

**SCOPE OF SUPPLY WITH TERMS & CONDITIONS**

**Design, Engineering, Supply, installation, Testing and commissioning of the project "16.7MVA ,132/11 kV Transformer at 132 KV Sub-station for Turbine & governing shop" at BHEL, Haridwar.**

SL	Description and Details of Equipment	Make	Unit	Qty.
1	<b>POWER TRANSFORMER</b> :- 16.7 MVA, 132/11 KV, POWER TRANSFORMER (nitrogen filled) and first filling of Transformer Oil to be supplied seperately with 10% extra, Vector Group YNyn0, ONAF, 12.5% Reactance with OLTC & its panel with the provision of parellel operation with similar rating of transformer, step size 1.25%, HT side Bushing suitable for ACSR Deer and LV cable box suitable for 06 Nos. of 1x630 Sq.mm XLPE Alluminium cable. Applicable Standadrs for Transformer IS:2026, with upto date ammendments, along with HT Bushing as Spare - 01 No. LT Bushing as Spare - 01 No.	ABB /Areva/ Siemens/Volt amp/ Telk	No.	1
<b>SPECIAL TERMS AND CONDITIONS :-</b>				
1.	Power supply of 415 Volt AC, 110 Volts AC & 110 Volts DC are available.			
2.	Type test certificate of any lot of same rating equipments to be provided and routine test certificate for all supplied equipments (original and one copy), O&M manual (3 sets) for individual equipments shall be provided by the party.			
3.	All G.A. drawings for 16,7 MVA Power transformers and wiring scheme are to be provided by the party after placement of Purchase Order.			
4.	Party has to submit the PERT chart for overall completion of the 16.7 MVA Power Ttransformer (Supply, erection, testing and commissioning and handing over) after placement of Purchase Order.			
5.	All the tools, tackles and T&P shall be arranged by the party for erection, testing and commissioning of the 16.7 MVA Power Ttransformer.			
6.	Pipes and perforated trays from sub-trenches to equipments shall be in the scope of party for equipment cabling.			
7.	Custodian and security of material related to above work shall be in the scope of Party.			
8.	Open space for storage of the material shall be provided by BHEL.			
9.	No furnished/unfurnished accomodation shall be provided by BHEL.			
10.	BHEL will provide only power point connection for ETC and temporary lighting in switchyard.			
11.	BHEL will not allow any space for labour camping inside the premises.			
12.	Soil resistivity and other calculations regarding earthing of the transformer, neutral & body shall be in the scope of			
13.	Gravelling under Transformer in switchyard shall be done by the party after antiweeding treatment of the soil.			
14.	Party has to arrange approval of drawings & inspection for the above Power Transformer before commissioning of the system from Central Electrical Authorities/Inspectorate.			
<b><u>BHEL, Haridwar Scope of Work :</u></b>				
1.	Excavation & levelling of site.			
2.	Preperation of transformer foundation, oil soak pits etc., however the drawings shall be prepared & submitted by the party for approval from BHEL.			
3.	Electrical power & water supply will be provided free of charge for construction work.			

**SCOPE OF SUPPLY WITH TERMS & CONDITIONS**

**Design, Engineering, Supply, installation, Testing and commissioning of the project "4th Bay of 132/11 kV Circuit with associated equipments etc. for new turbine & governing shop" at BHEL, Haridwar.**

