10. All the electrical equipment such as motors, generators, etc. shall be tested for insulation resistance at least once in three months and a record of such measured insulation values shall be maintained.

11. Following preservatives/preservation methods can be used depending upon type of equipment

    a. Rust preventive fluid (RPF)

    b. Rust protective paints

    c. Tarpaulin covers, in case of outdoor storage

    d. De-oxy aluminate for weld-ments

c) GENERAL INSPECTION REQUIREMENTS

1. Period inspection of materials with specific reference to –

    - Ingress of moisture and corrosion damages.
    - Damage to protective coating.
    - Open ends in pipes, vessels and equipment -
        - In case any open ends are noticed, same shall be capped.

2. Any damages to equipment / materials.

    - In case of any damages, these shall be promptly notified and in all cases, the repairs / rectification shall be carried out.
    - Any items found damaged or not suitable as per project requirements shall be removed from site. If required to store temporarily, they shall be clearly marked and stored separately to prevent any inadvertent use.

4. TYPE OF STORAGE FOR VARIOUS EQUIPMENT

The types of storage are broadly classified under the following heads:

i **Closed storage with dry and dust free atmosphere**. (C)

The closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated asbestos sheets / galvanised iron sheets for roofing. Brick walls / asbestos sheets can be used to cover all the sides. The floor of the shed can be finished with plain cement concrete suitably glazed. The shed shall be provided with proper ventilation and illumination.

ii **Semi-closed storage**. (S)

The semi closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated / asbestos sheets for roofing. The floor shall be brick paved. If required a small portion of sides can be covered to protect components from rainwater splashing onto the components.

iii Open storage (O)

The open yard shall be levelled, well consolidated to achieve raised ground with the provision of feeder roads for crane approach along with access roads running all sides. One part of the open yard shall be stone pitched, levelled and consolidated with raised ground suitable for storing / stacking heavier and critical components with due space to handle them by cranes etc . Adequate number of sleepers, concrete block etc. to be provided to make raised platforms to stack critical materials.

A separate yard to be identified as “scrap yard” slightly away from main open yard to store wooden/steel scraps, which are to be disposed off. This is required to avoid mix up with regular components as well as to avoid fire hazard.

Some of the components, which are having both machined & un-machined surfaces and are bulky, shall be stored in open storage area on a raised ground and suitably covered with water proof / fire retardant tarpaulin.

The equipment listed below shall be stored and inspected as per requirement mentioned in the table below.

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
Raw material /mechanical items like pipes, plates, structure sections etc.)				
1.	Steel pipes (lined/unlined)	S	Damage , paint, corrosion, rubber lining peeling	Provide end cap
2.	MS Plates	S	Damage, paint, corrosion	
3.	SS Plates	S	Damage	
4.	Non-metallic pipes	S	Damage, cracks	Provide end cap
5.	Stainless steel pipes	S	Damage ,	Provide end cap
6.	MS sections, beams	S	Damage, paint, corrosion	
7.	Cable trays	S	Damage, condition of preservations	
8.	Insulation sheets	S	Damage	
9.	Insulation	C	Damage, packing	
10.	Hangers Rods	S	Damage, paint, packing	
11.	Tubes	S	Damage, paint , packing	Provide end cap
12.	Hume pipes	O	Damage	
13.	Castings	O	Damage, paint, corrosion	
Fabricated mechanical items (pressure vessels, tanks etc.)				
14.	Pressure vessels (unlined)	O	Damage, paint, corrosion,	Covered nozzles
15.	Atmospheric storage tanks (unlined)	O	Damage, paint, corrosion	Covered nozzles

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
16.	Pressure vessels (lined)	S	Damage, paint, corrosion, rubber lining	
17.	Atmospheric storage tanks(lined)	S	Damage, paint, corrosion, rubber lining	
18.	Support structures	O	Damage , paint, corrosion	
19.	Flanges	C	Damage , paint, corrosion	
20.	Fabricated pipes	S	Damage , paint, corrosion	Provide end cap
21.	Vessels internals	C	Damage , paint, corrosion ,packing	
22.	Grills	S	Damage , paint, corrosion	
23.	Angles	S	Damage , paint, corrosion	
24.	Bridge mechanism/clarifier mechanism	O	Damage , paint, corrosion	
25.	Cranes, rails	S	Damage , paint, corrosion	
26.	Stair cases	O	Damage , paint, corrosion	
27.	Ladders/handrails	O	Damage , paint, corrosion	
28.	Fabricated ducts	S	Damage , paint, corrosion	
29.	Isolation Gates	O	Damage , paint, corrosion	
30.	Fabricated boxes/panels	S	Damage , paint, corrosion	
Mechanical components like valves, fittings, cables glands, spares etc.)				
31.	Valves	S	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
32.	Fittings	S	Damage , packing	Provide end cap
33.	Cable glands	C	Damage , packing	
34.	Tools & tackles	C	Damage , packing	
35.	Nut , bolts, washers,	C	Damage , packing	
36.	Gasket & Packings	C	Damage , packing	
37.	Copper tubes	C	Damage , packing, corrosion	Provide end cap
38.	SS tubing	C	Damage , packing	Provide end cap
Rotating assemblies (pumps, blowers, stirrers, fans, compressors etc.)				
39.	Pumps	S	Damage , packing, corrosion	Shaft rotation
40.	Blowers/Compressors	S	Damage , packing, corrosion	Shaft rotation
41.	Agitators/stirrers/radial launders	C	Damage , packing, corrosion	Shaft rotation
42.	Rollers for chlorine tonner mounting	C	Damage , packing, corrosion	
43.	Centrifuge	S	Damage , packing,	
44.	Gear box	C	Damage , packing, corrosion	
45.	Bearings	C	Damage , packing, corrosion	
46.	Fans	S	Damage , packing, corrosion	
47.	Dosing skids	S	Damage , packing, corrosion	
48.	Pump assemblies	S	Damage , packing, corrosion	
49.	Air washers(INTERNALS)	S	Damage , packing	
50.	Air conditioners (split)	C	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
51.	Elevators(CONTAINERIZED)	O	Damage , packing, corrosion	
52.	Chillers/VA machines	S	Damage , packing	
53.	Air handling Unit/Package unit	S	Damage , packing	
54.	Chlorinators & Evaporators	C	Damage , packing	
55.	Ejectors	C	Damage , packing	
56.	Electrolyser	C	Damage , packing	
Miscellaneous items like chain pulley blocks, hoists etc.				
57.	Chain pulley blocks	S	Damage, Packing	
58.	Electric hoists	S	Damage, Packing	
59.	Fire extinguishers	C	Damage, expiry date	
60.	Fork Lift Truck	S	Damage, Packing	
61.	Hydraulic Mobile Crane	O	Damage, Packing	
62.	Mobile Pick Up & Carry Crane	O	Damage, Packing	
63.	Motor boats	O	Damage, Packing	
64.	Safety showers	S	Damage, Packing	
65.	Diffusers/dampers	S	Damage, Packing	
Chemicals and consumables (acid, alkali, paints, oils, reagents and special chemicals)				
66.	Hydro Chloric Acid (HCl)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical
67.	Sulphuric acid (H_2SO_4)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
68.	Sodium hydroxide (NaOH)	Store in canes/ storage tank in dyke area	Date of production/ leakage/ fumes/ breather	hazardous chemical ,breather to be checked for air ingress
69.	Sodium hypo chlorite	To be stored under shed	Date of production/ leakage/ fumes	hazardous chemical ,self-life normally 15-30 days after which strength of chemical decays
70.	Ammonia	S	Date of production/ leakage/ fumes	Store in closed storage tanks, hazardous chemical
71.	CW treatment chemicals	S	Date of production , Self-life	Store in closed canes
72.	RO/UF cleaning chemicals	S	Date of production , Self-life	Store in closed canes
73.	Lime	C	Damage to packing , seepage	Prevent moisture, rain
74.	Alum bricks	C	Damage to packing	Prevent moisture, rain
75.	Poly electrolyte	S		Store in closed storage tanks
76.	Laboratory chemicals(powder)	C	Damage, Packing self-life	
77.	Laboratory chemicals(liquid)	C	Damage, Packing self-life	
78.	Lubrication oils	C	Leakage	
79.	Paints	S	Leakage ,air tightness	
80.	Sand	O	Damage of packing	No hooks
81.	Salt (NaCl)	C	Damage of packing, water ingress	Prevent moisture, rain
82.	Anthracite	S	Damage of packing	
83.	Activated carbon	S	Damage of packing	

Sl. No.	**Description of the equipment**	**Type of Storage**	**Check for**	**Remarks**
84.	Thermal insulation	S	Damage of packing	
85.	Cement	C	Damage of packing	Prevent moisture, rain
86.	Gravels	O	Damage of packing	
87.	ION exchange resins	C	Damage , packing	Refer manufacturer guidelines
88.	RO membranes	C	Damage , packing	Refer manufacturer guidelines
89.	UF membranes	C	Damage , packing	Refer manufacturer guidelines
90.	Cleaning chemicals	C	Damage , packing	Refer manufacturer guidelines
91.	Chemicals for analysers/calibration	C	Damage , packing	Refer manufacturer guidelines
Electrical and C & I items (motors, cables etc.)				
92.	Motors	C	Damage , packing	
93.	Cable drums	O	Damage	
94.	Control Panel /control desk, UPS ,JB	S	Damage, Packing	
95.	Instruments(gauges/analysers)	C	Damage	
Special items		As per Manufacturer's item, like Hydrogen cylinders, Ozonator, Analyser, Chlorine dioxide generators etc.		

