenser pressure of 25.4 mm Hg (abs) and sub cooled to 4.17 deg.C below the temperature corresponding to absolute suction pressure shall not be less than 20 SCFM. Correction curves for establishing the capacity at site conditions shall also be furnished.	Bidder clarifies that this is basically Shop test. Cannot be demonstrated at site. Test report shall be provided for same	Bidder to comply specification requirements.
300	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.02.03 (II-c)	PAGE 4 OF 17	Air leakage in the condenser under full load condition shall not exceed more than 50% of design value taken for sizing the condenser air evacuation system.	Bidder clarifies that this is basically Shop test. Cannot be demonstrated at site. Test report shall be provided for same	Bidder to comply specification requirements.
301	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.03.03 (II-e)	PAGE 4 OF 17	The air and vapour mixture from air cooling zone of condenser shall be 4.17 deg.C below the saturation temperature corresponding to 25.4 mm Hg (abs) suction pressure. Correction curves for establishing the same at site conditions shall also be furnished.	Bidder clarifies that this is basically Shop test. Cannot be demonstrated at site. Test report shall be provided for same.	Bidder to comply specification requirements.
302	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.03.03 (II-g)	PAGE 4 OF 17	Condenser on load tube cleaning system life of sponge rubber balls & Number of balls lost during 1000 hrs of plant operation shall be as indicated by bidder in the offer & accepted by the Employer.	Bidder clarifies that this cannot be demonstrated at site. Certificate of compliance from vendor will be provided for the same.	Bidder to comply specification requirements.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
303	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.03.03 (VIII-c)	PAGE 5 OF 17	Cold start up / hot start up of the unit using TDBFP with motive steam from auxiliary steam header.	Bidder clarifies that this will be not possible with aux steam as the temperature will be not sufficient.	Bidder to comply specification requirements.
304	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.02.04 (b)	PAGE 6 OF 17	Pumps, blowers, fans, compressors and rotating equipment shall be capable of delivering flow and head corresponding to design point as specified	Bidder clarifies that this is basically Shop test. Cannot be demonstrated at site. Test report shall be provided for same.	Bidder to comply specification requirements.
305	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.03.03 (VIa)	PAGE 5 OF 17	Each CEP set shall be capable of delivering flow & total dynamic head corresponding to runout point as specified	Bidder clarifies that this is basically Shop test. Cannot be demonstrated at site. Test report shall be provided for same as done for all current execution project.	Bidder to comply specification requirements.
306	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.03.03 (VII-a)	PAGE 5 OF 17	Each drip pump shall be capable of delivering flow & total dynamic head corresponding to design point as specified	Bidder clarifies that this is basically Shop test. Cannot be demonstrated at site. Test report shall be provided for same as done for all current execution project i.e. Solapur & Nabinagar	Bidder to comply specification requirements.
307	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.03.03 (VIII-a)	PAGE 5 OF 17	Each boiler feed pump set shall be capable to deliver flow and total dynamic head corresponding to runout point as specified elsewhere.	Bidder clarifies that this is basically Shop test. Cannot be demonstrated at site. Test report shall be provided for same as done for all current execution project.	Bidder to comply specification requirements.

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Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
308	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.02.05 (b,k)	PAGE 6 & 7 OF 17	Oil flushing of lube oil system, control & jacking oil system, etc. for turbines shall be done. Entire flushing oil requirement & refilling with fresh oil and other consumables along with flushing equipment shall be met by the Contractor.	Bidder clarifies that as per standard practice, its recommended not to refill fresh oil after flushing completion. This is due to fact that flushed oil is more pure the the fresh oil as we have achieved the requied NAS value	Bidder to comply specification requirements.
309	PART A	SECTION – VI, PART-A SUB-SECTION-A9 POWER CYCLE PIPING	2.04.00 (d)	PAGE 5 OF 10	All temporary piping, supports, valves, blanking plates, blanking inserts, caps, pressure gauges, thermo wells/ temperature measuring instruments, plugs, gaskets, bolts & nuts, tools & tackles, spool pieces for valves/control valves/ flow nozzles & specialties etc., tanks and other accessories as required to complete chemical cleaning & Steam Blowing operation of piping systems in bidder's scope as specified elsewhere in the technical specification.	Bidder clarifies that necessary blind/ cap require to do the hydrostatic test of each scope (SG/TG vendor) of piping shall be considered by respective parties. GEPSIPL shall consider blind / cap as require to do the hydro of their scope of piping. Temporary Cap / blind fitted in GEPSIPL scope of piping shall be cut by GEPSIPL after execution of hydrotest. final connection of GEPSIPL piping with SG vendor piping to be done by SG vendor. Connection will be golden joint with 100% RT.	Technical Specification Requirements are Clear. Bidder to Comply the same.
310	PART A	SECTION – VI, PART-A SUB-SECTION-A9 POWER CYCLE PIPING	2.04.00 (c)	PAGE 5 OF 10	c.) The bidder's scope shall also include supply of necessary blanks, blanking inserts, hydraulic test tool kit or other special devices and accessories (as applicable) for the Stop valves/ control valves/OLV supplied by the TG package contractor and connected to/ installed on SG Package contractor's scope of piping (i.e. MS,HRH, CRH, HP&LP Bypass) for carrying out hydrostatic testing of these piping systems with the Stop valves/control valves in circuit, as per the scheme/ procedure for hydrostatic testing approved	Bidder clarifies that necessary blinking device shall be provided for MSSV, HPBP & IPSV valve for hydrotest, LP Bypass stop valve can be used as terminal point for hydrotest of reheater circuit . But CRH NRV should not be considered at a limit for hydrostatic test. Necessary blind require to do the hydro test shall be consider by SG vendor for CRH piping. CRH NRV shall be install after completion of hydrostatic test of CRH piping.	Technical Specification Requirements are Clear. Bidder to Comply the same.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
					by employer.		
311	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.02.05 €	PAGE 6 OF 17	Steam blowing & chemical cleaning, as applicable of integral piping of CEP sets & other piping in the scope of the Contractor shall be done by the Contractor	Bidder clarifies that steam blowing & chemical cleaning for CEP set integral piping are not applicable as these piping are coming as clean erected piping. Bidder also clarifies that Power cycle piping & other piping coming under bidder scope of work shall be cleaned as per cleaning concept proposed by bidder subjected to customer approval.	Cleaning of the integral piping shall be as per the commissioning procedure to be approved during detail Engineering stage.
312	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.02.05 (d)	PAGE 6 OF 17	Steam blowing & chemical cleaning, as applicable of integral piping of the turbo-generator, Low pressure piping, Power cycle piping & other piping in the scope of the Contractor shall be done by the Contractor.	Bidder clarifies that integral piping of the turbo-generator are coming as clean erected piping as our standard practice, so chemical cleaning & steam blowing of these piping are not applicable. Bidder also clarifies that Low pressure, Power cycle piping & other piping coming under bidder scope of work shall be cleaned as per cleaning concept proposed by bidder subjected to customer approval.	Cleaning of the integral piping shall be as per the commissioning procedure to be approved during detail Engineering stage.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
313	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.02.05 (I)	PAGE 6 OF 17	Steam blowing & chemical cleaning, as applicable of integral piping of the Heaters & other components in the scope of the Contractor shall be done by the Contractor.	Bidder clarifies that steam blowing & chemical cleaning for heaters & its components are not applicable as heater are coming as shop clean equipment. Bidder also clarifies that Power cycle piping & other piping coming under bidder scope of work shall be cleaned as per cleaning concept proposed by bidder subjected to customer approval.	Cleaning of the intergral piping shall be as per the commisssioning procedure to be approved during detail Engineering stage.
314	PART-B	SECTION – VI, PART-B SUB-SECTION - PRE-COM & COM	3.02.05 (L)	PAGE 7 OF 17	Steam blowing & chemical cleaning, as applicable of integral piping of BFP sets & other piping in the scope of the Contractor shall be done by the Contractor	Bidder clarifies that steam blowing & chemical cleaning for BFP set integral piping are not applicable as these piping are coming as clean erected piping. Bidder also clarifies that Power cycle piping & other piping coming under bidder scope of work shall be cleaned as per cleaning concept proposed by bidder subjected to NTPC approval..	Cleaning of the intergral piping shall be as per the commisssioning procedure to be approved during detail Engineering stage.
315	PART D	SECTION – VI, PART-D ERECTION CONDITIONS OF CONTRACT (ECC)	13.01.00	PAGE 6 OF 58	Mineral wool mats with wire netting on both sides shall be applied against the surface with lugs piercing through	Agreed for multilayer insulation. But for first layer insulation (in case of single layer insulation) mattress shall be backed with hexagonal mesh on one side (only) as per standard industrial practice & market availability.	Technical Specification Requirements are Clear. Bidder to Comply the same.
316	PART D	SECTION – VI, PART-D ERECTION CONDITIONS OF CONTRACT (ECC)	13.01.00	PAGE 6 OF 58	Galvanized binding wire of 1.63 mm dia (16 SWG)	Bidder would like to clarify that binding wire should be 20 SWG for all insulation interface temperature as per standard industrial practice. Kindly accept.	Noted

