STEEL AUTHORITY OF INDIA LIMITED

DURGAPUR STEEL PLANT

LESION DEPMLTD ENT

# TECHNICAL SPECIFICATION

FOR

Extension of 3.3KV SwitchBoard at HT-13 Substation of Power Management Department, DSP

TECHNICAL SPECIFICATION NO.- DD/TS/2021 -841

1. INTRODUCTION:

1.1. Durgapur Steel Plant (DSP), a unit of Steel Authority of India Ltd., is situated at Durgapur in West Bengal. DSP was commissioned with an initial capacity of 1.0 MTPA of ingot steel. In the year 1989, a modernisation programme was undertaken and the Plant capacity was enhanced to 1.802 MTPA of crude steel. After the recent modernisation and expansion plan, Plant capacity has been enhanced to 2.2 MTPA of crude steel.

1.2. The maximum demand of electrical power for DSP in 2.2 MTPA stage is of the order of 220 MVA. The plant gets power from DVC with a contract demand of 100 MVA. Balance is met through in-plant generations. The power from DVC (PARULIA) is received at 220kV Main Receiving Station (MRS) and there after stepped down through number of 220/33kV transformers and then supplied in bulk to 33kV load centre sub-stations. From the 33 kV sub-stations power is taken to different load centres and stepped down to 11 kV through 16 or 10 MVA transformers and further stepped down to 3.3 kV & 0.415 kV level at various downstream substations to feed the various shop end drives.

1.3. <u>EXISTING FACILITIES:</u>

1.4. Mill Pump House (MPH) is a vital area in Durgapur Steel Plant. It is located inside Rolling Mill Pump House area inside main campus of Durgapur Steel Plant (DSP).

1.5. The main function of Rolling Mill Pump House is to pump treated & untreated water to different shops of DSP. For its functionality it has 05 (five) numbers 3.3 kV voltage rated Cold Well Pumps & 04 (four) numbers 3.3 kV voltage rated Hot Well Pumps. It has two substations — Mill Pump House Substation & HT-13 substation.

1.6. In Mill Pump House(MPH), power is available in two voltage level:

1.7. 3.3 kV Voltage level (AC)— For 09 no's Pump in MPH [CWP(cold well pump)- 1,2,3,4,5 & HWP(Hot well pump)-1,2,3,4]

1.8. 415 V Voltage level (AC) —For Auxiliary supply, Illumination, Crane & Miscellaneous other LT requirement. It also provides vital emergency (OPP source) LT power to all mills (including Merchant mill, Section mill & Wheel and Axle Plant) and Punabad area

1.9. <u>OVERVIEW OF THE PROJECT:</u>

1.10. The following problems are being encountered in Mill Pump House substation:

1.11. The existing 3.3kV switchboard is approximately more than 50 years old. Due to technological obsolescence & lack of spares of electrical equipment's, it is becoming difficult to perform preventive maintenance & trouble shooting of Air Circuit Breakers (ACB) of frequently operated pumps resulting in process delay. Also because of ageing the dielectric property of the switchboard has deteriorated substantially and the e is every possibility of electrical failure.

1.12. The building is itself more than 50 years old. The structural condition of the building is very poor. Numerous attempts had been made in the last 10-12 years to arrest water seepage

permanently, however its recurrence is becoming a yearly incident. The unsafe condition of the building is a threat to the operation & maintenance personnel working inside the substation.

1.13. The substation is actually located in the lowest point with respect to ground level as compared to surrounding areas, causing water accumulation in and around the substation area during the monsoon. Rigorous dewatering is done every year to prevent water ingress inside the substation, Transformer pen area & Isolator room. There is every chance of flashover due to moisture ingress inside the substation.

1.14. The existing 3.3 kV switchboard is having 6 different types of Circuit Breakers/Panels and hence multiple spare/stand by circuit breakers is required to be maintained. However due to dimensional constraint of the building, it becomes very difficult to maintain the accommodated spare/standby circuit breakers inside the substation.

1.15. Main pipeline for raw water storage is passing through the basement of the substation, resulting in basement being flooded with raw water (mixture of sludge & water) causing difficulty in maintenance of power cables & cable structure.

1.16. A number of structures has come up in the vicinity of the transformer pen causing hindrance in the regular monitoring & maintenance of the transformer.

1.17. HT-13 substation is located beside MPH S/S (Mill Pump House substation) which was installed during modernisation. Both the substations i.e. MPH and HT-13 Substations caters power to pump to Rolling Mills. The available space in HT—13 Substation can accommodate the breakers of MPH Substation with some modification (both civil & electrical) and relocation of the existing equipment of HT-3 Substation. It has been decided to shift the existing feeders of MPH Substation to HT-13 substation by extension of existing 3.3 kV switchboard.

1.18. It has been also decided to extend the switch board of HT-13 Substation with the breakers of existing make & model of HT-13 substation because extension of HT-13 Substation with breakers of other make & model will require an additional linking chamber for which sufficient space is not available. Moreover extension with the breakers of existing make & model will facilitate inter changeabiiity of circuit breakers.