5. CONCLUSION

Concerned storage agency at site should make sure that loss in equipment performance and wear & tear are minimised through proper storage and preservation. The above are broad guidelines and cover major equipment / materials. However specific storage practices shall be followed as per manufacturer recommendation. All the necessary measures even in addition to the ones mentioned above, if found necessary, should be taken to achieve the objective.

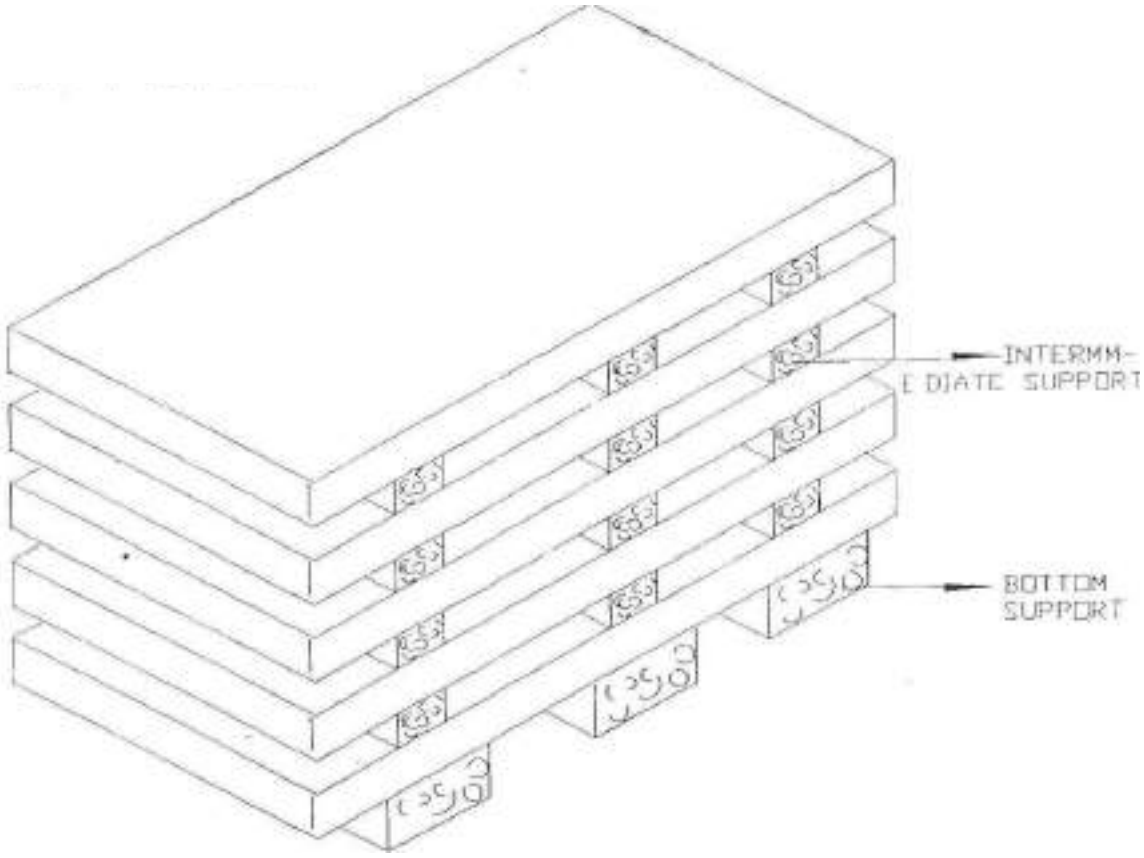


Figure – 1 – PLATE STACKING ARRANGEMENT

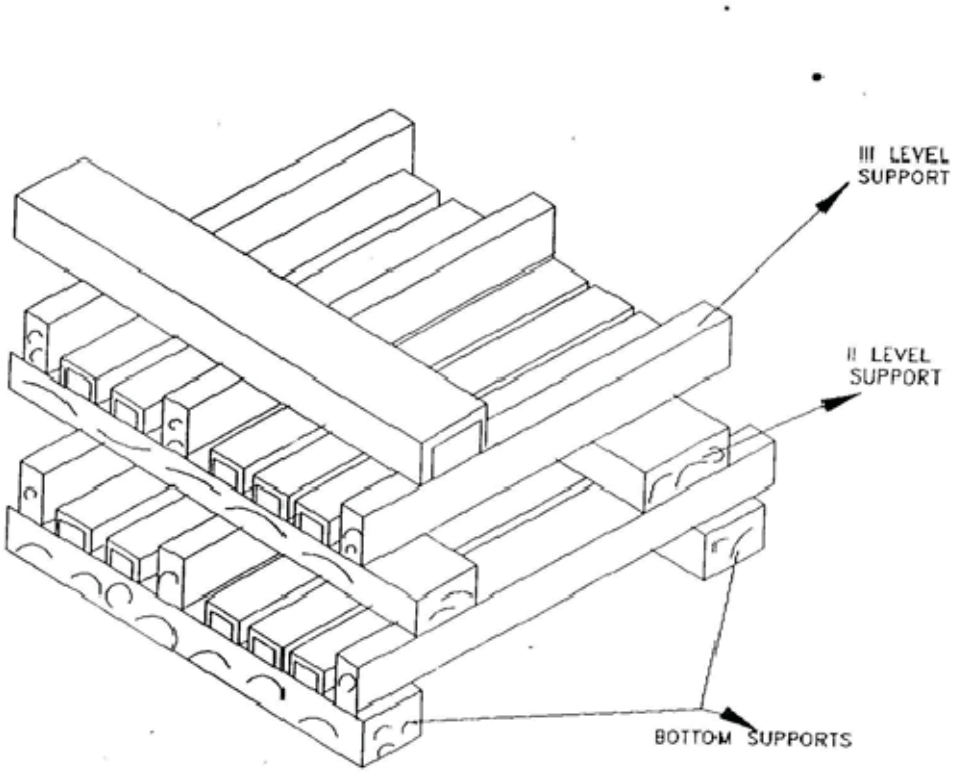


Figure – 2 – STRUCTURAL STEEL STACKING ARRANGEMENT

SECTION II

SECTION-II

SUB-SECTION-1

INSPECTION AND TESTING

1.01.00 Inspection and Tests during Manufacture.

1.01.01 The method and techniques to be used by the Bidder for the control of quality during manufacture of all plant and equipment shall be agreed with the Owner.

1.01.02 The Owner's general requirements with respect to quality control and the required shop tests are set out elsewhere in this specification.

1.01.03 Before any item of plant or equipment leaves its place of manufacture the Owner shall be given the option of witnessing inspections and tests for compliance with the specification and related standards.

1.01.04 Advance notice shall be given to the Owner as agreed in the Contract, prior to the stage of manufacture being reached, and the piece of plant must be held at this stage until the Owner has inspected the piece, or has advised in writing that inspection is waived. If having consulted the Owner and given reasonable notice in writing of the date on which the piece of plant will be available for inspection, the Owner does not attend the Bidder may proceed with manufacture having forwarded to the Owner duly certified copies of his own inspection and test results.

The owner's representative shall have at all reasonable times access to bidder's or his sub-vendor's premises and shall have power to inspect/ examine materials and workmanship or equipment under manufacture.

The Bidder shall forthwith forward to the engineer duly certified copies of the Test Certificates in six copies (one to the Purchaser and five to the Consulting Engineer) for approval. Further nine (9) copies of Shop Test Certificates shall be bound with Instruction Manuals referred to elsewhere.

For electrical equipment, routine tests as per relevant IS spec are to be carried out on all equipment. Type tests are also to be carried out on selected equipment as detailed in the specs of concerned electrical equipment.

1.01.05 Under no circumstances any repair or welding of castings be carried out without the consent of the Engineer. Proof of the effectiveness of each repair by radiographic and/or other non-destructive testing technique, shall be provided to the Engineer.