SL	Description and Details of Equipment	Make	Unit	Qty.
<b>A.</b>	<b>Equipments :-</b>			
<b>1</b>	<b>LINE ISOLATOR</b> :- 145KV, 600A, Tripple pole, gang operated , Centre Post Rotating Horizontally Double Break Line Isolator, suitable for 31.5 kA for 1 Sec., Electrically & manually Operated with One Manually operated Earth Switch with Support Insulator & Support Structure, complete with all accessories. Applicable Standadrs for Isolator IS:9921 (Part I to V) / IEC 1128, for Insulator IS:2544 with upto date ammendments.	GR Power/ Elpro	No.	1
<b>2</b>	<b>CURRENT TRANSFORMER</b> :- 145KV, 100-50/1A (3 Cores), 31.5 kA for 1 Sec., CURRENT TRANSFORMER, Out door, oil cooled, hermatically sealed , Live Tank, for Differential Protection, Over Current & Earth fault Protection and Metering purpose, with Support Structure. Applicable Standadrs for Current Transformer IS:2705, for Bushings IS:2099, for Insulating Oil IS:335 with upto date ammendments.	Mehru/ CGL/ Vishal	Nos.	3
<b>3</b>	<b>POTENTIAL TRANSFORMER</b> :- 145 KV / 110 V ,Single phase potential transformer,31.5 KA for 1 Sec., out door, oil cooled, hermatically sealed for protection and metering purpose with support structure (complete in all respect ). The applicable standard for potential transformer IS :2705 , for bushing IS :2099 & for insulating oil IS :335 with up to date ammendments.	Mehru/ CGL/ Vishal	Nos.	3
<b>4</b>	<b>P.T.ISOLATOR</b> :- 145KV, 600A, Tripple pole, gang operated, Centre Post Rotating Horizontally Double Break P.T. Isolator, suitable for 31.5 kA for 1 Sec., Electrically & manually Operated with Support Insulator & Support Structure, complete with all accessories. Applicable Standadrs for Isolator IS:9921 (Part I to V) / IEC 1128, for Insulator IS:2544 with upto date ammendments.	GR Power/ Elpro	No.	1
<b>5</b>	<b>CIRCUIT BREAKER</b> :- Supply of 145 KV, 2500 A, 31.5 KA for 1 Sec., SF6 CIRCUIT BREAKER with support insulators and structure, suitable for 110 V DC supply, rated Impulse withstand Voltage 650 kVp, rated operating duty O - 0.3 Sec.-CO - 3 Min - CO. Applicable Standadrs for SF-6 Circuit Breaker IEC 56 with upto date ammendments.	ABB/ Siemens	No.	1
<b>6</b>	<b>LIGHTENING ARRESTOR</b> :- 120kV, 10KA Surge Arrestors/ Lightening Arresters with surge monitor (Metal Oxide Gapless LA) (1-ph). Insulated copper conductor of adequate length shall be provided for connecting LA base and surge counter. Applicable Standadrs for Lightening Arrester IS:3070 / IEC 99, for Insulator IS:2544 with upto date ammendments.	Elpro/ CGL/ Areva/ Oblum	No.	3
<b>7</b>	<b>CONTROL PANEL</b> :- Control relay & protection panel for 16.7MVA Transformer with remote & local control on load tap changer panel with the provision of parellel operation with similar rating of transformer along with control switches, control cable incorporating indicating lamps, tape position indicator, oil & winding temp. indicator, control switch with discripency indicator, ammeter & voltmeter with three phase selector switch, Static protection relays for over current, earth fault and Differential, and auxiliaries & tripping Flag relays for PRV, Buchholze, oil & winding temp., oil level (alarm & tripping), Flag relays for all SF-6 Circuit Breaker control & protection, Power meter with accuracy Class 0.5, featuring KW, KVA, KVAR, KWH, KVAH, KVARh, Frequency, Voltage, Current, Power Factor. Inputs available 110 VAC (from PT) and 110 VDC (Charger/Battery Bank) and any other control & protection for transformer & OLTC, if required . Applicable Standadrs for Panel IS:3427, IEC 298, BS 5277, VDE 0670 with	ABB/ Siemens	No.	1
<b>8</b>	<b>BAY MARSHALLING KIOSK</b> :- Outdoor type, Bay Marshalling Kiosk having Aluminium bus bar with colour codification for three phases, MCBs, Fuses, Terminal Blocks, Space Heater, Lamp with door limit switch etc. as per IS: 8623, Degree of protection IP: 55, suitable for ambient temprature 50 Deg.C. Voltage rating 415 Volt, Current rating as per site equirement.	ABB/ Siemens	No.	1