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
317	PART B	SECTION – VI, SUB-SECTION-A6 (LOW PRESSURE PIPING)	2.10.03	PAGE 9 OF 21	After erection, all water lines shall be mass flushed with water. The cleaning velocities in water lines shall be 1.2-1.5 times the operating velocities in the pipelines	Bidder clarifies that mass flushing shall be done in line with VGB R_513 guideline i.e.flushing velocity should be between 0.5 to 1 m/s only	Technical Specification Requirements are Clear. Bidder to Comply the same.
318	SECTION – VI	Part-B, E-1	1.06.01(h)	15 of 13	<p>Piping : Non-Destructive Examination of welds shall be carried out in accordance with the relevant design/manufacturing codes. However, as a minimum, the following requirements shall be met (except for oil piping). Further statutory requirement, wherever applicable shall also be complied with</p> <p>1) Temperature > 400°C and / or pressure exceeding 71 bar.</p> <p>i. 100% RT/UT on butt welds and full penetration branch welds.</p> <p>ii. 100% MPE.</p> <p>2) Temperature > 175°C up to 400°C and / or pressure exceeding 17 bar and up to 71 bar.</p> <p>i. 100% RT / UT on butt welds and full penetration branch welds for pipe dia more than 100 NB.</p> <p>ii. 10% RT / UT on butt welds and full penetration branch welds for pipe dia up to 100 NB.</p> <p>iii. 100% MPE.</p>	<p>Bidder requests to follow requirement of ASME B31.1, as given below</p> <p>1) Temperature > 400°C and / or pressure exceeding 71 bar</p> <p>i) For Butt Joints - 100% RT for NPS > 2", MPE/PT for NPS ≤ 2"</p> <p>ii) For Weld branch Connection- 100% RT for NPS > 4", MPE/PT for NPS ≤ 4"</p> <p>2) Temperature > 175°C up to 400°C and / or pressure exceeding 17 bar and up to 71 bar.</p> <p>i) For Butt Joints - 100% RT for NPS > 2" & thickness > 19mm, MPE/PT for NPS ≤ 2"</p> <p>ii) For Weld branch Connection- 100% RT for NPS > 4" & thickness > 19mm, MPE/PT for NPS ≤ 4" .</p> <p>Kindly accept the same.</p>	Bidder to comply with specification requirement.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
319	SECTION – VII, Book 2 of 3	ATTACHMENT - 6(P) Page 2 of 2	(v)		The total Auxiliary Power Consumption (in KW) for all the Turbine Generator Auxiliaries and Turbine cycle equipments and other common auxiliaries, required for continuous unit operation at 660 MW (i.e. 100% of rated load) under rated steam conditions and at condenser pressure of 77 mmHg (abs) with zero make-up shall not be more than 4200 KW.	Bidder understand that Guaranteed auxiliary power consumption includes transformer losses, HVAC, common auxiliary and all turbine cycle cycle equipment as listed, considering all that 4200 MW seems lower side. Bidder request owner to relook the same.	Please refer amendment in this regard.
320	Part E	Equipment lay out plan 9915-999-POM-F-001			Unit pitch may vary from 133 to 142 m. same shall be decided by owner.....	Bidder request owner to clarify when bidder shall receive the confirmed unit pitch dimension.	As specified Unit pitching is to be decided during detailed engineering based on SG island and TG island contractor data.
321	Part A	VI	4.00.00 (d)	14 of 33	Contractor to provide triple redundant sensors (limit switches) for the status of gates/valves to be implemented in 2oo3 configuration being used in protection of critical drives (BFP & CEP)	Bidder has observed there is discrepancy in no. of limit switches required on gate/valves for BFP & CEP. As per OEM standard practice, the valve open/close condition is used as an start permissive. Hence the limit switches as shown in Tender P&ID shall be provided. Please confirm the acceptance of the same	Usage of suction valve open/close condition in tripping of BFP and CEP shall be decided during detailed engineering based on finalised process write up. In case the same are used for protection, then triple redundant sensors (limit switches) are to be provided by Bidder in line with specification requirements.
	Part E	-	9915-999-POM-A-009 / 010		Condensate P&ID & Feedwater P&ID LSO & LSC are shown on CEP & BFP suction manual valves		

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
322	TECHNICAL SPECIFICATION SECTION – VI	Part-B, E-1	1.10.02 (b)	22 of 13	Condenser assembly All weld seams shall be subjected to DPT/MPI. At least 10% of butt welds shall be subjected to radiographic examination.	Bidder clarifies that all weld seams shall be subjected to 10% DPT/MPI as per contract clause 1.03.01 (a) page 12 of 23 of Part B, E-1. "a) All welds shall be visually examined. Radiographic examination of 10% of butt welds shall be carried out. However, for vacuum containing welds, R.T. on at least 10% of each butt weld shall be carried out. Surface defect examination by magnetic particle inspection or equivalent test method shall be carried out for minimum 10% weldments. This shall apply to site welds also." Bidder requests to accept the same	Bidder to meet the technical specification requirement.
323	PART-ETENDER DRAWINGS, 2, Layout	<div>Equipmet Layout Plan at El 0.0M (Side Mill Arrangement)</div> <div>Main Plant layout plan at EL.8.5/17.0 M/24.0M/28.0M/32.0M/38.0?</div> <div>Equipmet Layout Plan at El 0.0M (Front Mill Arrangement)</div>	<div>Drawin g no. 9915-999-POM-F-001</div> <div>Drawin g no. 9915-999-POM-F-002</div> <div>Drawin g no. 9915-999-POM-F-004</div>		TG annex building dimensions	Bidder's understanding is TG annex building (Control Tower) dimensions (Length X Height) provided in the drawing/specification is indicative only and bidder can provide the dimensions as per their layout keeping intact the Width (10.5 x 2 = 21.0 M) of annex building.	Bidder to refer the clause no-1.06.00, sub section -A-2 of section -VI, part-B wherein the area requirement for CCR and CER is defined at operating and mezzanine floor to be read in conjunction with other requirement given in this section for CCR, Control Tower.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
324	PART-ETENDER DRAWINGS, 2, Layout	Equipment Layout Plan at El 0.0M (Side Mill Arrangement)	Drawing no. 9915-999-POM-F-001		Floor level	Bidder understands that Equipment locations, Building dimensions & floors elevation of TG building are indicative only. Bidder can change floor levels as per bidder's layout keeping width of TG building (A to C row) 42 to 48 M. Kindly confirm bidder's understanding	Bidder to note that dimension thus (*) marked are tentative and can be optimised by the bidder. Please refer note no-17 of drawing no 9915-999-POM-F-001. Other dimensions are fixed.
		Main Plant layout plan at EL.8.5/17.0 M/24.0M/28.0M/32.0M/38.0?	Drawing no. 9915-999-POM-F-002				
		Equipment Layout Plan at El 0.0M (Front Mill Arrangement)	Drawing no. 9915-999-POM-F-004				
325	B	B-16	1.00.00 (1)	1 of 18	All the MV & LT Incomers, Bus Ties, Bus couplers and Transformer feeders shall be controlled from Switchgear SCADA and also from DDCMIS.	<p>All the MV & LT Incomers, Bus Ties, Bus couplers and transformer feeders covers and limited to Turbine Inland scope shall be controlled from Switchgear SCADA and also from TG DDCMIS .</p> <p>Bidder clarifies that no separate switchgear SCADA is envisaged by TI Bidder for BOP switchgear under TI package such as for 11KV & 3.3 KV FGD switchgear , 11KV & 3.3KV AHP switchgear , 11KV & 3.3 KV CHP switchgear . 11 KV WTP & 3.3 KV WTP switchgear etc. Please confirm.</p>	All switchgears(Main Plant & Off site) shall have provision to control from single Switchgear SCADA system under STG Package in line with the Technical specification.

CLARIFICATION NO 03 TO BIDDING DOCUMENTS (TECHNICAL SPECIFICATION)

Sl. No.	SECTION	SUB-SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION / CUSTOMER	REQUESTED CLARIFICATION	EMPLOYER REPLY
	B326	B-16	1.00.00 (3)	1 of 18	To integrate with DDCMIS the final HMI output shall be given to the LVS In respective control rooms. In case of offsite, the HMI shall be integrated with the respective offsite DDCMIS systems.	<p>To integrate with DDCMIS the final HMI output shall be given to the LVS In respective control rooms for scope covers & limited to TG DCS only.</p> <p>In case of offsite/BOP , the HMI shall be integrated with the respective offsite DDCMIS systems and same shall not be under TI bidder scope of supply.</p>	In case of offsite/BOP, the Bidder shall provide Swgr SCADA HMI output for integration with the respective offsite LVS. The LVS is not under Bidder's scope of supply.
327	PART-ETENDER DRAWINGS, 2, Layout	Equipmet Layout Plan at EI 0.0M (Side Mill Arrangement)	Drawing no. 9915-999-POM-F-001		-	Bidder understands that CW piping corridor shown in drawing is indicative only , same will be revised as per bidder's transformer yard layout. Kindly confirm bidders understanding.	
		Equipmet Layout Plan at EI 0.0M (Front Mill Arrangement)	Drawing no. 9915-999-POM-F-004				

Sl. No.	Specification Reference				Specification	Requested Clarification	Employer's Reply
	Volume	Section	Clause No	page			
1	III	BDS Item No. 9.0	ITB Cl. Ref. No. 39.0	20 of 31	Time for Completion of Facilities from the date of Notification of Award shall be 46 & 52 months for Unit 1 & Unit 2 respectively	Bidder understand that their is an typographical error in different places in bid specification and we request to kindly confirm that Completion of Facilities is 46 months for Unit 1 with unit gap of 6 months.	Completion of Facilities is 44 months for Unit 1 with a phase gap of 6 months for Unit-II. Please refer Amendment No. 5 to the Bidding Documents in this regard.
2	III	BDS Item No. 9.0	ITB Cl. Ref. No. 39.0	21 of 31	1.0 Milestone Schedule for Steam Turbine & Auxiliaries: Table Sl. No. 24 Completion of facilities : 44 Months		
3	V	SCC No. 1	Reference GCC Cl. 1	2 of 31	Time for Completion: "Completion of the Facilities" for Unit-1 & Common System for the project shall be attained within 46 months from the date of Notification of Award. There will be a phase gap of 6 months in completion of facilities for subsequent Units.		
4	V	SCC No. 6	Reference GCC Cl. 8.2	4 of 31	Time for Completion: "Completion of the Facilities" for Unit-1 & Common System for the project shall be attained within 46 months from the date of Notification of Award. There will be a phase gap of 6 months in completion of facilities for subsequent Units.		
5	VII (Book 1 of 3)	Attachment 14	1.0	1-2 of 6	Major Activity / Milestone Chart 1.0 Milestone Schedule for Steam Turbine & Auxiliaries: Table Sl. No. 24 Completion of facilities : 46 Months		
6	VII (Book 3 of 3, Part 1)	Appendix 4	1.0	2 of 8	Major Activity / Milestone Chart 1.0 Milestone Schedule for Steam Turbine & Auxiliaries: Table .. Sl. No. 24 Completion of facilities : 44 months		
7	III	BDS Item No. 9.0	ITB Cl. Ref. No. 39.0	20-21 of 31	1.0 Milestone Schedule for Steam Turbine & Auxiliaries: Complete table	Various mile stone schedules provided in Attachment - 14 does not match the mile stone schedule provided in other referred clause. Bidder request to kindly clarify the same.	Completion of Facilities is 44 months for Unit 1 with a phase gap of 6 months for Unit-II. Please refer Amendment No. 5 to the Bidding Documents in this regard.
8	VII (Book 3 of 3, Part 1)	Appendix 4	1.0	1-2 of 8	Major Activity / Milestone Chart 1.0 Milestone Schedule for Steam Turbine & Auxiliaries: Complete table		
9	VII (Book 1 of 3)	Attachment 14	1.0	1-2 of 6	Major Activity / Milestone Chart 1.0 Milestone Schedule for Steam Turbine & Auxiliaries: Complete table		
10	II	ITB	27.5	31 of 38	3. Adjustments for Functional Guarantees : X 4 Evaluated Bid Price FEP : (N+P+X)	Since there is no Functional guarantees under evaluation, hence bidder request to remove " Adjustments for Functional Guarantees : X" from evaluation formula.	This is a general clause. Since there is no adjustment factor for Bid evaluation, the same will not be applicable.
11	V	SCC	5.0, GCC reference Cl. 7.3.1.8	3 of 31	The Contractor shall guarantee the long term availability of spares of equipment manufactured by the Contractor or by SG manufacturer to the Employer for the full life of the equipment covered under the Contract. The Contractor/ SG manufacturer shall guarantee that before going out of production of spare parts of the equipment covered under the Contract, they shall give the Employer at least 2 years advance notice so that the latter may order his bulk requirement of spares, if it so desires. Further in case of discontinuance of manufacture of any spares by the Contractor / SG manufacturer ,.....	Bidder understand that their is typographical error in the referred paragraph and the same should be revised as below: The Contractor shall guarantee the long term availability of spares of equipment manufactured by the Contractor or by STG manufacturer to the Employer for the full life of the equipment covered under the Contract. The Contractor/STG manufacturer shall guarantee that before going out of production of spare parts of the equipment covered under the Contract, they shall give the Employer at least 2 years advance notice so that the latter may order his bulk requirement of spares, if it so desires. Further in case of discontinuance of manufacture of any spares by the Contractor /STG manufacturer,.....	Bidder's understanding is correct. Please refer Amendment No. 5 to the Bidding Documents in this regard.
12	V	SCC	5.0, GCC reference Cl. 7.3.1.9	3 of 31	The prices of all future requirements of item of spares manufactured by contractor / SG manufacturer beyond 3 years operational.....	Bidder understand that their is typographical error in the referred paragraph and the same should be revised as below: The prices of all future requirements of item of spares manufactured by contractor / STG manufacturer beyond 3 years operational.....	Bidder's understanding is correct. Please refer Amendment No. 5 to the Bidding Documents in this regard.