1.01.06 All the individual and assembled rotating parts shall be statically and dynamically balanced in the works.
Where accurate alignment is necessary for component parts of machinery normally assembled on site, the Bidder shall allow for trial assembly prior to despatch from place of manufacture.

1.01.07 All materials used for the manufacture of equipment covered under this specification shall be of tested quality. Relevant test certificates shall be made available to the Purchaser. The certificates shall include tests for mechanical properties and chemical analysis of representative material. Equipment or parts coming under any statutory

Regulations shall be certified by a Competent Authority under the regulations in the specified format.

1.01.08 All pressure parts connected to pumping main shall be subjected to hydraulic testing at a pressure of 150% of shut-off head for a period not less than one hour. Other parts shall be tested for one and half times the maximum operating pressure, for a period not less than one hour.

1.01.09 All necessary non-destructive examinations shall be performed to meet the applicable code requirements.

1.01.10 All welding procedures adopted for performing welding work shall be qualified in accordance with the requirements of Section-IX of ASME code or IBR as applicable. All welded joints for pressure parts shall be tested by liquid penetrant examination according to the method outlined in ASME Boiler and Pressure Vessel code. Radiography, magnetic particle examination magnuflux and ultrasonic testing shall be employed wherever necessary/ recommended by the applicable code. At least 10% of all major but welding joints shall be radiographed unless otherwise stipulated.

Statutory payments in respect of IBR approvals including inspection shall be made by the bidder. Bidder's scope shall include to preparation of all necessary documents, co-ordination and follow-up for above approval. Owner shall only forward assistance/endorsement of documents /design /drawings /reports/records to be submitted for approval as stipulated/ required by Statutory Authorities till registration of the unit and clearance for commercial operation.

1.02.00 Performance Tests at Site

1.02.01 The full requirements for testing the system shall be agreed between the Owner and the Bidder prior to Award of Contract. The completely erected System shall be tested by the Bidder on site under normal operating conditions. The Bidder shall also ensure the correct performance of the System under abnormal conditions, i.e. the correct working of the various emergency and safety devices, interlocks, etc.

1.02.02 The Bidder shall provide complete details of his normal procedures for testing, for the quality of erection and for the performance of the erected plant. These tests shall include site pressure test on all erected pipe work to demonstrate the quality of the piping and the adequacy of joints made at site.

1.02.03 The Bidder shall furnish the quality procedures to be adopted for assuring quality from the receipt of material at site, during storage, erection, pre-commissioning to tests on completion and commissioning of the complete system/equipment.

1.03.00 For details of specific tests required on individual equipment refer to respective section of this specification.

All Statutory testing / clearance is in Bidder's scope including payment of all fees, etc. as required

QAP FORMAT

BHARAT HEAVY ELECTRICALS LIMITED

CORPORATE QUALITY ASSURANCE

PROJECT: SYSTEM :

VENDOR : ITEM :

SL NO	COMPONENT /OPERATION OPERATIONS	CHARACTERISTICS CHECKED	CATEGORY	TYPE /METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1	2	3	4	5	6	7	8	9	10			11

Legend: 1. BHEL 2. Vendor 3. Sub-Vendor

QP No	CQS/SQP/31	Signature	Date			
	Rev		Name			
Page No	1 of 1		Party	Customer/Consultant	Bhel	Vendor

BIDDER SHOULD SUBMIT THE SIGNED AND STAMPED COPY OF THE FOLLOWING DOCUMENTS:

1. Compliance cum confirmation certificate
2. Guaranteed power consumption format (In the format attached in the specification) declaring guaranteed power consumption value in KW.
3. Un priced format for main package (mentioning quoted against each item)
4. Un priced format for mandatory spare (mentioning quoted against each item)
5. Un priced format for Tools and Tackles (mentioning quoted against each item)
6. Un priced format for Commissioning spare (mentioning quoted against each item)
7. Complete set of technical specification
8. No deviation certificate

COMPLIANCE CUM CONFIRMATION CERTIFICATE

The bidder shall confirm compliance with following by signing / stamping this compliance certificate (every sheet) and furnish same with the offer.

a) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions, other than those mentioned under "exclusion and those resolved as per 'Schedule of Deviations', with regard to same.

b) There are no other deviations w.r.t. specifications other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations'

c) Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL / CUSTOMER approval & customer hold points for inspection / testing shall be marked in the QP at the contract stage. Inspection / testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. This is within the contracted price without any extra implications to BHEL after award of the contract.

d) All drawings/ data-sheets / calculations etc. submitted along with the offer shall not be taken cognizance off.

e) The offered materials shall be either equivalent or superior to those specified in the specification & shall meet the specified / intended duty requirements. In case the material specified in the specifications is not compatible for intended duty requirements then same shall be resolved by the bidder with BHEL during the pre-bid discussions, otherwise BHEL / Customer's decision shall be binding on the bidder whenever the deficiency is pointed out.

For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.

f) The commissioning spares shall be supplied on 'As Required Basis' & prices for same included in the base price itself.

g) All sub vendors shall be subject to BHEL / CUSTOMER approval in the event of order.

h) Guarantee for plant/equipment shall be as per relevant clause of GCC / SCC / Other Commercial Terms & Conditions

i) In the event of order, all the material required for completing the job at site shall be supplied by the bidder within the ordered price even if the same are additional to approved billing break up, approved drawing or approved Bill of quantities within the scope of work as tender specification. This clause will apply in case during site

commissioning, additional requirements emerges due to customer and / or consultant's comments. No extra claims shall be put on this account

j) Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's / Customer's / Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.

k) As built drawings shall be submitted as and when required during the project execution.

l) The bidder has not tempered with this compliance cum confirmation certificate and if at any stage any tempering in the signed copy of this document is noticed then same shall be treated as breach of contract and suitable actions shall be taken against the bidder.

m) Successful bidder shall furnish detailed erection manual for each of the equipment supplied under this contract at least 3 months before the scheduled erection of the concerned equipment / component or along with supply of concerned equipment / component whichever is earlier.

n) Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.

o) In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion.

PRE-BID CLARIFICATION SCHEDULE

S. NO.	SECTION/CLAUSE/PAGE NO.	STATEMENT OF THE REFERRED CLAUSE	CLARIFICATION REQUIRED

The bidder hereby clarifies that above mentioned are the only clarifications required on the technical specification for the subject package.

Signature: _____

Name: _____

Designation: _____

Company: _____

Date: _____

Company Seal

NO DEVIATION CERTIFICATE

Refer GCC-6, Annexure-II Deviation sheet (Cost of withdraw)

REFER ANNEXURE-III

SECTION-II
SUB-SECTION-7

SUGGESTIVE PRICE FORMAT

SUGGESTED PRICE FORMAT			Doc No:	PE-PF-425-554-A001	
			Rev No:	0	
			Date of issue	17/04/2018	
NAME OF PROJECT:	**2X800 MW TANGEDCO UPPUR TPP BTG**				
NAME OF PACKAGE:	**VENTILATION PACKAGE**				
TECHNICAL SPECIFICATION No:	**PE-TS-425-554-A001**				

S. No.	DESCRIPTION	UNIT	QTY	AMOUNT (Ex-Works)
1	Total lump sum firm price inclusive of all prevailing taxes, duties and other levies for **Supply part, Services part and Mandatory spares** comprising of design (i.e.preparation and submission of drawing /documents including "As Built" drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles fill of lubricants & consumables, mandatory spares alongwith spares for erection, startup and commissioning as required, forwarding, proper packing, shipment and delivery at site, unloading, handling, transportation & storage at site, in-site transportation, assembly, erection & commissioning, final painting at site, minor civil work, trial run at site, preperation of layout drawings 3D (as applicable) and carrying out Performance guarantee / Functional / Demonstration tests at site, training of customer/client O&M staff and handover in flawless condition of the package to the end customer complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order.	1 Lot		
2	**MAJOR BREAK-UP OF PRICES GIVEN IN 1.0 ABOVE.**			
2.1	Total lump sum firm price inclusive of all prevailing taxes, duties and other levies for **Supply part** comprising of design (i.e.preparation and submission of drawing /documents including "As Built" drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles, fill of lubricants & consumables alongwith spares for erection as required, startup and commissioning spares as required, forwarding, proper packing, shipment and delivery at site, preperation of layout drawings 3D (as applicable) for the total scope defined as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order.**(Break-up as per Annexure-I)**	1 Lot		
2.2	Total lumpsum firm prices inclusive of all prevailing taxes, duties and other levies for **Services part** comprising of service part for unloading, handling, transportation & storage at site, in-site transportation, assembly, erection & commissioning, final painting at site, minor civil work, trial run at site and carrying out Performance guarantee / Functional / Demonstration tests at site, training of customer/client O&M staff and handover in flawless condition of the package to the end customer complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order. **(Break-up as per Annexure-I)**	1 Lot		
2.3	Total lumpsum firm price inclusive of all prevailing taxes, duties and other levies for **Mandatory spares** comprising of manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, forwarding, proper packing, shipment, delivery at site & guarantee as per tender technical specification above, amendment & agreements till placement of order. **(Price break up of mandatory spares is to be furnished as per Annexure- II)**	1 Lot		

Note:
1.) Bidder to quote **Guaranteed Power Consumption for Air Conditining System as per Annexure-III**.
2.) PG to consider and suitably incorporate taxes, duties and other commercial aspects.