1.19. <u>INTENT OF SPECIFICATION:</u>

1.20. The intent of this tender specification is to furnish required details for enabling the Bidder to submit their best offers (technical & commercial) as per the scope of work mentioned at technical specifications. This tender specification shall be read in conjunction with other documents enclosed with the NIT.

1.21. <u>SCOPE OF WORK:</u>

1.22. The scope of work shall cover design, engineering, procurement, manufacture, fabrication, supply, transportation, insurance, storage, handling, dismantling & removal of debris, construction, erection, testing, commissioning, stabilization and demonstration of performance guarantee of equipment to the satisfaction of the Employer. The plant and equipment supplied shall be new and best of its kind. The Bidder shall be responsible for execution of the jobs envisaged for replacement based 3.3 kV switchboards and civil and structural works.

1.23. The complete job is to be executed on <u>Turnkey basis</u>. <u>The brief scope of work envisages the following:</u>

1.24. The equipment and facilities envisaged under this package shall be located as per general layout drawings enclosed with the TS. Layout of plant and equipment shall have provision for easy and safe movement of operation/ maintenance personnel for operation/inspection of the running plant. Adequate space for dismantling/ removal of equipment/ parts for repair shall also be built in the layout.

1.25. All the manufacturing/ fabrication works shall be carried out only on the basis of approved drawings and schemes or as directed by the Employer.

1.26. Any equipment/ work/ service, which may not have been specifically mentioned in this document but is necessary for completeness of the work, shall be clearly brought out in the offer and included in their scope of work.

1.27. Site cleaning, preparation, transfer of benchmarks & geodetic lines, checking & fixing, aligning of structures, initial and final cleaning of site to be done after completion of the work.

1.28. Civil works such as chipping/cutting of floors for making grooves or laying pipes/ cables, making holes/opening through walls, ceiling or floors, drilling of holes through steel structures and frames, grouting of frames, hooks on walls/ceiling, etc. required for execution [Wide Parallel Flange Beam (WPB) and Narrow Parallel Flange Beam (NPB) sections, being produced by SAIL, shall be used. In case of non-availability /non- suitability of WPB or NPB sections, tapered rolled SAIL sections or built up sections using SAIL steel shall be used. This is in addition to the relevant clauses of SBD 2020 with regards to usage of SAIL steel.]

1.29. <u>Scope of Services:</u>

1.30. Receiving *o/* equipment from Manufacturers and transportation to site.

1.31. Unloading of equipment at site, unpacking, cleaning up, and checking for completeness and transportation to site for erection.

1.32. Supply of all erection consumables like oil, kerosene, cotton waste, oxygen and acetylene gas cylinders, electrodes, asbestos sheets, asbestos ropes, sealing compounds etc.

1.33. Arranging tools, tackles, construction & erection machineries, cranes and other handling & testing equipment, scaffolding, temporary platforms, erection fixtures, skilled/semiskilled/ unskilled personnel etc.

1.34. Required loading/ unloading / transportation of the equipment part, which may require repairs at Employer's repair shop(s).

1.35. Arranging inspection of equipment at manufacturer's/ sub supplier's works wherever required as per approved QAP.

1.36. Arranging and rendering equipment and personnel to employer for checking the correctness of the work in progress.

1.37. Submission of test certificates and data sheet from approved third part testing laboratory or manufacturer respectively.

1.38. All equipment shall confirm to the relevant provisions of Statutory and other Regulations in force such as Indian explosives Act, Indian Factories Act, Indian Boiler Regulation, State Factories Act, Indian Electricity Rules, Central Pollution Control Board and Indian Weights & Measures Act as applicable. The Bidder shall provide all necessary assistance to the Employer to get all the installations within the scope of supply approved by the concerned legal

1.39. Any rectification/modification of existing facilities required during erection of equipment.

1.40. The Bidder shall be responsible for protection and/or diversion of underground and all existing over-ground services, wherever required and/or diversion of the underground services which are indicated in the drawing made available to the Bidder. In case, there are under-ground services which need to be protected and/or diverted but are not shown in the drawing, the Bidder shall be responsible to execute the same at extra price, if any, to be mutually agreed between Bidder & Employer.

1.41. Sundry works such as making of holes, grouting, chiselling of holes/ opening through walls, ceiling, floors, steel structures, etc. including providing inserts as per requirement, cleaning of site periodically and at the time of final handing over.

1.42. Periodic transportation including Loading, unloading and spreading the unserviceable material, debris & surplus excavated earth with all lift and lead within plant premises unless otherwise specified.

1.43. All instructions in the manuals for assembly, erection, testing, commissioning and maintenance of the equipment shall be in English. Hard Copies of six (06) complete set of as built drawing to be provided.

1.44. All the electrical work shall be under bidder's scope. After erection, surface shall be

1.45. Unloading of equipment at site, unpacking, cleaning up, and checking for completeness and transportation to site for erection.

1.46. Supply of all erection consumables like oil, kerosene, cotton waste, oxygen and acetylene gas cylinders, electrodes, asbestos sheets, asbestos ropes, sealing compounds etc.