Sl. No.	Specification Reference				Specification	Requested Clarification	Employer's Reply
	Volume	Section	Clause No	page			
13	V	SCC	21, GCC reference Cl. 27.10	10 of 31	<p>The critical components covered under the extended warranty as specified in Technical Specification are the mill wear parts.</p> <p>Further, in case the Steam Turbine Generator Manufacturer has an evaporator in the reference Steam Turbine Generator designed for constant pressure (universal pressure) operation only and has an ongoing license agreement (which covers technology transfer) with the original Technology Owner (licensor) for design, manufacture, sell, use, service of once through variable pressure super critical steam turbine generator technology (with evaporator suitable for variable pressure operation in sub-critical and super critical pressure ranges), Contractor shall furnish an extended warranty of atleast one year for successful performance of Steam Turbine Generator as detailed in the Technical Specification.</p>	<p>Referred components / technology is not applicable to Steam Turbine Generator. Hence bidder request to delete this clause.</p>	<p>Please refer Amendment No. 5 to the Bidding Documents in this regard.</p>
14	V	SCC	30.1 (a)	14 of 31	<p>(a) Subsidiary Company The subsidiary company shall remain subsidiary company of the Qualified Steam Turbine Generator Manufacturer for a minimum period of seven (7) years from the date of incorporation of such subsidiary company or upto the end of defect liability period of this contract whichever is later in case the contractor is Qualified Steam Generator Manufacturer or Indian Subsidiary company of Qualified Steam Turbine Generator Manufacturer.</p>	<p>Bidder understand that their is typographical error in the referred paragraph and the same should be revised as below:</p> <p>(a) Subsidiary Company The subsidiary company shall remain subsidiary company of the Qualified Steam Turbine Generator Manufacturer for a minimum period of seven (7) years from the date of incorporation of such subsidiary company or upto the end of defect liability period of this contract whichever is later in case the contractor is Qualified Steam Turbine Generator Manufacturer or Indian Subsidiary company of Qualified Steam Turbine Generator Manufacturer.</p>	<p>Bidder's understanding is correct. Please refer Amendment No. 5 to the Bidding Documents in this regard.</p>
15	VII (Book 3 of 3, Part 2)	Form of DJU	Form 13C2	1 of 10	<p>*M/s a Company, other than the Qualified Steam Turbine Generator Manufacturer, registered under having its Registered Office at and having 25% or higher equity participation in the Indian Subsidiary Company/ JV Company (hereinafter jointly called the "OTHER PROMOTER",.....</p>	<p>Bidder understand that below paragraph of the DJU shall be as follows:</p> <p>**M/s a Company, other than the Qualified Steam Turbine Generator Manufacturer, registered under having its Registered Office at and having 25% or higher equity participation in the *Indian Subsidiary Company/ JV Company (hereinafter jointly called the "OTHER PROMOTER",....."</p> <p>Bidder request to kindly confirm that the bidders understanding is correct and accordingly amend the form of DJU.</p>	<p>Bidder's understanding is correct. Please refer Amendment No. 5 to the Bidding Documents in this regard.</p>
16	VII (Book 3 of 3, Part 2)	Form of DJU	Form 13C2	2 of 10	<p>AND WHEREAS clause 1.3.3 item 4.0 of BDS of Bidding Documents, stipulate that if the Qualified Steam Turbine Generator Manufacturer meets the requirement of Clause 1.1.1 of item 4.0 of BDS (except for Generator), then the Subsidiary Company / Joint Venture Company shall associate.....</p>	<p>Bidder understand that below paragraph of the DJU shall be as follows:</p> <p>"AND WHEREAS clause 1.3.3 item 4.0 of BDS of Bidding Documents, stipulate that if the Qualified Steam Turbine Generator Manufacturer meets the requirement of Clause 1.1.1 of item 4.0 of BDS (except for Generator), then the *Subsidiary Company / Joint Venture Company shall associate....."</p> <p>Bidder request to kindly confirm that the bidders understanding is correct and accordingly amend the form of DJU.</p>	<p>Bidder's understanding is correct. Please refer Amendment No. 5 to the Bidding Documents in this regard.</p>

Sl. No.	Specification Reference				Specification	Requested Clarification	Employer's Reply
	Volume	Section	Clause No	page			
17	VII (Book 3 of 3, Part 2)	Form of DJU	Form 13C2	3 of 10	3. We, the Qualified Steam Turbine Generator Manufacturer and the Qualified Generator Manufacturer do further undertake, declare and confirm that we shall be fully responsible for imparting relevant training to the personnel of the Indian Manufacturing Company as part of the technology transfer agreement	Bidder understand that below paragraph of the DJU shall be as follows: "3. We, the Qualified Steam Turbine Generator Manufacturer and the *Qualified Generator Manufacturer do further undertake, declare and confirm that we shall be fully responsible for imparting relevant training to the personnel of the Indian Manufacturing Company as part of the technology transfer agreement" Bidder request to kindly confirm that the bidders understanding is correct and accordingly amend the form of DJU.	Bidder's understanding is correct. Please refer Amendment to the Bidding Documents in this regard.
18	VII (Book 3 of 3, Part 2)	Form of DJU	Form 13C2	3 of 10	4. That in consideration of the award of the Contract by the Employer to the Contractor, we the Qualified Steam Turbine Generator Manufacturer, Qualified Generator Manufacturer , OTHER PROMOTER.....	Bidder understand that below paragraph of the DJU shall be as follows: "4. That in consideration of the award of the Contract by the Employer to the Contractor, we the Qualified Steam Turbine Generator Manufacturer, *Qualified Generator Manufacturer , OTHER PROMOTER....." Bidder request to kindly confirm that the bidders understanding is correct and accordingly amend the form of DJU.	Bidder's understanding is correct. Please refer Amendment No. 5 to the Bidding Documents in this regard.
19	VII (Book 3 of 3, Part 2)	Form of DJU	Form 13C2	3 of 10	6. ....The liability of the the Qualified Steam Turbine Generator Manufacturer, Indian Subsidiary Company/ JV Company and OTHER PROMOTER shall be limited to an amount equivalent to US\$ 87 Million for each.....	Bidder understand that below paragraph of the DJU shall be as follows: "6. ....The liability of the the Qualified Steam Turbine Generator Manufacturer, *Indian Subsidiary Company/ JV Company and OTHER PROMOTER shall be limited to an amount equivalent to US\$ 87 Million for each....." Bidder request to kindly confirm that the bidders understanding is correct and accordingly amend the form of DJU.	Bidder's understanding is correct. Please refer Amendment No. 5 to the Bidding Documents in this regard.
20	VII (Book 3 of 3, Part 2)	Form of DJU	Form 13C2	4 of 10	7 e).....For the items to be manufactured by the Contractor's design, the Qualified Steam Turbine Generator Manufacturer shall ensure completeness and correctness of the design, data, document and information in every detail provided to the Indian subsidiary/Joint Venture Company , which would.....	Bidder understand that below paragraph of the DJU shall be as follows: "7 e).....For the items to be manufactured by the Contractor's design, the Qualified Steam Turbine Generator Manufacturer shall ensure completeness and correctness of the design, data, document and information in every detail provided to the *Indian subsidiary/Joint Venture Company , which would....." Bidder request to kindly confirm that the bidders understanding is correct and accordingly amend the form of DJU.	Bidder's understanding is correct. Please refer Amendment No. 5 to the Bidding Documents in this regard.
21	VII (Book 3 of 3, Part 2)	Form of DJU	Form 13C2	4 of 10	7 f) The Qualified Steam Turbine Generator Manufacturer shall be responsible to manufacture portion of the equipment which are to be manufactured at its works or its Indian subsidiary's/Joint Venture Company's	Bidder understand that below paragraph of the DJU shall be as follows: "7 f) The Qualified Steam Turbine Generator Manufacturer shall be responsible to manufacture portion of the equipment which are to be manufactured at its works or its Indian *subsidiary's/Joint Venture Company's" Bidder request to kindly confirm that the bidders understanding is correct and accordingly amend the form of DJU.	Bidder's understanding is correct. Please refer Amendment No. 5 to the Bidding Documents in this regard.