Particulars of bidder / authorised representative

	Name	Designation	Signature	Date	Company Seal

SUGGESTED PRICE FORMAT ANNEXURE - I						Doc No:	PE-PF-425-554-A001
						Rev No:	0
						Date of issue	17/04/2018
NAME OF PROJECT:	**2X800 MW TANGEDCO UPPUR TPP BTG**						
NAME OF PACKAGE:	**VENTILATION SYSTEM**						
TECHNICAL SPECIFICATION No:	**PE-TS-425-554-A001**						
SL NO	**DESCRIPTION**	**UNIT**	**Qty**	**SUPPLY AMOUNT (Ex-Works)**	**ERECTION AND AMOUNT (Ex-Works)**		
1	"Sheet metal type air washer unit with centrifugal fan (DIDW) with motor, pumps with motors, filters, air washer internals, inlet air louvers, piping as per IS:1239, Part-I (heavy class galvanised), valves, nozzles, back wash arrangement, galvanised drain piping, etc as per specification of capacity 300000 CMH. Each air washer has 2 no centrifugal fan (2 x 50% duty) of capacity 1,50,000 CMH at min. 90 mm SP. Each centrifugal fan shall be provided with VFD driven motor alongwith VFD and other accessories as required for VFD shall also be included in the price."	**8**	**NO**				
2	"Unitary air filtration unit with centrifugal fan with motor, pumps with motors, filters, UAF internals, inlet air louvers, piping as per IS: 1239 pt I (heavy class galvanised), valves, nozzles, back wash arrangement, galvanised drain piping etc. as per specification of capacity 95,000 CMH. Each UAF has 1 no centrifugal fan (1 x 100% duty) of capacity 95,000 CMH at min. 75 mmWC SP. Each centrifugal fan shall be provided with VFD driven motor alongwith VFD and other accessories as required for VFD shall also be included in the price."	**2**	**NO**				
3*	Supply air ducting (finished) for above area complete with dampers, grills (with VCD & without VCD), supports (painted) and all accessories as specified.						
3.1*	Finished GSS (zinc coating 275 **gms/sq.m**) Ducting with support structure etc.						
a)*	18 G	**4600**	**SQM***				
b)*	20 G	**4600**	**SQM***				
c)*	22 G	**3450**	**SQM***				
d)*	24 G	**4600**	**SQM***				
3.2*	MS Duct With Epoxy paint for battery room.	**200**	**SQM***				
3.3*	MS Grilles with VCD	**230**	**SQM***				
3.4*	MS Grilles without VCD	**12**	**SQM***				
3.5*	Exposed duct insulation with fibre glass insulation as per specifications.	**2300**	**SQM***				

SUGGESTED PRICE FORMAT ANNEXURE - I						Doc No:	PE-PF-425-554-A001
						Rev No:	0
						Date of issue	17/04/2018
NAME OF PROJECT:	**2X800 MW TANGEDCO UPPUR TPP BTG**						
NAME OF PACKAGE:	**VENTILATION SYSTEM**						
TECHNICAL SPECIFICATION No:	**PE-TS-425-554-A001**						
SL NO	**DESCRIPTION**	**UNIT**	**Qty**	**SUPPLY AMOUNT (Ex-Works)**	**ERECTION AND AMOUNT (Ex-Works)**		
3.6*	Wall mounted dampers (gravity operated) for different areas.	**35**	**SQM***				
3.7*	Inlet Louvres	**60**	**SQM***				
3.8*	VOLUME CONTROL DAMPERS in GI construction as per specifications	**23**	**SQM***				
4*	FIRE DAMPER						
a)*	Fire damper	**30**	**SQM***				
b)*	Motorized Actuator with single phase power supply for the above Fire damper with auto resetting, limit switches, indication lamps etc	**45**	**Nos.***				
c)*	Fusible Link type Fire Damper	**20**	**SQM***				
5*	Roof extractor units (axial flow type) with hood, disconnect switch and all accessories as specified. **Following fan shall have 15 mmwc static pressure.**						
a)*	Capacity 50,000 CMH with Motor rating 5.5 KW	**48**	**Nos.***				
b)*	Capacity 40,000 CMH with Motor rating 5.5 KW	**4**	**Nos.***				
c)*	Capacity 20,000 CMH with Motor rating 2.2 KW	**2**	**Nos.***				
6*	Axial flow supply fans with pre and fine filter (wall mounted) complete with casing, TEFC sq cage induction motors & mounting frame, MS rain protection cowl, bird screen and all other accessories (suitable for 415V/3-phase supply). **Following fan shall have 32 mmwc static pressure.**						
a)*	Capacity 10,000 CMH with Motor rating 2.2 KW	**8**	**Nos.***				
b)*	Capacity 7,500 CMH with Motor rating 1.5 KW	**8**	**Nos.***				
c)*	Capacity 6,000 CMH with Motor rating 1.1 KW	**16**	**Nos.***				
d)*	Capacity 4,000 CMH with Motor rating 0.75 KW	**10**	**Nos.***				
7*	Axial flow supply fans with pre filter (wall mounted) complete with casing, TEFC sq cage induction motors & mounting frame, MS rain protection cowl, bird screen and all other accessories (suitable for 415V/3-phase supply) as specified. **Following fan shall have 20 mmwc static pressure.**						
a)*	Capacity 10,000 CMH with Motor rating 1.5 KW	**12**	**Nos.***				
b)*	Capacity 7,500 CMH with Motor rating 1.1 KW	**12**	**Nos.***				
c)*	Capacity 6,000 CMH with Motor rating 1.1 KW	**4**	**Nos.***				
d)*	Capacity 4,000 CMH with Motor rating 0.75 KW	**4**	**Nos.***				
8*	Axial flow exhaust fans (Bifurcated type, spark proof construction, wall mounted) complete with casing, flame proof motor & mounting frame, MS rain protection cowl, bird screen and all other accessories epoxy painted (suitable for 415V/3-phase supply) as specified. **Following fan shall have 15 mmwc static pressure.**						
a)*	Capacity 15,000 CMH with Motor rating 2.2 KW	**5**	**Nos.***				
b)*	Capacity 10,000 CMH withMotor rating 1.5 KW	**8**	**Nos.***				
c)*	Capacity 7,500 CMH with Motor rating 1.1 KW	**6**	**Nos.***				
d)*	Capacity 4,000 CMH with Motor rating 0.55 KW	**4**	**Nos.***				
e)*	Capacity 2,000 CMH with Motor rating 0.55 KW	**6**	**Nos.***				
9*	Axial flow exhaust fans (Wall mounted) complete with casing,TEFC sq cage induction motor & mounting frame, MS rain protection cowl, bird screen and all other accessories epoxy painted (suitable for 415V/3-phase supply) as specified.**Following fan shall have 10 mmwc static pressure.**						
a)*	Capacity 15,000 CMH with Motor rating 1.1 KW	**12**	**Nos.***				
b)*	Capacity 10,000 CMH with Motor rating 0.75 KW	**5**	**Nos.***				
c)*	Capacity 7,500 CMH with Motor rating 0.55 KW	**5**	**Nos.***				
d)*	Capacity 6,000 CMH with Motor rating 0.55 KW	**20**	**Nos.***				
e)*	Capacity 4,000 CMH with Motor rating 0.55 KW	**5**	**Nos.***				
f)*	Capacity 2,000 CMH with Motor rating 0.37 KW	**5**	**Nos.***				
10*	Exhaust fan (propeller type) completes with induction motor & mounting frame MS rain protection cowl, bird screen and all other accessories as specified (suitable for 240V/ 1 phase). **Following fan shall have 5 mmwc static pressure.**						
a)*	Capacity 1200 CMH with Motor rating 100 watts	**75**	**Nos.***				
11*	Handling arrangement for Ventilation equipments						
(a)*	Manually operated, platform trolley of 1 Ton capacity with base area 2m x 1.5m	**2**	**NO***				
(b)*	1T Chain pulley block with travelling trolley	**8**	**NO***				
(c)*	1T Chain pulley block without travelling trolley	**2**	**LOT**				
12	Total lumpsum price for special tools & tackles for maintenance inclusive of packing forwarding, transportation up to site, etc. (Bidder shall submit item-wise **price break-up-As per Appendix A**).	**1**	**LOT**				
13	Total lumpsum price for commissioning spares inclusive of packing forwarding, transportation up to site, etc. (Bidder shall submit item-wise **price break-up-As per Appendix B**).	**1**	**LOT**				
14	Cable tray, condutes, junction box, Local control panel and Field instruments like pressure gauge, temperature gauge, temperature and pressure transmitters, DP transmitters, flow transmitters, flow indicator, etc. as required for the complete system	**1**	**LOT**				
16	Paint	**1**	**LOT**				
17*	NON CHEMICAL SCALE INHIBITOR	**10**	**sets***				
18	Any other item not indicated above, but required to make the system complete in all respects.	**1**	**LOT**				

NOTES	
1	The bidder shall furnish unit rates for variable item (marked *) for necessary adjustment (plus or minus) variation during detailed engg. stage. The unit rates quoted above shall be considered and no separate unit rates shall be quoted. Unit rates shall be valid throughout the contract.
2	Any other item not indicated above, but required to make the system complete in all respects, as per the technical specification, shall be supplied without any cost implication to BHEL.
3	Any cell left blank in the unpriced schedule shall be treated as "Quoted" and is included in total price.