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SL	Description and Details of Equipment	Make	Unit	Qty.
9	<b>REACTOR</b> : 750A, 11 KV, Single phase, Air cooled, copper wound Reactor, 6% Reactance, with provision of bus-bar with support insulators,. connectors and accessories etc. for connection of 2 Nos., 1x630 Sq.mm. cable at Incoming and Out going of each reactor. The reactor shall be complete in all respect.	ABB, SIEMENS, AREVA AND L&T OR	Nos.	3
10	<b>INCOMER PANEL</b> :- Incomer VCB, 11 KV,1250 A, 31.5 kA for 1 Sec., should have bus bar arrangement to accomodate 06 nos. cable end termination (Heat shrinkable Type) of 1X630 Sq.mm with Current Transformer (Qty.-3 Nos.) of 11KV, 1200-800/5A (3 Cores for Differential Protection, Over Current & Earth fault Protection and Metering purpose) fitted with Bus-Bars on each phase., Incorporating indicating lamps, control switch, ammeter & voltmeter with three phase selector switch, protection relay for over current & earth fault (static) and other auxiliary relays for anunciation & alarm purpose, Power meter with accuracy Class 0.5, featuring KW, KVA, KVAR, KWH, KVAH, KVARh, Frequency, Voltage, Current, Power Factor (for supply voltage 110 VAC and control voltage 110 VDC), metering instrument should be of Accuracy Class 1.0. Degree of protection not less than IP-54 fabricated of CRCA Sheet Steel. Applicable Standadrs for Panel IS:3427, IEC 298, BS 5277, VDE 0670 with upto date ammendments.	ABB / Siemens	No.	1
11	<b>OUTGOING PANEL</b> :- Out going VCB 11KV, 1000A, 31.5 kA for 1 Sec. with copper bus bar to accomodate 4 nos. cable end termination (Heat Shrinkable Type) of 3X400 Sq.mm size with Current Transformer (Qty.-3 Nos.) of 11KV, 1200-800/5A (2 Cores for Differential Protection, Over Current & Earth fault Protection (PS Class) and 1core for Metering purpose (Accuracy class-2) fitted with Bus-Bars on each phase, with support structure. Incorporating indicating lamps, control switch, protection relay for over current & earth fault (static) and other auxiliary relays for anunciation & alarm purpose, Power meter with accuracy Class 0.5, featuring KW, KVA, KVAR, KWH, KVAH, KVARh, Frequency, Voltage, Current, Power Factor (for supply voltage 110 VAC and control voltage 110 VDC), metering instrument should be of Accuracy Class 1.0. Degree of protection not less than IP-54 fabricated of CRCA Sheet Steel. Applicable Standadrs for Panel IS:3427, IEC 298, BS 5277, VDE 0670 with upto date ammendments.	ABB / Siemens	Nos.	2
12	<b>P.T. PANEL</b> :- Suitable for11 kV/110V Drawout type PT, which shall be supplied with Voltage indicator and complete in all respect. Applicable Standadrs for Panel IS:3427, IEC 298, BS 5277, VDE 0670 with upto date ammendments.	ABB / Siemens	No.	1
13	<b>XLPE CABLE</b> :- 1X630 sq. mm, 11 KV (E) XLPE cable Alluminium Conductor, conductor & XLPE insulation sheilding of extruded semi conducting compound, screened with copper tape, Non-magnetic round armouring, 12 Lengths of 400 RM each (from transformer to reactor and reactor to 11 KV Incomer Panel). Applicable Standadrs for cable IS:7098 (II) 1985 with upto date ammendments.	CCI, Uniflex, RPG, Torrents & Universal	RM	4800
14	<b>JOINTING KIT</b> :- End termination joints (heat shrinkable type) suitable for 1X630 sq. mm. XLPE Aluminium conductor armoured Cable.	Rechem make	Nos.	55
15	<b>CONTROL CABLES</b> :- 1.1 KV grade, 6x2.5 Sq.MM. control cables with copper conductor PVC insulated with inner seathed and armoured. Applicable Standadrs for cable IS: 1544 (1/1988) with upto date ammendments.	CCI, Uniflex, RPG, Torrents & Universal	Lot	1
16	<b>BUS POST INSULATOR</b> :- 132/145 KV solid core post insulator as per IS: 2544-1973 and IEC: 168-1994 to support the tap off jumper for all three phases from Jack Bus of 132 KV which is also to be made by the party in the switch yard.	Modern Insulator, IEC, Sarvana	Nos.	3