Sl. No.	Specification Reference				Specification	Requested Clarification	Employer's Reply
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22	VII (Book 3 of 3, Part 2)	Form of DJU	Form 13C2	5 of 10	8.Employer to the Contractor shall prejudice any right of Employer under this Deed of Joint Undertaking to proceed against the Qualified Generator Manufacturer , the Qualified Steam Turbine Generator Manufacturer, OTHER PROMOTER and Contractor.....	Bidder understand that below paragraph of the DJU shall be as follows: "8.Employer to the Contractor shall prejudice any right of Employer under this Deed of Joint Undertaking to proceed against the *Qualified Generator Manufacturer , the Qualified Steam Turbine Generator Manufacturer, OTHER PROMOTER and Contractor....." Bidder request to kindly confirm that the bidders understanding is correct and accordingly amend the form of DJU.	Bidder's understanding is correct. Please refer Amendment No. 5 to the Bidding Documents in this regard.
23	III	BDS Item No. 4.0	ITB Cl. Ref. No. 8.1.2 (a) 1.1.1.	2 of 31	The Bidder should have designed, engineered, manufactured / got manufactured, erected / supervised erection, commissioned / supervised commissioning of (i) at least one (1) number supercritical steam turbine of tandem compound, condensing, reheat type of 500 MW or above capacity with main steam pressure of 225 Kg/cm2 (gauge) or higher and main steam / reheat temperature of 5650 C /5650 C or higher and....	Bidder understand that their is an typographical error and paragraph should be read as below: The Bidder should have designed, engineered, manufactured / got manufactured, erected / supervised erection, commissioned /supervised commissioning of (i) at least one (1) number supercritical steam turbine of tandem compound, condensing, reheat type of 500 MW or above capacity with main steam pressure of 225 Kg/cm2 (gauge) or higher and main steam / reheat temperature of 565 ° C /565 ° C or higher and..... Please confirm that bidders understanding is correct.	Bidder's understanding is correct. Bidder may also refer Section-I (IFB) in this regard.
24	III	BDS	Item No. 13	27 of 31	Royalty 1. The Bid Price shall be inclusive of any Royalties or Seigniorage Fee or Cess or other charges payable on the quarried or mined metal,minerals, or minor minerals, as the case may be, at the rate(s) prevailing as on seven (7) days prior to the date of Price bid opening	Bidder understand that if earth excavated by contractor during construction works within the plant premises can be used for further construction elsewhere within the plant boundaries without applicability of Royalty? Please confirm.	Bidder may refer clause 45 of Section-V (SCC) regarding Royalty and quote their prices accordingly. However, in case Royalty is levied on earth excavated by contractor during construction works within the plant premises, the same will be paid by the Bidder and reimbursed by the Employer upon submission of documentary evidence by the Bidder.
25	III	BDS Item No. 6.1	ITB Cl. Ref. No. 16.1	19 of 31	Address to which physical documents shall be submitted : AGM (Corporate Contracts) THDC India Ltd., Pragati Bhawan, By-Pass Road, Pragatipuram, Rishikesh - 249 201 Ph. No. 0135-2431461/2473229/2473469	Bidder request to clarify that Bid / Communication to be addressed to GM (Corporate Contracts) or AGM (Corporate Contracts)	Bidder's understanding is correct. Please refer Amendment No. 5 to the Bidding Documents in this regard.
26	Detailed Invitation for Bids	-	-	18 of 18	Address for Communication: GM (Corporate Contracts) THDC India Ltd., Pragati Bhawan, By-Pass Road, Pragatipuram, Rishikesh - 249 201 Ph. No. 0135-2431461 /2473229/ 2473469		
27	VII	Book 1 of 3	Attachment 3C	1 of 2	(Details of Design, Engineering, Manufacturing and Testing Capabilities of Bidder and/or wherever applicable, Qualified Steam Generator Manufacturer, Promoters of Indian Subsidiary Company/Promoters of Indian Joint Venture (JV) Company, as applicable	Bidder understand that their is an typographical error and the said paragraph should be read as "(Details of Design, Engineering, Manufacturing and Testing Capabilities of Bidder and/or wherever applicable, Qualified Steam Turbine Generator Manufacturer, Promoters of Indian Subsidiary Company/Promoters of Indian Joint Venture (JV) Company, as applicable" Accordingly bidder request to amend the Attachment 3C	Bidder's understanding is correct. Please refer Amendment No. 5 to the Bidding Documents in this regard.

Sl. No.	Specification Reference				Specification	Requested Clarification	Employer's Reply
	Volume	Section	Clause No	page			
28	VII	Book 2 of 3	Cl. 15.0 Bid Form	8 of 8	We confirm that we have quoted the mandatory spares price on CIF/Ex-works basis for grinding elements for coal pulverisers alongwith Attachment-6(P) which shall be considered for evaluation of bids. Further, we confirm that quoted mandatory spares price of grinding elements for coal pulverisers indicated in Attachment-6(P) is included in the total price of all the mandatory spares of Steam Generator and Auxiliaries quoted by us in Schedule-1/Schedule-2.	Bidder understand that their is an typographical error and the said paragraph should be read as "We confirm that we have quoted the mandatory spares price on CIF/Ex-works basis for grinding elements for coal pulverisers along with Attachment-6(P) which shall be considered for evaluation of bids. Further, we confirm that quoted mandatory spares price of grinding elements for coal pulverisers indicated in Attachment-6(P) is included in the total price of all the mandatory spares of Steam Turbine Generator and Auxiliaries quoted by us in Schedule-1/Schedule-2." Accordingly bidder request to amend the Bid Form.	This clause is not applicable for the subject package. Please refer Amendment No. 5 to the Bidding Documents in this regard.
29	VII	Book 2 of 3	Schedule - 12	1 of 10	STEAM GENERATOR AND ASSOCIATED PACKAGES INCLUDING SITE LEVELING FOR KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) BIDDING DOCUMENT NO. : THDC/RKSH/CC-9915-370	Bidder understand that referred document is not applicable for TG package. Request you to release correct format applicable for TG package.	Please refer Amendment No. 5 to the Bidding Documents in this regard.
30	VII	Book 1 of 3	Attachment - 3H	1 of 10	TURBINE GENERATOR AND ASSOCIATED PACKAGES FOR KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) BIDDING DOCUMENT NO. : THDC/RKSH/CC- 9915-370	Bidder understand that there is an typographical error in the bidding document no. and same may be corrected as THDC/RKSH/CC- 9915-371	Bidder's understanding is correct. Please refer Amendment No. 5 to the Bidding Documents in this regard.
31	IV	GCC	25.2.1	33 of 57	The Guarantee Tests (and repeats thereof) shall be conducted by the Contractor along with Commissioning (i.e. initial operation) of the Facilities or the relevant part thereof to ascertain whether the Facilities or the relevant part can attain the Functional Guarantees specified in the Contract Documents.	Bidder request to carry out the PG test after completion of facilities (COF) , i.e. beyond 46 months for Unit 1 und after 52 months for Unit 2. As, to conduct the PG test plant needs certain stabilization in operation and if any fine tuning is required, that can be carried out in this period.	Provisions of Bidding documents shall prevail.
32	VII Book 1 of 3	Attachment 18	Note : 3	3 of 31	3. The certificates from a practicing Chartered Accountant shall be submitted by the bidder certifying the amount of subscribed and paid up share capital, or net worth as the case may be as on a date not earlier than 15 days from the date of techno-commercial bid opening / award date as applicable.	In case of extension date of bid submission, the certificate need to be revised every time. Hence bidder request to amend the clause as follows: 3. The certificates from a practicing Chartered Accountant shall be submitted by the bidder certifying the amount of subscribed and paid up share capital, or net worth as the case may be as on a date not earlier than 15 days from the original date of techno-commercial bid opening / award date as applicable.	Provisions of Bidding documents are clear and shall prevail.
33	II	ITB	8.1.1	5 of 38	In addition to uploading at website portal http://eprocure.gov.in/eprocure/app , Original documents to be submitted in physical form in separate sealed envelope (s) duly marked in accordance with ITB clause 15	Bidder understand that technical bids will not be visible to other bidders participating in this bid. Bidder request to kindly confirm the same.	Bidder's understanding is correct.
34	General	-	-	-	-	Bidder request to arrange a training session on bid submission procedure on CPP portal.	Please refer Clarification No. 2 in this regard.
35	IV	GCC	GCC Cl. Reference 14.4	18 of 57	_____However, these adjustments would be restricted to direct transactions between the Employer and Contractor and Bought out items (dispatched directly from sub-vendor's works to Site). These adjustments shall not be applicable on procurement of raw materials, intermediary components, and intermediary services etc. by the Contractor._____	Kindly clarify whether 'Direct Transactions' would cover all service transactions whether performed by the bidder through its own people or through sub-contractors (including civil sub-contractors).	Provisions of Bidding documents are clear and shall prevail. 'Direct Transactions' referred to in GCC clause 14.4 includes both the goods and the services.
36	Sec-II Sec-VII (Book 1 of 3)	Sec-II Sec-VII (Book 1 of 3)	8.1.1 (m) & 41.0 Attachment-20	7 & 37 of 38 Page 1 to 5 of 5	Attachment-20: Integrity Pact	Bidder couldn't find Integrity Pact duly signed on behalf of the Employer in the bidding documents and request to provide the same.	Bidder to submit Attachment-20: Integrity Pact as provided in the Bidding Documents.

Sl. No.	Specification Reference				Specification	Requested Clarification	Employer's Reply
	Volume	Section	Clause No	page			
37	ITB	Sec-II	10.6.3	17 of 38	Concessional Custom Duty for Power Project	Bidder understand that bidder is responsible for availing the concessional custom duty for power projects, however necessary certificates viz. Project Essentiality Certificate (PEC) and any other document / certificate required for availing such benefits has to be provided by Employer. Hence bidder request to add the following at the end of this clause: "Necessary certificates or any other document or information as may be required by the authorities and has to be provided by the Employer for availing such benefits shall be provided by Employer in a timely manner"	Provisions of Bidding documents are clear and shall prevail.
38	BDS	Sec-III	19.0	28 of 31	Add a new ITB Clause 45.0 as under: Delay in signing of contract agreement In case delay in signing of contract agreement attributable to the contractor is caused due to non-submission of performance security within the stipulated time, a penalty shall be deducted from the RA bill (s) of the contractor as per the slab given below:	There are no clauses in ITB after clause 42.0. As per clause 3.3, Article 3, of Form 5, Form of Contract Agreement, under Sec-VII, Book 3 of 3 (Part-1), if the Contract Agreement has not been duly executed for and on behalf of the Employer and the Contractor and Contractor has not submitted the Performance Security, Security towards faithful performance of the Deed(s) of Joint Undertaking (if applicable) and the Down Payment Security within two (2) months from the date of Notification of Award because of the reasons attributable to the contractor, the contract will become effective from the date of Notification of Award. In this case, Contract Price and/or time of completion shall not be adjusted. Also as per clause 12.7, Sec-II, Employer has the right to forfeit the Bid Security in case Bidder fails to sign the contract agreement and/or furnish the required Contract Performance Guarantee/Security. Bidder request to delete this clause.	Provisions of Bidding documents are clear and shall prevail.
39	GCC	Sec-IV	7.3.1.13 (iii)	13 of 62	The Defects Liability of spares that are not used within 18 months from the respective date of the delivery at Site covered in para (b) and (c) above will, however, be subject to condition that all such spares being stored/maintained/preserved in accordance with Contractor's standard recommended practice, if any, and the same has been furnished to the Employer.	Provisions of this clause applies to all categories of spares, hence bidder request to modify the clause as below: <i>"The Defects Liability of spares covered in para (i) (a), (b) and (c) above will, however, be subject to condition that all such spares being stored/maintained/preserved in accordance with Contractor's standard recommended practice, if any, and the same has been furnished to the Employer."</i>	Provisions of Bidding documents shall prevail.
40	GCC	Sec-IV	9.3	14 of 57	permits, approvals and/or licenses	Bidder request to include responsibility matrix specifying obligation of each party for its permits/licenses, accordingly please Modify the last sentence of the clause as below: <i>"The Employer and Contractor shall acquire in their name all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located that are necessary for the performance of the Contract. Responsibility matrix mentioning responsibility of each party is mutually agreed between the parties within 30 days of NOA and shall form part of contract document"</i>	Provisions of Bidding documents shall prevail.
41	GCC	Sec-IV	21.4	26 of 57	Customs Clearance: In the event of delays in customs clearance due to fault of the Employer, the Contractor shall be entitled to an Extension in the Time for Completion, pursuant to GCC Clause 40.	Please add at the end: <i>"and all resulting additional costs (if any) incurred by the Contractor, including storage costs, demurrages, etc."</i>	Provisions of Bidding documents shall prevail.
42	GCC	Sec-IV	22.1.1	26 of 57	Bench Mark: If such error is based on incorrect data provided in writing by or on behalf of the Employer, the expense of rectifying the same shall be borne by the Employer.	Please add at the end: <i>"and corresponding extension of Time for Completion shall be granted to the Contractor"</i>	Provisions of Bidding documents shall prevail.