Particulars of bidder / authorised representative

	Name	**Designation**	**Signature**	**Date**	**Company Seal**

SUGGESTED PRICE FORMAT ANNEXURE-II LIST OF MANDATORY SPARES		Doc No:	PE-PF-425-554-A001		
		Rev No:	**0**		
		Date of issue	**17/04/2018**		
NAME OF PROJECT:		**2X800 MW TANGEDCO UPPUR TPP BTG**			
NAME OF PACKAGE:		**VENTILATION SYSTEM**			
TECHNICAL SPECIFICATION:		**PE-TS-425-554-A001**			
S. No.	**DESCRIPTION**	**UNIT**	**Qty**	**AMOUNT (Ex-Works)**	
SL. NO.	**EQUIPMENT / PACKAGE**	**QUANTITY (COMMON FOR BOTH UNITS)**			
	Ventilation system				
S.no.	**Item / equipment**	**Quantity required**			
A	**Mechanical**				
1	**Centrifugal fans**				
A)	V-belts	2 sets of each type			
B)	Blower bearing sets	2 sets of each type			
C)	Blower motor bearings	2 sets of each type			
D)	Seal gasket and other wear out parts in sets	2 sets of each type			
E)	Vibration isolators	2 sets of each type			
2	**Axial fans**				
A)	Fan bearings	2 sets of each type			
B)	Fan motor bearing	2 sets of each type			
C)	Dry filters	2 sets of each type and size			
3	**Air washer system**				
A)	**Water strainers**	2 sets of each size			
B)	**Spray nozzles**	2 sets of each size			
C)	**Water repellent type filters**	2 sets of each size			
4	Horizontal centrifugal pump				
A)	Impeller for each of pump set	2 sets of each type			
B)	Bearings	2 sets of each type			
C)	Shaft sleeves	2 sets of each type			
D)	Bearings motor	2 sets of each type			
Control and Instrumentation					
Sl. No	**Description**		**Quantities are per unit. In case of common system, quantities shall be doubled.**		
1.00.01	**Measuring and Field Instruments**		The quantity of mandatory spares indicated herein shall be as per package basis		
1.00.01.01	**Indicators, Recorders, Electrical**				
	Metering and Skid Mounted Instruments				
(i)	Indicators, recorders and meters offered from each model for the project. These instruments shall be supplied with three sets of blank scales.	Nos.	10 % of Installed of each type/Model or a minimum of one number for each model and type, whichever is more.		
(ii)	For skid mounted instruments	Nos.	10% of total number of instruments, valves, C&I equipment, C&I item etc. for each Type and model or a minimum of one number for each model and type, whichever is more.		
1.00.01.03	**Temperature Transmitters and Electronic Transmitters (For Pressure, DP, Temp, Flow, Level), Process Transmitters, Level & Flow Transmitter for each type, Rota meters, Sight Flow indicators, Temperature, Pressure, Flow & Level Switch, safety & Protection switches, Gauges, Process meters, Junction Boxes, Position Transmitters/switches, Analysers, Transd other Transducer or any other instrument etc.**	Nos.	i.) 10% of total number of each item offered for each model and type for the project or a minimum of one number, whichever is more. ii.) 10% of Electronic card/PCB assembly and power supply card/module for each type, model & rating of Transmitter, analysers & Flow Meters.		

1.00.02	**Distributed Control System and Other Electronic Systems/Sub-Systems/ DDCMIS/DCS/PLC/VMS/MIS/LAN/VFD/Si mulator, Video conferencing System, Microprocessor based control system and any other system as supplied as per NIT etc. -**				
1.00.02.01	(Power supply, Electronic modules (of input, output, processor, memory, I/O adapter, processor interface, communication types)	Nos	10% of number for each type or minimum of 2 number for each type, model and rating whichever is high.		
1.00.02.02	Auto/Manual stations, set-point/bias stations, Push Buttons, Fire safety trip Push Buttons, Emergency trip Push buttons etc	Nos.	10% of the number of stations offered for the project from each type or a minimum of 2 number from each model, whichever is more.		
1.00.02.03	Control logic power supply, fuses, MCB,MCCB, at each current rating required for the project.	Nos.	20% spare for each type/Model or a minimum of 2 number from each type/model, whichever is more.		
1.00.02.04	Electronic cards of each type used for each type of Servers supplied with any control system	Nos.	Ten (10) percent or 2 no. (Whichever is more)		
1.00.04	**Relay based Control Panels**				
1.00.04.01	LEDs for indicating lights	Nos.	100% of qty installed.		
1.00.04.02	Control circuit fuses/	Nos.	300% of installed of each type, current rating.		
1.00.04.03	Relays modules & contactors.	Nos.	20% spare of qty Installed of each type & rating.		
1.00.04.04	MCB/MCCB of each current rating	Nos.	Ten percent of each current rating required		
1.00.04.05	Cooling Fans of each type, model and rating.	Nos.	20% or 2 nos. of each type and rating, (whichever is more).		
1.00.04.06	Push buttons, ILPBs	Nos.	Ten (10) percent or 2 nos (whichever is more) of each type.		
1.00.04.07	Electric meter.	Nos.	Ten (10) percent or 2 nos (whichever is more) of each type		
1.00.04.08	Power supply modules.	Nos.	Ten (10) percent or 2 nos (whichever is more) of each type		
1.00.05	**Alarm Annunciation System**				
1.00.05.01	logic modules, group card modules, power supply modules, Hooters and any other electronic module.	Nos.	20% spares of each type installed		
1.00.05.02	un-engraved window boxes complete with LED etc.	Nos.	5% spares of each size installed		
1.00.05.03	LEDs for annunciation facia windows and LEDs box assemblies offered for the project	Nos.	20% of qty installed		
1.00.05.04	Annunciator hooter	Nos.	One (1) No. of each type		
1.00.07	**Erection hardware**				
1.00.07.01	Instrument valves, manifold, fittings, impulse pipe, impulse tubes, drains pipes,	Nos.	Ten (10) percent of each type, rating, model number & Size installed		
1.00.07.02	Condensate pots of each type, rating , model no. & Size installed	Nos.	Ten (10) percent of total number of Installed or four numbers whichever is higher .		
1.00.07.03	Manifold	Nos.	Ten (10) percent of each type & Size installed		
1.00.07.04	Fittings	Nos.	Ten (10) percent of each type & Size installed		
1.00.07.05	MCB, and Power sockets used in LIE/LIR.		Ten (10) percent of each type.		
1.00.07.06	Fuses used in LIE/LIR.		Fifty (50) percent of each type.		
1.00.07.07	Electric meter.	Nos.	Ten (10) percent or 2 nos (whichever is more) of each type		
1.00.07.08	Power supply modules.	Nos.	Ten (10) percent or 2 nos (whichever is more) of each type		
1.00.13	**Mandatory Spares for Solenoid valves, Control valves, Power Cylinder, Control Da mpers, Actuators, Flow Elements and Accessories**				
(A)	**Following spares shall be furnished for control valves, Power Cylinder, Control Dampers as applicable.**				
e.	Limit switches		2 sets of limit switches		
h.	Actuator		One of each type or min 10% for each type and size whichever is more.		
g)	**Solenoid valves.**		20 percent or min 10 no. of each type & model for total qty. (whichever is more)		

1.00.15	**Mandatory spares not covered above**				
	Sensor/instrument, analysers /special instruments/Electronic card, instrumentation/mechanical fittings etc. for any other electronic system, feeder control cabinets, hydrastep (EWLI), CCTV, C&I Lab Instruments, On line Carbon in Ash analyser system, On line Coal mass flow/speed measurement system, On line secondary air flow measurement system Mass Flow meter, Solid flow meter ,3 D Acoustic type level transmitters, Nucleonic & non nucleonic density transmitter, Chemical dosing system, O2 dosing system, Station LAN, MIS, mercury analyser, Viscosity meter, Hydrogen In		10% or 1 no. (whichever is more) of each type.		