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SL	Description and Details of Equipment	Make	Unit	Qty.
<b>B.</b>	<b>Other Items :-</b>			
i)	Jack Bus Gantry structure (Galvenised) as per IS:	Kamani, Richardson & Crudas or other	Lot	1
ii)	11 KV Disk/Suspension type insulators for jumpering of both the ends of jack bus.	Kamani, Richardson & Crudas or other	Lot	1
iii)	Conductor (ACSR Deer). Applicable Standadrs for conductor IS:398 (1961) with upto date ammendments.	Reputed Make	Lot	1
iv)	Clamps connector as per IS:	Reputed	Lot	1
v)	Earth mat with 40 mm MS round rods as per IS:	Reputed	Lot	1
vi)	Earthing pits as per IS:	Reputed	Lot	1
vii)	Sheilding wire as per IS:	Reputed	Lot	1
viii)	Equipment earthing from GI Strip (50x6 mm) with earth mat X-axis & Y-axis as per IS:	Reputed Make	No.	1
ix)	Lighting mast as per IS:	Kamani, Richardson & Crudas or other Standard	Lot	1
x)	Illumination (Luminaire of 1000 Watt metal halide with Lamp, control gears and photo cell etc.) for switch yard as per IS:	Philips, Crompton & Bajaj	Nos.	4
<b>SPECIAL TERMS AND CONDITIONS :-</b>				
1.	All the above items includes support structure & other accessories required to complete the work.			
2.	Power supply of 415 Volt AC, 110 Volts AC & 110 Volts DC are available.			
3.	Type test certificate of any lot of same rating equipements to be provided and routine test certificate for all supplied equipments (original and one copy), O&M manual (3 sets) for individual equipments shall be provided by the party.			
4.	All G.A. drawings for Isolators, Lighting arrestors, Current transformers, Potential transformers, Reactor, HT Panels, Cotrol & relay panels wiring scheme are to be provided by the party after placement of Purchase Order.			
5.	Plan, sections, layout of switchyard & drawings of foundations for associated equipments etc., cable schedule, lighting layout, earthing layout, schematic diagram and as built drawings/documents are to be provided for approval from BHEL by the party well before the start of installation work. However soil's load bearing details for foundations shall be provided by BHEL.			
6.	Party has to arrange approval of drawings & inspection for the above 4th bay before commissioning of the system from Central Electrical Authorities/Inspectorate.			
7.	Detail designing of the project shall be done by the party and shall take the approval from BHEL.before start of work.			
8.	All the Control wiring shall be carriedout with 650 Volt grade standard copper wire with PVC insulation. For CT & PT circuit the wire size should be 2.5 Sq.mm. and other circuit shall be with 1.5 Sq.mm copper wire.			
9.	Jack Bus arrangement with material, to be made for tapping the power supply for this bay, is in the scope of party.			
10.	Supply of consumables like nuts & bolts for foundations (Foundation Bolts with templates for all the equipments, supervision of grouting of foundation bolts shall be in scope of Party) and other equipments, clamps, connectors, SF-6 gas or any other instruments/ machines required for the erection, testing & commissioning of the above equipment shall be done by the party. Civil work shall be done by BHEL.			
11.	Party has to submit the PERT chart for overall completion of the project (Supply, erection, testing and commissioning and handing over) after placement of Purchase Order.			
12.	All the tools, tackles and T&P shall be arranged by the party for erection, testing and commissioning of the project.			
13.	Being a turnkey project the principle vendor of the project shall be responsible for inspection, performance, quality, erection, testing and commissioning of the items/equipments supplied by the them.			
14.	Pipes and perforated trays from sub-trenches to equipments shall be in the scope of party for equipment cabling.			
15.	Bus Bars of all HT Panels shall be of Copper.			
16.	Contract will be on unit rate basis wherever quantities specified in Bill of Quantity are fixed (no variation). Lot quantity will be lump sum only (no variation).			

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17.	Custodian and security of material related to above work shall be in the scope of Party.
18.	Open space for storage of the material shall be provided by BHEL.
19.	No furnished/unfurnished accomodation shall be provided by BHEL.
20.	BHEL will provide only power point connection for ETC and temporary lighting in switchyard.
21.	BHEL will not allow any space for labour camping inside the premises.
22.	Cable laying & end termination work in readymade trenches in switch yard, Aluminium clamps for single core cables to make trafoil shall be in the scope of Party.
23.	Soil resistivity and other calculations regarding earthing of the system shall be in the scope of party.
24.	Gravelling of extension bay in switchyard shall be done by the party after antiweeding treatment of the soil.
	<b><u>BHEL, Haridwar Scope of Work :</u></b>
1.	Excavation & levelling of site.
2.	Preperation of Equipment foundations, cable trenches, oil soak pits etc., however the drawings shall be prepared & submitted by the party for approval from BHEL.
3.	Electrical power & water supply will be provided free of charge for construction work.

SINGLE LINE DIAGRAM OF 4<sup>th</sup> BAY AT 132 KV SUB-STATION, HEEP, HARDWAR.