Sl. No.	Specification Reference				Specification	Requested Clarification	Employer's Reply
	Volume	Section	Clause No	page			
43	GCC	Sec-IV	27.8	36 of 57	Defect Liability: If the Facilities or any part thereof cannot be used by reason of such defect and/or making good of such defect, the Defects Liability Period of the Facilities or such part, as the case may be, shall be extended by a period equal to the period during which the Facilities or such part cannot be used by the Employer because of any of the aforesaid reasons. Upon correction of the defects in the Facilities or any part thereof by repair/replacement, such repair/replacement shall have the Defects Liability Period extended by a period of twelve (12) month from the time such replacement/repair of the Facilities or any part thereof	Please add at the end of this clause: <i>"However, in no event shall the Defect Liability Period for the Equipment and any additional defect liability period (for repaired or replaced parts) exceed 42 months from the date of Schedule Completion".</i>	Provisions of Bidding documents shall prevail.
44	GCC	Sec-IV	39.2.5	49 of 57	Payment and interim extension of time for executed works under 'Pending Agreement Change Order' issued by the Employer.	Please add the following at the end of clause: <i>"In cases where the Pending Agreement Change Order is issued by the Employer, in accordance to detail provided in the submitted Change proposal, for the executed work, the Employer shall grant the Contractor an interim Extension of Time and pay the Contractor on 'on account basis' until parties reach an agreement in accordance with the provisions of GCC Sub-Clause 6.1"</i>	Provisions of Bidding documents shall prevail.
45	GCC	Sec-IV	40.2	50 of 57	Extension of Time for Completion: As soon as reasonably practicable after receipt of such notice and supporting particulars of the claim, the Employer and the Contractor shall agree upon the period of such extension.	Bidder request to include Time bar on agreement of Extension of Time review and approval by Employer, accordingly please modify the clause as below: <i>"The customer shall review the claim and provide its acceptance or rejection within 25 days from the date of notification of claim by Contractor."</i>	Provisions of Bidding documents shall prevail.
46	SCC	Sec-V	8.0	5 of 31	Values of the Contract Performance Securities furnished by Main Contractor shall be reduced to 67% and 34% of their original values on expiry of ninety (90) days after actual completion of defect liability period of all facilities relating to Unit-I and Unit-II respectively.	As there are only Two Units, so value of Performance security should be reduced to 50% on completion of defect liability period of first Unit. Bidder request to modify the clause as below: <i>"Values of the Contract Performance Securities furnished by Main Contractor shall be reduced to 50% of their original values on expiry of ninety (90) days after actual completion of defect liability period of all facilities relating to Unit-I."</i>	Provisions of Bidding documents shall prevail.
47	SCC	Sec-V	23.0	11 of 31	Limitation of Liability: The Limitation of total Liability of the DJU Partner(s) (other than Contractor) to the Employer shall be limited to the Liability amount specified in the respective Deed of Joint Undertaking(s), However, the aggregate liability of the Contractor to the Employer, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to any obligation of the Contractor to indemnify the Employer with respect to patent infringement.	Bidder understand that the aggregate liability of the Contractor and Contractor's DJU Partner(s) / executant(s) (other than Contractor) to the Employer, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to any obligation of the Contractor to indemnify the Employer with respect to patent infringement. Please confirm	Provisions of Bidding documents are clear and shall prevail.

Sl. No.	Specification Reference				Specification	Requested Clarification	Employer's Reply
	Volume	Section	Clause No	page			
48	SCC	Sec-V	56 (GCC 20.3.5)	29 of 31	If any dispute or difference occurs between the Employer and the Contractor in connection with or arising out of the disapproval by the Project Manager of any document and/or any modification(s) thereto that cannot be settled between the parties within a reasonable period, then such dispute or difference may be referred to Director (Technical), THDCIL for determination in accordance with GCC Sub-Clause 6.1 hereof. If such dispute or difference is referred to Director (Technical), THDCIL, the Project Manager shall give instructions as to whether and if so, how, performance of the Contract is to proceed. The Contractor shall proceed with the Contract in accordance with the Project Manager's instructions, provided that if the Director (Technical), THDCIL upholds the Contractor's view on the dispute and if the Employer has not given notice under GCC Sub Clause 6.2.1 hereof, then the Contractor shall be reimbursed by the Employer for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the Director (Technical), THDCIL shall decide, and the Time for Completion shall be extended accordingly.	Clause 6.1 requires disputes to be settled first through mutual consultation and in case parties fail to resolve any such dispute by mutual consultation, then the dispute shall be referred to Adjudicator. Bidder therefore request to keep the provision of this clause as per GCC 20.3.5.	Provisions of Bidding documents are clear and shall prevail.
49	SCC	Sec-V	57 (GCC 23.7)	29 of 31	If any dispute or difference of opinion shall arise between the parties in connection with or arising out of the test and/or inspection of the Plant and Equipment or part of the Facilities that cannot be settled between the parties within a reasonable period of time, it may be referred to the Director (Technical), THDCIL for determination in accordance with GCC Sub-Clause 6.1.	Clause 6.1 requires disputes to be settled first through mutual consultation and in case parties fail to resolve any such dispute by mutual consultation, then the dispute shall be referred to Adjudicator. Bidder therefore request to keep the provision of this clause as per GCC 23.7.	Provisions of Bidding documents are clear and shall prevail.
50	SCC	Sec-V	58 (GCC 39.2.5)	30 of 32	If the parties cannot reach agreement within sixty (60) days from the date of issue of the Pending Agreement Change Order, then the matter may be referred to the Director (Technical), THDCIL in accordance with the provisions of GCC Sub-Clause 6.1.	Clause 6.1 requires disputes to be settled first through mutual consultation and in case parties fail to resolve any such dispute by mutual consultation, then the dispute shall be referred to Adjudicator. Bidder therefore request to keep the provision of this clause as per GCC 39.2.5.	Provisions of Bidding documents are clear and shall prevail.
51	SCC	Sec-V	59 (GCC 40.2)	31 of 32	the Contractor shall be entitled to refer the matter to the Director (Technical), THDCIL, pursuant to GCC Sub-Clause 6.1.	Clause 6.1 requires disputes to be settled first through mutual consultation and in case parties fail to resolve any such dispute by mutual consultation, then the dispute shall be referred to Adjudicator. Bidder therefore request to keep the provision of this clause as per GCC 40.2.	Provisions of Bidding documents are clear and shall prevail.
52	Book 3 of 3 Part 1	Sec-VII	60 (GCC 12.4) Appendix-1 to Form-5 clause 5.3	30 & 31 of 31 15 of 29	Payments related to Erection / Civil / Site Fabricated Structural Works	Bidder requests to delete this requirement of payments related to Erection / Civil / Structural works through a separate account and made such payments directly to the Contractor	Provisions of Bidding documents shall prevail.
53	Book 3 of 3 Part 1	Sec-VII	Appendix-1 to Form-5 clause 5.1	25 of 29	The Employer will establish an irrevocable Letter of Credit (L/C) in favour of the Contractor through the Employer's Bank in Employer's country for payments due, as per Terms of Payment, on despatch of equipments including Mandatory Spares i.e. CIF despatch of equipments including Mandatory Spares (including due payments towards Ocean Freight and Marine Insurance).	Bidder request for L/C for Ex-Works dispatch of equipments including Mandatory Spares, accordingly pleasemodify this clause as below: <i>The Employer will establish an irrevocable Letter of Credit (L/C) in favour of the Contractor through the Employer's Bank in Employer's country for payments due, as per Terms of Payment, on despatch of equipments including Mandatory Spares i.e. Ex-Works/CIF despatch of equipments including Mandatory Spares (including due payments towards Ocean Freight and Marine Insurance).</i>	Provisions of Bidding documents are clear and shall prevail.
54	Book 2 of 3	VII	Price Schedule 3	Complete Price Schedule 3	Schedule No. 3 : Local Transportation including Port Handling, Port Clearance & Port Charges, Inland Insurance and other local costs incidental to delivery of plant & equipment and mandatory spares at site.....	Currently, a consolidated consideration has been envisaged for local transportation, inland transit insurance, loading, unloading etc. It is requested that consideration for local transportation should be segregated from consideration for other services like inland transit insurance.	Provisions of Bidding documents shall prevail.

Sl. No.	Specification Reference				Specification	Requested Clarification	Employer's Reply
	Volume	Section	Clause No	page			
55	BDS	II	10.6	17 of 38	Concessional Custom Duty for Power Projects Bidder may ascertain the availability of custom duty benefits	Whether Employer would be 'importer on record' for supplies from outside India covered Schedule 1. If yes, then whether High Sea Sales model is acceptable to the Employer	Bidder's understanding is correct.
56	GCC	III	14	17 of 57	Taxes and Duties: Except as otherwise		
57	SCC	V	9 (Reference GCC Clause 14)	6 of 31	Taxes and Duties: Add the following at the end.....		
58	SCC	Sec-V	6.2.1	26 of 31	The mechanism of settling the disputes through arbitration shall be applicable only in cases where the disputed amount (i.e. total amount of Claims excluding claims of interest) does not exceed Rs. 25 crores. In case the disputed amount exceeds Rs. 25 Crores, the parties shall be within their rights to take recourse to remedies as may be available to them under the applicable laws....	In case the dispute is more than Rs. 25 Crore bidder suggests that dispute resolution shall be by institutional arbitration like Delhi arbitration.	Provisions of Bidding documents shall prevail.
59	SCC	Sec-V	6.2.1	27 of 31	The parties to the contract shall invoke arbitration within Six months from the date of completion of the Facilities under the contract or the termination of the contract as the case may be and the parties shall not invoke arbitration later on after expiry of the said period of six months. The parties shall not invoke arbitration other than in the case of completion of the Facilities or the termination of the contract as mentioned above.	This clause prohibits parties to commence arbitration prior to completion of facilities or termination of contract. Considering that the contractor under Clause 6.4 is required to still proceed with the obligations under the contract, Bidder therefore request that there should be no time bar on the ability of the contractor to commence arbitration even prior to completion/termination.	Provisions of Bidding documents shall prevail.
60	SCC	Sec-V	6.5	29 of 31	No claim for interest or damage will be entertained or be payable by the corporation in respect of any amount or balance which may be lying with the corporation or may become due owing to any dispute, difference or misunderstanding between the parties or in respect of any delay or omission on the part of the Engineer in charge in making intermediate or final payment or in respect of any amount/ damage which may be claimed through arbitration or in any other respect whatsoever	As per Clause 6.4 (b) ,In case of arbitration, the Employer is liable to pay the Contractor any money due. Hence bidder request to delete this clause.	Provisions of Bidding documents shall prevail.