Notes:

a) Mandatory spares listed in Price Schedule is bare minimum requirement. In case any additional mandatory spares requirement is covered elsewhere in the tender specification apart from specified above, same shall be deemed to have been covered in bidder's scope of supply.
b) "One (1) Set" and "One (1) set of each type & rating" is defined as total numbers as required for one complete replacement for one equipment of similar size & capacity. (Definition of set to be verified by DE with contract and then to be included in specification / EMOM)
c) All mandatory spares shall be supplied as per the requirement of the specifications. In case any spare indicated in the specification is "not applicable" for particular equipment, then suitable applicable alternate spare has been offered / shall be supplied by the bidder without any financial implication."
d) For quantities indicated in percentage, fractions are to be rounded-off to next higher integer.
e) Bidder to write "Quoted / Not Applicable" against all items. Any item which is quoted as "not applicable" by the bidder in the above list and is found to be "applicable" at a later date shall be supplied by the bidder without any commercial and delivery implication.
f) Any cell left blank in the unpriced schedule shall be treated as "Quoted" and is included in total price.

2. **Control & Instrumentation spares listed above** - Quantities are per unit. In case of common system, quantities shall be doubled.

Particulars of bidder / authorised representative					
	Name	**Designation**	**Signature**	**Date**	**Company Seal**

SUGGESTED PRICE FORMAT APPENDIX - A Special tools & tackles for maintenance	Doc No:	PE-PF-425-554-A001
	Rev No:	**0**
	Date of issue	**17/04/2018**

NAME OF PROJECT:	**2X800 MW TANGEDCO UPPUR TPP BTG**
NAME OF PACKAGE:	**VENTILATION SYSTEM**
TECHNICAL SPECIFICATION No:	**PE-TS-425-554-A001**

SL NO	DESCRIPTION	UNIT	Qty	AMOUNT (Ex-Works)	
1	Measuring tape	NO	1		
2	Tachometer	NO	1		
3	Double ended spanner	SET	1		
4	Ring spanners	SET	1		
5	Gasket punch	NO.	1		
6	Center punch	NO.	1		
7	Hammer with wooden handles	NO.	1		
8	Scissors for sheet metal cutting	NO.	1		
9	Torch light (suitable for 2 cells)	NO.	1		
10	Multimeter	NO.	1		
11	Anemometer	NO.	1		
12	Compound pressure gauge	NO.	1		
13	Slide wrench 8”	NO.	1		
14	Slide wrench 10”	NO.	1		
15	Slide wrench 6”	NO.	1		
16	Box spanner set	SET	1		
17	Screw driver set	SET	1		
18	Align key set	SET	1		
19	MS tool box	NO	1		
NOTES					
NOTES					
1	ABOVE IS THE MINIMUM LIST. ANY OTHER TOOL / TACKEL REQUIRED FOR THE SYSTEM SHALL ALSO BE PROVIDED BY THE VENDOR WITHOUT ANY COST IMPLICATION.				

Particulars of bidder / authorised representative

	Name	Designation	Signature	Date	Company Seal

SUGGESTED PRICE FORMAT APPENDIX - B Commissioning spares	Doc No:	PE-PF-425-554-A001
	Rev No:	**0**
	Date of issue	**17/04/2018**

NAME OF PROJECT:	**2X800 MW TANGEDCO UPPUR TPP BTG**
NAME OF PACKAGE:	**VENTILATION SYSTEM**
TECHNICAL SPECIFICATION No:	**PE-TS-425-554-A001**

SL NO	DESCRIPTION	UNIT	Qty	AMOUNT (Ex-Works)
1	FAN BELTS	SET	1	
2	PRESSURE GAUGE	NO	1	
3	TEMPERATURE GAUGE	NO	1	
4	FILTER	SET	1	
NOTES				
1	ABOVE IS THE MINIMUM LIST. ANY OTHER COMMISSIONING SPARE REQUIRED FOR THE SYSTEM SHALL ALSO BE PROVIDED BY THE VENDOR WITHOUT ANY COST IMPLICATION.			

Particulars of bidder / authorised representative

	Name	Designation	Signature	Date	Company Seal

SUGGESTED PRICE FORMAT ANNEXURE - III Guaranteed Power Consumption For Air Conditioning System	Doc No:	PE-PF-425-554-A001
	Rev No:	0
	Date of iss	17/04/2018

NAME OF PROJECT:	2X800 MW TANGEDCO UPPUR TPP BTG
NAME OF PACKAGE:	VENTILATION SYSTEM
TECHNICAL SPECIFICATION No:	PE-TS-425-554-A001

S.NO.	DESCRIPTION OF EQUIPMENT	NO OF EQUIPMENT		TOTAL GUARANTEED POWER CONSUMPTION FOR EACH EQUIPMENT AT MOTOR INPUT TERMINAL AND CONTROL PANEL (IN KW)	DUTY FACTOR	TOTAL KW
		WORKIN	STANDBY			
		3A	3B	4	5	6=3Ax4x5
1	VENTILATION SYSTEM FOR TG BUILDING					
1.1	Centrifugal Fan of cap. 1,50,000 CMH at 90 mmwc static pr for air Washers.	16	0		1	
1.2	Pumps for circulation of water in spray chamber of above air washer	8	8		1	
1.3	RE Units 50,000 cmh at 15mmwc	34	0		1	
2	VENTILATION SYSTEM FOR ESP BUILDING					
2.1	Centrifugal Fan of cap. 95,000 CMH at 75 mmwc static pr for UAF.	2	0		1	
2.2	Pump for above UAF.	2	2		1	
				TOTAL (KW)		

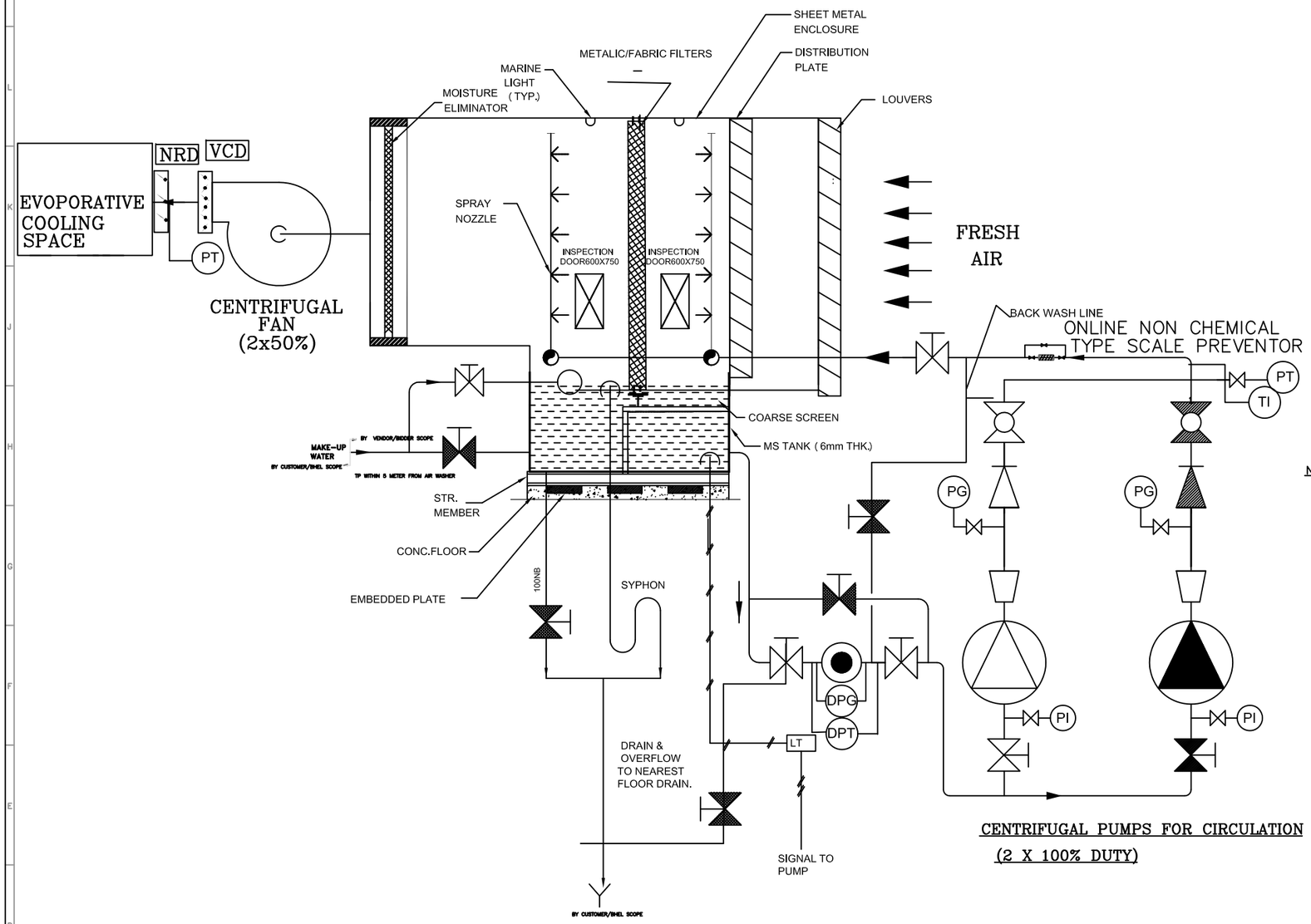
Note: Estimated power consumption (EPC) figure for the system (for working drives only) has been considered as 1375 KW. So long bidder's quoted guaranteed power consumption (GPC) above remains within this EPC, there will be no technical loading of bid on power consumption for evaluation. However, if bidder's quoted GPC exceeds EPC, there shall be technical loading of bid for evaluation @ Rs 588401/- per KW of additional power over EPC.