Sl. No.	Specification Reference				Specification					Requested Clarification	Employer's Reply
	Volume	Section	Clause No	page							
61	VI	Part - A, FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	1.01.02	5 of 20	Sl. No.	Guarantee	Rate of Liquidated Damage (LD)	Acceptable Shortfall Limit with LD	Upper Limiting Value	Bidder request to kindly revise the acceptable shortfall limit for turbine heat rate as +2.5% of the guaranteed value considering the guarantee test procedure methodology proposed in the specification document.	Please refer Amendment to Technical Specifications in this regard.
					i)	For Increase in the Guaranteed Turbine Cycle heat rate in Kcal/Kwhr at	US \$ 722,311 (US Dollar Seven Hundred Twenty Two Thousand	(+) 1% of the Guaranteed turbine cycle heat rate.	1795 Kcal/Kwhr		
						660MW under rated steam conditions at 77 mmHg(abs) condenser pressure with zero make up	Three Hundred Eleven only) per 1 Kcal/Kwhr increase in Turbine Cycle heat rate				
					ii)	For Increase in the Guaranteed Turbine Cycle Heat rate in Kcal/Kwhr under turbine throttle main steam pressure of 150 Kg/cm2(abs) and with rated steam temperature at 77 mmHg(abs) condenser pressure and zero make up at 363 MW	(US \$ 118,665 (US Dollar One Hundred Eighteen Thousand Six Hundred Sixty Five only) per 1 Kcal/Kwhr increase in Turbine Cycle heat rate	(+) 1% of the Guaranteed turbine cycle heat rate.	1905 Kcal/Kwhr		

Clarification No. 04 to Bidding Document (Commercial Portion)

S/N	Section/Part/ Chapter/Volume	Clause No.	Page No.	Bidding Document Clause	Statement of Bidders' Queries & Clarifications	Employer's Reply
1.	Section-II, ITB	8.1.2	10/38	Attachment 5: Subcontractors Proposed by the Bidder After discussion between Employer and the Contractor, relevant appendix to Contract Agreement (List of Sub-Contractors) shall be completed, listing the approved Sub Contractor(s)/Vendor(s) for each item.	We understand that the Bidder/Contractor may include some Vendors/Sub-contractors in the Vendor list which are not approved (but in DR Category) for Employer's approval during execution stage.	Provisions of Bidding documents shall prevail. Bidder may refer clause 19 of GCC in this regard.
2.	Section-II, ITB	10.1	14/38	Unless otherwise specified in the Technical Specifications, Bidders shall quote for the entire facilities on a "single responsibility" basis such that the total bid price covers all the Contractor's obligations mentioned in or to be reasonably inferred from the bidding documents in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation, commissioning, Completion of the facilities and conductance of Guarantee tests for the facilities including supply of mandatory spares (if any).	We request the Employer to modify the clause as follows: Unless otherwise specified in the Technical Specifications, Bidders shall quote for the entire facilities on a "single responsibility" basis such that the total bid price covers all the Contractor's obligations mentioned in or to be reasonably inferred from the bidding documents in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation, commissioning, Completion of the facilities and conductance of Guarantee tests for the facilities including supply of mandatory spares (if any).	Provisions of Bidding documents shall prevail.

Package: Turbine Generator And Associated Packages

Project: Khurja Super Thermal Power Project, (2 X 660 MW)

Doc. No.: THDC/RKSH/CC-9915-371-CLRF.04

Clarification No. 04 to Bidding Document (Commercial Portion)

S/N	Section/Part/ Chapter/Volume	Clause No.	Page No.	Bidding Document Clause	Statement of Bidders' Queries & Clarifications	Employer's Reply
3.	Section-II, ITB	10.4	16/38	Import duty and Goods and Services Tax (GST) applicable on goods and services specified in Schedule No. 1 shall not be included in the schedule, but shall be quoted separately in Schedule No. 7A. The Import duty and Goods & Services Tax (GST) quoted by the bidder in Schedule No. 7A shall be as applicable in the Employer's country as on seven (7) days prior to the deadline for submission of Price Bids.	<p>Bidder understands that the Import duty and Goods & Services Tax (GST) quoted by the bidder in Schedule No. 7A shall be as applicable in the Employer's country as on seven (7) days prior to the last date for submission of bids. The exchange rate for conversion of foreign currency portion into Indian Rupees shall be as per SBI Bill selling exchange rates as applicable on seven (7) days prior to the last date for submission of Price Bids. Kindly confirm.</p> <p>Further, Bidder understands that any Imports Duty and Goods and Services Tax (GST) variation due to exchange rate (with respect to exchange rates as applicable on seven (7) days prior to the last date for submission of bids) shall be paid at actuals (based on Bill of entry) by the Employer, beyond the amount quoted in Schedule No. 7A. Kindly confirm.</p>	Provisions of Bidding documents shall prevail. Bidder may also refer clause 14 (Taxes and Duties) of GCC in this regard.
4.	Section-II, ITB	10.4	16/38	(d) Bidders are advised to price their bids in such a manner that Installation Price Component of the bid price (excluding Civil/Structural works price) should not be less than 15% of the cumulative total of FOB Price of Main Equipment indicated in Schedule No.1 and Ex-works Price	<p>As per Bidder's past experience, the Installation services price (excluding Civil/Structural works price) will be in the range of 8%-10% i.e. much lower than 15% of FOB & Ex-works price of Main Equipment.</p> <p>In view of the above, we request</p>	Provisions of Bidding documents shall prevail.

Package: Turbine Generator And Associated Packages

Project: Khurja Super Thermal Power Project, (2 X 660 MW)

Doc. No.: THDC/RKSH/CC-9915-371-CLRF.04

Clarification No. 04 to Bidding Document (Commercial Portion)

S/N	Section/Part/ Chapter/Volume	Clause No.	Page No.	Bidding Document Clause	Statement of Bidders' Queries & Clarifications	Employer's Reply
				of Main Equipment indicated in Schedule No.2. In case the Installation Price is below the minimum percentage specified above, the amount by which it is lower shall be retained proportionately from the FOB & Exworks component of Contract price while releasing payments due on receipt of equipment, and no interest shall be payable on the retained amount. The aforesaid retained amount shall be paid on pro-rata basis upon completion of installation of the respective equipment and its certification by the Project Manager.	Employer to modify the clause as follows: (d) Bidders are advised to price their bids in such a manner that Installation Price Component of the bid price (excluding Civil/Structural works price) should not be less than 15% 10% of the cumulative total of FOB Price of Main Equipment indicated in Schedule No.1 and Ex-works Price of Main Equipment indicated in Schedule No.2. In case the Installation Price is below the minimum percentage specified above, the amount by which it is lower shall be retained proportionately from the FOB & Exworks component of Contract price while releasing payments due on receipt of equipment, and no interest shall be payable on the retained amount. The aforesaid retained amount shall be paid on pro-rata basis upon completion of installation of the respective equipment and its certification by the Project Manager.	
5.	Section-II, ITB	10.5	17/38	The terms EXW, FOB, CIF, etc., shall be governed by the rules prescribed in the current edition of Incoterms, published by the International Chamber of Commerce, 38, Cours Albert 1er, 75008, Paris, France.	We request Employer to modify the clause as follows: The terms EXW, FOB, CIF, etc., shall be governed by the rules prescribed in the current edition of Incoterms, published by the International Chamber of Commerce,	Provisions of Bidding documents shall prevail.

Package: Turbine Generator And Associated Packages

Project: Khurja Super Thermal Power Project, (2 X 660 MW)

Doc. No.: THDC/RKSH/CC-9915-371-CLRF.04

Clarification No. 04 to Bidding Document (Commercial Portion)

S/N	Section/Part/ Chapter/Volume	Clause No.	Page No.	Bidding Document Clause	Statement of Bidders' Queries & Clarifications	Employer's Reply
					38, Cours Albert 1er, 75008, Paris, France <u>prevailing at the date seven (7) days prior to the date of price bid submission. Any changes in Incoterms after submission of the Bid shall not be applicable.</u>	
6.	Section-II, ITB	10.6.3	17/38	The bidders shall themselves be solely responsible for availing the above benefits, which they have considered in their bid. In case of failure of the bidders to receive the benefits partly or fully from the Govt. of India and/or in case of any delay in receipt of such benefits, the Employer shall neither be liable nor responsible in any manner whatsoever.	<p>1. We understand that in case such benefits are denied due to delays attributable to Employer, the Contractor shall be compensated by the Employer for the loss of such benefits. Kindly confirm.</p> <p>2. Further, we understand in case of withdrawal of such benefits during execution of the Contract, the same shall be covered under GCC Clause-36.1 (Change in Laws and Regulations). Kindly confirm.</p>	<p>1. Provisions of Bidding documents shall prevail.</p> <p>2. Provisions of Bidding documents shall prevail.</p>
7.	Section-II, ITB	12.5	19/38	The Bid Security of the Bidder whose Technical Bid has not been found acceptable, shall be returned within 15 days from the letter communicating rejection of Technical Bid. The Bid Security of all the Bidders except recommended/evaluated L-1 bidder, whose price bids are opened, shall be returned within 15 days after finalization of evaluation report/recommendations by the Tender	<p>We request Employer to modify the clause as follows:</p> <p>The Bid Security of the Bidder whose Technical Bid has not been found acceptable, shall be returned within 15 days from the letter communicating rejection of Technical Bid. The Bid Security of all the Bidders except recommended/evaluated L-1 bidder, whose price bids are opened, shall be</p>	Provisions of Bidding documents shall prevail.

Package: Turbine Generator And Associated Packages

Project: Khurja Super Thermal Power Project, (2 X 660 MW)

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				Committee (TC) whether the recommendation of TC is for award/negotiation/annulment.	returned within 15 days after finalization of evaluation report/ recommendations by the Tender Committee (TC) whether the recommendation of TC is for award/negotiation/annulment <u>or upon expiry of Bid validity, whichever is earlier.</u>	
8.	Section-II, ITB	13.1	20/38Stage-II (Price) Bid including Stage-I (Techno- Commercial) Bid to the extent not contrary to the bidding documents read in conjunction with the amendments/errata/ clarification issued shall remain valid and open for acceptance for one hundred eighty (180) days from the date of opening of Stage-II (Price) Bid.	Considering the current market scenario, we request Employer to revise the bid validity to Ninety Days (90) from the date of opening of Stage-II (Price) Bid.	Provisions of Bidding documents shall prevail.
9.	Section-II, ITB	13.2	20/38	The bidder is required to keep the prices of recommended spares covered under Price Schedule No.6 valid for a period of six (6) months after Notification of Award for main equipment and mandatory spares.	The prices of recommended spares shall be kept valid for 6 months from date of Notification of Award. However as the prices of Mandatory Spares are part of Bid evaluation, the price validity of Mandatory Spares shall remain same as that of the Bid.	Provisions of Bidding documents shall prevail.
10.	Section-II, ITB	30.3	32/38	Employer reserves the right to vary the quantity of any of the Spares and/or delete any item of Spares altogether at the time of Award of	We understand that in such cases Employer shall adjust the Contract Price accordingly. Kindly confirm.	Bidder's understanding is correct.

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				Contract.		
11.	Section-III, BDS	Item No. 4.0, Note to clause 3.0.0	18/31	Bidders who have already given commitments for PMPshall not be required to furnish further bank guarantees for security for default against specified PMP.	In case Bank Guarantee(s) for PMP have already been furnished by the Bidder for the supercritical project to any Central / State Sector Power Generating Company then the same is not required to be furnished for this project.	Provisions of Bidding documents shall prevail.
12.	Section-V, SCC	30.5	16/31	Liquidated Damage (LD) for delay in Phased Manufacturing Program (PMP) The amount of Liquidated Damage for delay to meet, various milestones of phased manufacturing program for manufacturing of Supercritical Steam Turbine Generator sets in India will be subject to maximum of USD 9 Million. LD for each milestones shall be indicated at SCC No. 30.2.	In view of the above, we understand that Liquidated Damages for delay in meeting specified milestones of PMP will also be applicable only on the first order received by the bidder from any Central / State Sector Power Generating Company (where the Bank Guarantees(s) for PMP are already furnished) and not on subsequent orders including <i>"Turbine Generator and Associated Packages for Khurja Super Thermal Power Project (2X660 MW)"</i> . Kindly confirm.	LD for PMP in such cases will be dealt as per the guidelines/conditions governing PMP.
13.	Section-III, BDS	Item No. 9.1, Clause- 2.2	22/31	Schedule for Award of Other Systems/ Packages:	We request Employer to allow bidders to finalise the schedule of Award of other systems/packages during Post Award Stage, meeting overall time for Completion.	Schedule of Award of other systems/packages, as per provision of bidding documents, is to be adhered to by the bidders.
14.	Section-III, BDS	Item No. 9.1, Clause-	23/31	THDC Inputs	We understand that Employer shall provide suitable time extension and cost compensation to the Contractor in case of	Provisions of Bidding documents shall prevail.

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		3.0			any delay in providing these inputs by THDC.	Bidder may also refer clause 40 (Extension of time for completion) of Section IV (GCC) in this regard.
15.	Section-III, BDS	Item No. 19.0	28/31	Delay in signing of contract agreement In case delay in signing of contract agreement attributable to the contractor is caused due to non-submission of performance security within the stipulated time, a penalty shall be deducted from the RA bill (s) of the contractor as per the slab given below:.....	The successful bidder/Contractor would put in his best efforts to adhere to the timelines specified in tender for signing of Contract Agreement and submission of Performance Security. Such provision is not available in any other Central/State Utility Tenders. We, therefore, request Employer to delete this clause.	Provisions of Bidding documents shall prevail.
16.	Section-IV, GCC	1.1	2/57	"Installation Services" means all those services ancillary to the supply of the Plant and Equipments for the Facilities, to be provided by the Contractor under the Contract; e.g., transportation and provision of marine or other similar insurance, inspection, expediting, Site preparation works (including the provision and use of Contractor's Equipments and the supply of all construction materials required), installation, testing, precommissioning, commissioning, operations, maintenance, the provision of operations and	Since the operations & maintenance shall be carried out by the Employer, we request the Employer to modify the clause as follows: "Installation Services" means all those services ancillary to the supply of the Plant and Equipments for the Facilities, to be provided by the Contractor under the Contract; e.g., transportation and provision of marine or other similar insurance, inspection, expediting, Site preparation works (including the provision and use of Contractor's Equipments and the supply of all construction materials required), installation, testing,	Provisions of Bidding documents shall prevail.

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				maintenance manuals, training, etc.	precommissioning, commissioning, operations, maintenance , the provision of operations and maintenance manuals, training, etc.	
17.	Section-IV, GCC	1.1	2/57	"Contractor's Equipments" means all plant, facilities, equipments, machinery, tools, apparatus, appliances or things of every kind required in or for installation, completion and maintenance of Facilities that are to be provided by the Contractor, but does not include Plant and Equipments, or other things intended to form or forming part of the Facilities.	We request Employer to modify the clause as follows: "Contractor's Equipments" means all plant, facilities, equipments, machinery, tools, apparatus, appliances or things of every kind required in or for installation, completion and maintenance of Facilities that are to be provided by the Contractor, but does not include Plant and Equipments, or other things intended to form or forming part of the Facilities.	Provisions of Bidding documents shall prevail.
18.	Section-IV, GCC	1.1	3/57	NEW DEFINITION "Defects"	We request Employer to define "Defects" as follows: The term "Defects" means any material non-conformance with the design, material and workmanship requirements set for in the Technical Specification contained in this contract.	Provisions of Bidding documents shall prevail. Bidder may also refer clause 27 (Defects Liability) of Section IV (GCC) in this regard.
19.	Section-IV, GCC	4.1	6/57	Unless otherwise stated in the Contract, all notices to be given under the Contract shall be in writing, and shall be sent by personal delivery, airmail post, special courier, cable, telegraph, telex, facsimile or	We request Employer to modify the clause as follows: Unless otherwise stated in the Contract, all notices to be given under the Contract shall be in writing, and shall be sent by	Provisions of Bidding documents shall prevail.

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				Electronic Data Interchange (EDI) to the address of the relevant party set out in the Contract Coordination Procedure to be finalised pursuant to GCC Sub Clause 17.2.3.1, with the following provisions.	personal delivery, airmail post, special courier, cable, telegraph, email , telex, facsimile or Electronic Data Interchange (EDI) to the address of the relevant party set out in the Contract Coordination Procedure to be finalised pursuant to GCC Sub Clause 17.2.3.1, with the following provisions.	
20.	Section-IV, GCC	4.1.1	7/57	Any notice sent by cable, telegraph, telex, telefax, facsimile or EDI shall be confirmed within two (2) days after dispatch by notice sent by airmail post or special courier, except as otherwise specified in the Contract.	We request Employer to modify the clause as follows: Any notice sent by cable, telegraph, telex, email telefax, facsimile or EDI shall be confirmed within two (2) days after dispatch by notice sent by airmail post or special courier, except as otherwise specified in the Contract.	Provisions of Bidding documents shall prevail.
21.	Section-IV, GCC	4.1.3	7/57	Any notice delivered personally or sent by cable, telegraph, telex, telefax, facsimile or EDI shall be deemed to have been delivered on date of its dispatch.	We request Employer to modify the clause as follows: Any notice delivered personally or sent by cable, telegraph, telex, telefax, facsimile, email or EDI shall be deemed to have been delivered on date of its dispatch.	Provisions of Bidding documents shall prevail.
22.	Section-IV, GCC	6.2.8	9/57	The decision of a majority of the arbitrators (or of the third arbitrator chairing the arbitration, if there is no such majority) shall be final and binding and shall be enforceable in any court of competent jurisdiction as	We understand that the underlined sentence is unenforceable as the same is against the provisions of Section 28 of the Indian Contract Act. We request Employer to please clarify.	Provisions of Bidding documents shall prevail. Bidder may also refer clause 55 of Section V (SCC) which supersedes GCC clause 6.

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				decree of the court. <u>The parties thereby waive any objections to or claims of immunity from such enforcement.</u>		
23.	Section-IV, GCC	7.1	9/57	.....Such specifications include, but are not limited to, the provision of supervision and engineering services; the supply of labour, materials, equipment, spare parts (as specified in GCC Sub Clause 7.3 below) and accessories; Contractor's Equipment; construction utilities and supplies; temporary materials, structures and facilities; transportation (including, without limitation, unloading and hauling to, from and at the Site); Insurance and storage, except for those supplies, works and services that will be provided or performed by the Employer, as set forth in Appendix 6 (Scope of Works and Supply by the Employer) to the Form of Contract Agreement.	We request Employer to modify the clause as follows: Such specifications mean and include, but are not limited to, the provision of supervision and engineering services; the supply of labour, materials, equipment, spare parts (as specified in GCC Sub Clause 7.3 below) and accessories; Contractor's Equipment; construction utilities and supplies; temporary materials, structures and facilities; transportation (including, without limitation, unloading and hauling to, from and at the Site); Insurance and storage, except for those supplies, works and services that will be provided or performed by the Employer, as set forth in Appendix 6 (Scope of Works and Supply by the Employer) to the Form of Contract Agreement.	Provisions of Bidding documents shall prevail.
24.	Section-IV, GCC	7.3.1.3	10/57	The Contractor will provide the Employer with the manufacturing drawings, catalogues, assembly drawings and any other document	We request Employer to delete manufacturing and assembly drawings from this clause as these drawings are proprietary in nature and modify the	Provisions of Bidding documents shall prevail.

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				required by the Employer so as to enable the Employer to identify the recommended spares. Such details will be furnished to the Employer as soon as they are prepared but in any case not later than six months prior to commencement of manufacture of the corresponding main equipment.	<p>clause as follows:</p> <p>The Contractor will provide the Employer with the manufacturing—drawings, catalogues, assembly drawings and any other document required by the Employer so as to enable the Employer to identify the recommended spares. Such details will be furnished to the Employer as soon as they are prepared but in any case not later than six months prior to commencement of manufacture of the corresponding main equipment.</p>	
25.	Section-IV, GCC	7.3.1.4	10/57	To enable the Employer to finalise the requirement of recommended spares which are ordered subsequent to placement of order for main equipment/plant in addition to necessary technical details, catalogue and such other information brought-out hereinabove, the Contractor will also provide a justification in support of reasonableness of the quoted prices of spares which will, inter-alia, include documentary evidence that the prices quoted by the Contractor to the Employer are not higher than those charged by him from other customers in the same period.	Kindly note that the Contractor is bound by Confidentiality Agreement/ Clause in all its on-going contracts (similar to provision of Clause No. 16.1 of GCC). Hence, documentary evidence of the nature asked in clause 7.3.1.4 can be produced to Employer subject to written consent/ approval from the relevant customers only.	Provisions of Bidding documents shall prevail.