Bidder's guaranteed power consumption at motor input terminals (not shaft power) as furnished in relevant schedule shall be demonstrated by the successful bidder during performance testing at works/ site. In case power consumption is noted higher than EPC / bidder's quoted GPC whichever is higher, during inspection/ PG test, penalty @ Rs 588401/- per KW shall be levied on vendor.

In case bidder fails to submit "GPC Format" declaring GPC value along with offer, base value mentioned above (i.e. 1375 KW) shall be considered as "GPC value" quoted by the bidder

Particulars of bidder / authorised representative

	Name	Designation	Signature	DATE	Company Seal



CENTRIFUGAL PUMPS FOR CIRCULATION
(2 X 100% DUTY)

LEGEND:-

SYMBOL	DESCRIPTION	MATERIAL
	GATE VALVE	CI
	GATE VALVE (NORMALLY CLOSED)	CI
	GLOBE VALVE	CI
	CHECK VALVE	CI
	POT STRAINER	CASING-CI, MESH - BRASS,
	VOLUME CONTROL DAMPER (OPPOSD.BLD.)	MS
	CENTRIFUGAL PUMP	CASING-CI,EMPELLER - BRONZE,
	PRE & FINE FILTER (WASHABLE TYPE)	SS
PG	PRESSURE GAUGE WITH COCK	-
	FLOAT VALVE	-
	REDUCER	MS
LT	LEVEL TRANSMITTER	-
PT	PRESSURE TRANSMITTER WITH MANIFOLD	-
TI	TEMPERATURE INDICATOR	-

NOTES:-

1. SATURATION EFFICIENCY OF AIR WASHER SHALL BE 90% MINIMUM.
2. CENTRIFUGAL FAN SHALL BE BACKWARD CURVED BLADE HEAVY DUTY TYPE.
3. GI PIPES HEAVY CLASS FOR AIR WASHER SHALL BE PROVIDED FOR SPRAY SYSTEM.
4. METALIC FILTERS SHALL BE PROVIDED.
5. GI LOUVERS (FIXED BLADE TYPE) SHALL BE PROVIDED, COMPLETE WITH GI BIRD SCREEN ETC.
6. ALL EQUIPMENTS DRAIN SHALL BE TERMINATED TO NEAREST FLOOR DRAIN.
7. IN THE AIRWASHER TANK LEVEL INDICATOR / GUAGE & LEVEL TRANSMITTER SHALL BE PROVIDED FOR ALARM / TRIP.
8. Centrifugal fans shall be provided with Variable frequency drive (VFD) and velocity sensor/static pressure sensor in supply air path to adjust air flow automatically.
9. Regarding reducndency of instruments and sensors please refer C&I portion of technical specification.

PROJECT: TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
5th Floor, Western Wing, NPKRR Maaligai,
144, Anna Salai, Chennai-600002

CONSULTANT: TRACTEBEL ENGINEERING PVT. LTD.

PROJECT: 2X800MW UPPUR STPP BTG (UNIT#1&2)
IN RAMANATHAPURAM DISTRICT, TAMILNADU

CONTRACTOR: BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

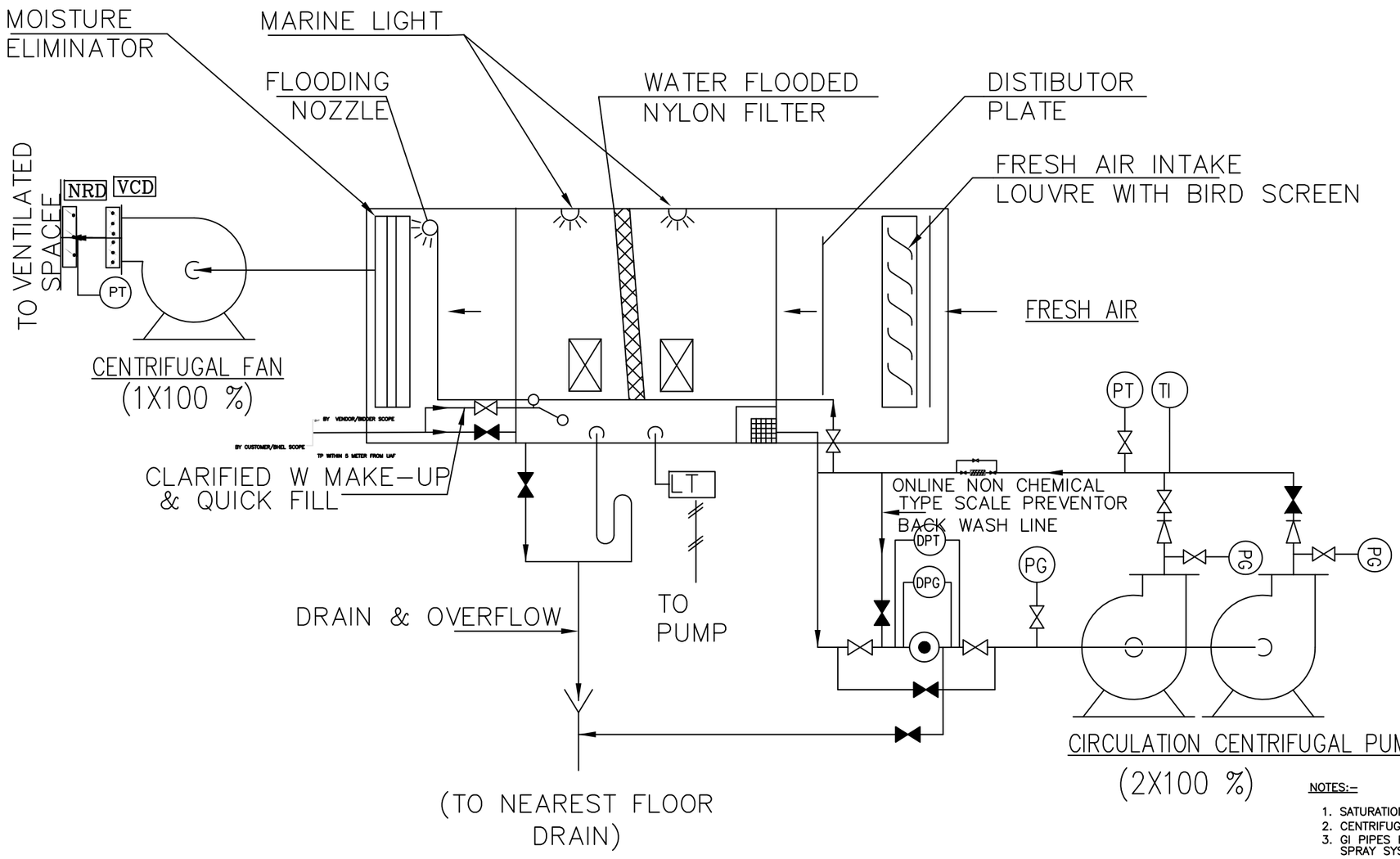
JOB NO.
STATUS CONTRACT
PRINT SCALE

REV.	DATE	ALTD	CHD	APPD

BHEL DRAWING NO. PE-DG-425-554-A001 SHEET 1 OF 1 REV. 0

TITLE: P & I DIAGRAM FOR WATER WASHER UNITS FOR TG HALL

	DATE	CHECKED	REV.
SCALE NTS	DRAWN	APPROVED	00



LEGEND:

GATE VALVE	
CHECK VALVE	
GLOBE VALVE	
GATE VALVE (NORMALLY CLOSED)	A
POT STRAINER	
SYPHON	
DRAIN	
PRESSURE GAUGE	PG
LEVEL TRANSMITTER	LT
PRE FILTER	
DIFF. PRESURE GUAGE	DPG
PRESSURE TRANSMITTER	PT

NOTES:–

1. SATURATION EFFICIENCY OF AIR WASHER SHALL BE 90% MINIMUM.
2. CENTRIFUGAL FAN SHALL BE BACKWARD CURVED BLADE HEAVY DUTY TYPE.
3. GI PIPES HEAVY CLASS FOR AIR WASHER SHALL BE PROVIDED FOR SPRAY SYSTEM.
4. NYLON FILTERS SHALL BE PROVIDED.
5. GI LOUVERS (FIXED BLADE TYPE) SHALL BE PROVIDED, COMPLETE WITH GI BIRD SCREEN ETC.
6. ALL EQUIPMENTS DRAIN SHALL BE TERMINATED TO NEAREST FLOOR DRAIN.
7. IN THE AIRWASHER TANK LEVEL INDICATOR / GUAGE & LEVEL TRANSMITTER SHALL BE PROVIDED FOR ALARM / TRIP.
8. Centrifugal fans shall be provided with Variable frequency drive (VFD) and velocity sensor/static pressure sensor in supply air path to adjust air flow automatically.
9. Regarding reducndency of instruments and sensors please refer C&I portion of technical specification.

PROJECT	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED 5th Floor, Western Wing, NPKRR Maaligai, 144, Anna Salai, Chennai-600002
CONSULTANT	TRACTEBEL ENGINEERING PVT. LTD.
PROJECT	2X800MW UPPUR STPP BTG (UNIT#1&2) IN RAMANATHAPURAM DISTRICT, TAMILNADU
CONTRACTOR	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA
BHEL DRAWING NO.	PE-DG-425-554-A002 — SHEET 1 OF 1 — REV. 0
TITLE	P&I DIAGRAM FOR UNITARY AIR FILTRATION UNITS FOR ESP CONTROL BUILDINGS
SCALE NTS	DATE / CHECKED / APPROVED — REV. 00

JOB NO. — STATUS CONTRACT — PRINT SCALE

REV.	DATE	ALTD	CHD	APPD

DRAWING NO. PE-DG-425-100-M002

FIRST ANGLE PROJECTION — ALL DIMENSIONS ARE IN MM

60.0N 165.0W — MAIN PLANT BOUNDARY WALL — 7.5M WIDE ROAD 60.0N — 60.0N 375.0E — BHEL CUST.

CUST. BHEL

0.00N/W — 0.00N/S

CHP IN CUST. SCOPE

MAIN PLANT BOUNDARY WALL

DG SET (COMMON FOR BOTH UNITS)

COMMON OIL COLLECTION PIT

MCC ROOM

AUXILIARY BOILER

ESP CONTROL ROOM (UNIT#1)

ESP CONTROL ROOM (UNIT#2)

ESP-A FAA-BHEM-297050-2 (6 NOS.)

ESP-B

ESP-C

ESP-D

ESP-E

ESP-F

BOILER AUX. MCC-2

BOILER AUX. MCC-1

CHIMNEY (CUST. SCOPE)

SERVICE BUILDING

CONDENSATE STORAGE TANK

CONDENSATE TRANSFER PUMP HOUSE

7.5M WIDE ROAD

MAIN PLANT BOUNDARY WALL

143500

200S

THIS ROAD LOCATION IS ON HOLD TILL FINALISATION OF FGD PACKAGE.

BHEL CUST. 360.0S 375.0E

21.5M WIDE ROAD INCLUDING SHOULDERS

360.0S

STATOR TRAILER

MAIN PLANT BOUNDARY WALL

CUST. BHEL 360.0S 165.0W

0.0E/W

FGD REGENERATION BUILDING (LOCATED IN CUSTOMER SCOPE AREA)

BHEL CUST.

200E

400S

WINDROSE

NORTH

CUSTOMER SCOPE ROAD

TO BE FINALISED WITH CUSTOMER, AS THESE FACILITIES ARE IN CUSTOMER SCOPE AREA.

0.0N/S

180000 (NTS)

40500 (NTS)

P&H PUMP HOUSE

CONTROL ROOM

ELECTRICAL MCC ROOM

DG UNLOADING PUMP HOUSE (CUSTOMER SCOPE)

FO DYKE AREA (CUSTOMER SCOPE)

CUSTOMER SCOPE ROAD

NOTES:-

1. ALL DIMENSION ARE IN MM AND LEVELS ARE IN METERS.
2. ALL ELEVATIONS INDICATED IN THE DRAWING ARE W.R.T. TG HALL GROUND FLOOR ELEVATION AS 0.00M, WHICH CORRESPONDS TO RL.(+)5.8M & BOILER PAVED LEVEL IS EL:(−)0.200M, WHICH CORRESPONDS TO RL.(+)5.6M. FFL IN TRANSFORMER YARD AREA IS RL.(+)5.7M.
3. THE FINISHED GRADE LEVEL OF POWER BLOCK AREA IS RL.(+)5.3M.
4. CABLE DUCT/TRENCH/SLIT LAYOUT IS SHOWN FOR REPRESENTATION PURPOSE ONLY. FOR DETAILS REFER ELECTRICAL DRAWING.
5. ALL COORDINATES MARKED ARE CONSIDERING TG HALL GRID−1 COLUMN AT A−ROW AS 0.00N/S, 0.00E/W IN LINE WITH CUSTOMER COMMENT. (1)
6. FO P&H PUMP HOUSE WILL BE IN FUEL OIL AREA OF CUSTOMER.
7. CPU REGENERATION BUILDING WILL BE IN DM PLANT AREA OF CUSTOMER.
8. MOBILE TRANSFORMER OIL FILTERNATION UNIT WILL BE PROVIDED IN TRANSFORMER YARD. (3)

BTG SCOPE PIPE CUM CABLE RACK

REFERENCE DRAWINGS:-

1. TG EQUIPMENT LAYOUT AT GROUND FLOOR − PE-DG-425-100-M003
2. KEY PLAN OF BOILERS − 0-00-020-77217
3. LAYOUT & GA OF AUXILIARY BOILER − 0-00-022-U4019
4. TRANSFORMER YARD LAYOUT − PE-DG-425-100-E001
5. ESP CONTROL ROOM LAYOUT − PE-DG-425-100-E008
6. SERVICE BUILDING LAYOUT AT EL:(+)0.0M − PE-DG-425-640-C001
7. AIR WASHER LAYOUT OUTSIDE A-ROW − PE-V0-425-554-A022

REV.	DATE	ALTD	CHD	APPD
03	06.02.2018	AB	SK	JJ
1)	DRAWING REVISED INLINE WITH CUSTOMER/ CONSULTANT COMMENTS.			
2)	OTHERS REVISED AS MARKED. (2)			

REV.	DATE	ALTD	CHD	APPD
02	21.09.2017	AB Sd/-	SK Sd/-	JJ Sd/-
1)	NO CHANGE IN DRAWING. ONLY REPLY SHEET CONVERTED IN EXCEL FORMAT INSTEAD OF WORD FORMAT (SUBMITTED WITH REV-01) AS DESIRED BY CUSTOMER.			

REV.	DATE	ALTD	CHD	APPD
01	02.09.2017	AB Sd/-	SK Sd/-	JJ Sd/-
1)	DRAWING REVISED INLINE WITH CUSTOMER/ CONSULTANT COMMENTS.			
2)	ROAD B/W TRANSFORMER YARD & SWITCHYARD SHIFTED TOWARDS TG HALL BY 37.5M.			
3)	OTHERS REVISED AS MARKED. (2)			

CUSTOMER	TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED
CUSTOMER'S CONSULTANT	TRACTEBEL ENGINEERING PVT. LTD.
JOB NO. 425	2X800MW UPPUR STPP (UNIT#1&2) IN RAMANATHAPURAM DISTRICT, TAMILNADU
STATUS CONTRACT	
DISTRIBUTION	
TO	
No. OF	

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

DEPT CODE		NAME	SIGN	DATE
M	DRN	ARVIND	Sd/-	03.06.2016
	DESN	ARVIND	Sd/-	03.06.2016
	CHD	SANJAY KUMAR	Sd/-	03.06.2016
	APPD	JACOB JAMES	Sd/-	03.06.2016

TITLE: MAIN EQUIPMENT PLAN

DEPT. | SCALE: 1:700 | DRAWING NO. PE-DG-425-100-M002
SIGN
DATE | SHEET 1 OF 1 | REV. 03

FORMAT SIZE A0

ELECTRONIC FILE NAME: PE-DG-425-100-M002-R3