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26.	Section-IV, GCC	7.3.1.7	11/57	The Contractor will provide the Employer with all the addresses and particulars of his sub-suppliers while placing the order on vendors for items/components/equipment covered under the Contract and will further ensure with his vendors that the Employer, if so desires, will have the right to place order for spares directly on them on mutually agreed terms based on offers of such vendors.	We request Employer to modify the clause as follows: The Contractor will provide the Employer with all the addresses and particulars of his sub-suppliers while placing the order on vendors for items/components/equipment covered under the Contract and will further ensure with his vendors that the Employer, if so desires, will have the right to place order for spares directly on them on mutually agreed terms based on offers of such vendors <u>however the Contractor shall not have any warranty liability for such orders and all associated systems related to those spares.</u>	Provisions of Bidding documents shall prevail.
27.	Section-IV, GCC	7.3.1.11	11/57	In case the Contractor fails to supply the mandatory, recommended or long term spares in the terms stipulated above, the Employer shall be entitled to purchase the same from the alternate sources at the risk and the cost of the Contractor and recover from the Contractor, the excess amount paid by the Employer over the rates worked on the above basis. In the event of such risk purchase by the Employer, the purchases will be as per the Works and Procurement Policy of the Employer prevalent at	Such risk purchase by Employer shall be carried out only if it is clearly established that the subject spares ordered under the Contract are required to ensure safe operation of the plant. Further, Employer shall offer to include a representative from the Contractor in finalizing such purchases.	Provisions of Bidding documents shall prevail.

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				the time of such purchases.		
28.	Section-IV, GCC	7.3.1.12	12/57 Further, the provisions pertaining to long term availability of spares shall be extended beyond 5 years applicability period mentioned hereinabove if so desired by the Employer and at the mutually acceptable escalation formula.	We request Employer to modify the clause as follows: Further, the provisions pertaining to long term availability of spares shall be extended beyond 5 years applicability period mentioned hereinabove if <u>mutually agreed by parties in writing</u> so desired by the Employer and at the mutually acceptable escalation formula.	Provisions of Bidding documents shall prevail.
29.	Section-IV, GCC	9.2	13/57	The Contractor confirms that it has entered into this Contract on the basis of a proper examination of the data relating to the Facilities (including any data as to boring tests) provided by the Employer, and on the basis of information that the Contractor could have obtained from a visual inspection of the Site (if access thereto was available) and of other data readily available to it relating to the Facilities as at the date twenty eight (28) days prior to bid submission. The Contractor acknowledges that any failure to acquaint itself with all such data and information shall not relieve its	The bid is being prepared based on the assumptions made in the proposal and data provided by the Employer. In the event actual data/conditions /access to site etc. during the execution of the Contract differs from the above data/assumptions the bidder shall be entitled to adjustments of Contract Price and extension in time for completion.	Provisions of Bidding documents shall prevail. Bidder may also refer clause 35 (Unforeseen Conditions) of Section IV (GCC) in this regard.

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				responsibility for properly estimating the difficulty or cost of successfully performing the Facilities.		
30.	Section-IV, GCC	9.3	14/57	The Contractor shall acquire in its name all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located that are necessary for the performance of the Contract, including, without limitation, visas for the Contractor's and Subcontractor's personnel and entry permits for all imported Contractor's Equipment. The Contractor shall acquire all other permits, approvals and/or licenses that are not the responsibility of the Employer under GCC Sub Clause 10.3 hereof and that are necessary for the performance of the Contract.	We request Employer to modify the clause as follows: The Contractor shall acquire in its name all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located that are necessary for the performance of the Contract, including, without limitation, visas for the Contractor's and Subcontractor's personnel and entry permits for all imported Contractor's Equipment. The Contractor shall acquire <u>all only such</u> other permits, approvals and/or licenses that are not the responsibility of the Employer under GCC Sub Clause 10.3 hereof and that are necessary for the performance of the Contract, <u>which are specifically listed and mutually agreed in the Contract.</u>	Provisions of Bidding documents shall prevail.
31.	Section-IV, GCC	9.4	14/57 The Contractor shall indemnify and hold harmless the Employer from and against any and all liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from the	We request Employer to modify the clause as follows: The Contractor shall indemnify and hold harmless the Employer from and against any and all <u>direct and proven</u>	Provisions of Bidding documents shall prevail.

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				violation of such laws by the Contractor or its personnel, including the Subcontractors and their personnel, but without prejudice to GCC Sub Clause 10.1 hereof.	liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including the Subcontractors and their personnel, but without prejudice to GCC Sub Clause 10.1 hereof.	
32.	Section-IV, GCC	10	14/57	Employer's Responsibilities	We request Employer to ensure peaceful industrial relations with locals/land losers etc. to avoid any kind of related disputes affecting or leading to work stoppages. In case of such incidence, bidder should be suitably compensated for time and cost. Kindly confirm.	Provisions of Bidding documents shall prevail.
33.	Section-IV, GCC	10.2	14/57	The Employer shall be responsible for acquiring and providing legal and physical possession of the Site and access thereto, and for providing possession of and access to all other areas reasonably required for the proper execution of the Contract, including all requisite rights of way, as specified in Appendix 6 (Scope of Works and Supply by the Employer) to the Form of Contract Agreement.	We therefore request the Employer to modify the clause as follows: The Employer shall be responsible for acquiring and providing legal and physical possession of the Site and access thereto, and for providing possession of and access to all other areas reasonably required for the proper execution of the Contract, including without limitation all requisite rights of way, as specified in Appendix 6 (Scope of Works and Supply by the Employer) to the Form of Contract Agreement.	Provisions of Bidding documents shall prevail.

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34.	Section-IV, GCC	10.3	14/57	The Employer shall acquire and pay for all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located, which such authorities or undertakings require the Employer to obtain them in the Employer's name, are necessary for the execution of the Contract (they include those required for the performance by both the Contractor and the Employer of their respective obligations under the Contract), including those specified in Appendix 6 (Scope of Works and Supply by the Employer) to the Form of Contract Agreement.	For the purpose of clarity, we request Employer to furnish the list of Clearances, Permits & Approvals to be obtained by the Employer.	Provisions of Bidding documents are clear and shall prevail.
35.	Section-IV, GCC	10.5	15/57	Unless otherwise specified in the Contract or agreed upon by the Employer and the Contractor, the Employer shall provide sufficient, properly qualified operating and maintenance personnel; shall supply and make available all raw materials, utilities, lubricants, chemicals, catalysts, other materials and facilities; and shall perform all work and services of whatsoever nature, to enable the Contractor to properly carry out Pre-commissioning,	<p>We request Employer to modify the clause as follows:</p> <p>Unless otherwise specified in the Contract or agreed upon by the Employer and the Contractor, the Employer shall provide sufficient, properly qualified operating and maintenance personnel; shall supply and make available all raw materials, utilities, lubricants, chemicals, catalysts, <u>coal, fuel oil</u>, other materials and facilities; and shall perform all work and services of</p>	Provisions of Bidding documents shall prevail.

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				Commissioning and Guarantee Tests, all in accordance with the provisions of Appendix 6 (Scope of Works and Supply by the Employer) to the Form of Contract Agreement at or before the time specified in the program furnished by the Contractor under GCC Sub Clause 18.2 (Program of Performance) hereof and in the manner thereupon specified or as otherwise agreed upon by the Employer and the Contractor.	whatsoever nature, to enable the Contractor to properly carry out Pre-commissioning, Commissioning and Guarantee Tests, all in accordance with the provisions of Appendix 6 (Scope of Works and Supply by the Employer) to the Form of Contract Agreement at or before the time specified in the program furnished by the Contractor under GCC Sub Clause 18.2 (Program of Performance) hereof and in the manner thereupon specified or as otherwise agreed upon by the Employer and the Contractor.	
36.	Section-IV, GCC	14	17/57	Taxes and Duties	<p>We request Employer to clarify the following:</p> <p>As per Building and Other Construction Workers (BOCW) Cess Rule 1998, Sec 4(3), in case the levy of cess pertains to building and other construction works of a Govt. or PSU, such Govt. or PSU shall deduct the cess payable from the bills paid for such works.</p> <p>In this scenario we understand that BOCW Cess will be deducted from ONLY Third Contact. Kindly confirm.</p>	Bidder is required to apprise himself of any applicable taxes, duties, cess or levies for the subject package and quote their prices accordingly.
37.	Section-IV, GCC	14.2	17/57	Notwithstanding GCC Sub-Clause 14.1 above, the Employer shall bear and promptly reimburse all Customs	Anti-dumping duty, Counter-vailing duty and Safeguard duty are part and parcel of custom duties and should not be treated	Provisions of Bidding documents shall prevail.

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				<p>& Import duties and GST, if imposed on the Plant and Equipment including Mandatory Spares supplied from abroad and specified in Price Schedule No. 1 (and on Recommended Spare Parts to be supplied from abroad and specified in Price Schedule No. 6, when awarded) and that are to be incorporated into the Facilities, by the law of the country where the Site is located. However, if the Plant and Equipment are shipped in Shipper's containers, then the custom duty levied on the cost of empty containers shall be borne and paid/reimbursed by the Contractor. Further, Anti-dumping duty, Counter vailing duty on subsidised articles, Safeguard duty etc. and any other tax including GST, levies, cess etc. applicable on such additional duties, if imposed on Plant and Equipment including Type Test and Mandatory Spares/ Recommended Spares, shall be borne by the Contractor.</p>	<p>separately.</p> <p>Hence, we request Employer to modify this clause to the extent that the Employer shall bear and promptly reimburse Anti-dumping duty, Counter-vailing duty and Safeguard duty if imposed on the Plant and Equipment including Mandatory Spares supplied from abroad.</p>	
38.	Section-IV, GCC	14.2	17/57	<p>..... Further, Anti-dumping duty, Counter vailing duty on subsidised articles, Safeguard duty etc. and any other tax including GST, levies, cess etc. applicable on such additional</p>	<p>We understand that, if any Anti-dumping duty, Counter vailing duty, Safeguard duty etc is imposed during execution or post the date of tax consideration (i.e. the date seven (7) days prior to the date of Price Bid</p>	<p>Provisions of Bidding documents shall prevail.</p>

Package: Turbine Generator And Associated Packages

Project: Khurja Super Thermal Power Project, (2 X 660 MW)

Doc. No.: THDC/RKSH/CC-9915-371-CLRF.04

Clarification No. 04 to Bidding Document (Commercial Portion)

S/N	Section/Part/ Chapter/Volume	Clause No.	Page No.	Bidding Document Clause	Statement of Bidders' Queries & Clarifications	Employer's Reply
				duties, if imposed on Plant and Equipment including Type Test and Mandatory Spares/ Recommended Spares, shall be borne by the Contractor.	submission), the same shall be covered under Clause No. 14.4 and 36 of the GCC. Kindly Confirm.	
39.	Section-IV, GCC	16.1	19/57	The Employer and the Contractor shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data and other information it receives from the Employer to the extent required for the Subcontractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this GCC Clause 16.	We understand that in this clause the term 'Subcontractor(s)' includes consultants and advisers engaged by or on behalf of the Contractor in connection with this Project. Kindly confirm. Further, we request Employer to modify the clause as follows: The Employer and the Contractor shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data and other information it receives from the Employer to the extent required for the Subcontractor(s) to perform its work under the Contract, in	Please refer GCC Clause 1 regarding Definition of Subcontractor. Provisions of Bidding documents shall prevail.

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