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1.57. All instructions in the manuals for assembly, erection, testing, commissioning and maintenance of the equipment shall be in English. Hard Copies of six (06) complete set of as built drawing to be provided.

1.58. All the electrical work shall be under bidder's scope. After erection, surface shall be

1.59. Broad scope of work for electrical system is as follows:(TABLE)

| Sl. | Item | Qty. |
|---|---|---|
| 1 | 3.3KV switchboard comprising of new vacuum circuit breakers, CTs, PTs, protective numerical relays, auxiliary relays, metering, indication, switches and all other associated auxiliaries in HT-13 sub-station comprising of 08 nos.( 1 Interconnector, 1 Bus Coupler & 5 Outgoing Pump feeders & 1 Outgoing Transformer Feeder) of new VCB panels.<br>The tentative SLD of the proposed 3.3 kV switchboard is given in Org. no. A3/211.03.000/91205<br>The VCB panels shall have facility for connecting two nos. of 3.3kV cables at outgoing side. | 1 Lot |
| 2 | LT PDB board (Emergency PDB) at HT-13 with 2 Incomers & 2 Interconnectors, 10 outgoings feeders | 1 Set |
| 3 | 3.3kV FRLS (Fire retardant low smoke) cables, associated control cables and termination units as required at the above mentioned substations. | Lot |
| 4 | 1.1kV LT FRLS(Fire retardant low smoke) power cables, associated control cables and termination units as required for the proposed equipment | Lot |
| 5 | Cable related job & distribution of power with new cable has been envisaged for the following:<br>1. Necessary cable related job for shifting ofT-27M 11KV LBS<br>2. 3.3KV cable for diversion Interconnector New Sajara (existing)<br>3. 2nd cable for 3.3KV Interconnector New Sajara (existing)<br>4. 3.3KV cables for diversion of 3.3KV Pumps — CWP-1, CWP-4, HWP-2, HWP-3, HWP-4<br>5. 3.3KV cable from T-113 transformer to new panel<br>6. 415V cable for diversion of Interconnector Billet Mill (emergency loop)<br>7. 415V cable from T-113 transformer to new PDB<br>8. 415V cable for re-location of Battery bank in HT-13<br>9. 415V power & control cable for re-location of Battery Charger in HT-13<br>10. 415V power & control cable for re-location of DCDB in HT- 13<br>11. LT control cable for 05 numbers Pumps for Remote Control Desk & Emergency Trip at motor end<br>Modification of transformer cable chamber for connection of cable | Lot |

| Sl. | Item | Qty. |
|---|---|---|
| 6 | Illumination in HT - 13 Substation building | Lot |
| 7 | Earthing and lightning protection system. | Lot |
| 8 | Supply and installation of following safety it‹•ms:<br>a) Rubber mat 11kV & other voltage grade | Lot |
| | b) Fire Extinguisher (Dry Powder)<br>c) First aid box<br>d) Shock treatment chart & Caution Boards.<br>e) Marking of lnterconnectors / Incomers / Bus Coupler using Halogen stickers<br>f) Earthing rods & Discharge rods<br>g) Panel Nomenclature using Fluorescent Sticker | |
| 9 | Conversion of panel of 3.3KV I/C (incoming) MPH to Outgoing feeder HWP-2<br>a. CT - Phase CT (CTR — 0-30-300/1) & ICT (Integrated CT)<br>b. Numerical Motor Protection Relay<br>c. Voltage Protection Relay<br>d. Master Trip Relay (VAJH 23) | 3 Numbers (for 3-phase)<br>1 Number<br>1 Number<br>1 Number |
| 10 | Technological structures for installation | Lot |
| 11 | Supply of tools & tackles, furniture, erection accessories | Lot |

1.60. UTILITIES:

1.61. Fire Fighting Facilities:

1.62. Portable fire extinguishers of DCP (6 kg) type shall be provided as per TAC norms in the premises of HT-13 substation

1.63. Sand buckets shall be provided in all transformer rooms and other locations as per TAC norms.

1.64. All the items to be used shall be of Tariff Advisory Committee (TAC) approved and subject to Employer's approval in case not included in the list of TAC.

1.65. Passive Fire Protection System:

1.66. Fire barriers at panel base of minimum 2 hours of fire rating.

1.67. Fire sealing for cable openings of not less than minimum 2 hours of fire rating.

1.68. CIVIL WORKS:

1.69. The area wise broad scope of work consists of the following:

1.70. MPH motor room: Inside/Outside- Renovation/repairing woik including dismantling of brick works as per requirement for cable laying related job

1.71. HT-13 substation: Inside/Outside - Renovation/ repairing work including dismantling of brick works as per requirement for cable laying related job

1.72. T-113 related job:

1.73. New transformer room (formerly TR-1 transformer room) at HT-13:-Modification of transformer foundation to accommodate the transformer

1.74. Old transformer room:— Dismantling of floor/base required for shifting of transformer.

1.75. Dismantling of floor/base for Battery Charger shifting inside HT-13 substation in existing location & new location

1.76. Dismantling of floor/base for Battery Bank shifting inside HT-13 substation in existing location & new location

1.77. Dismantling of floor/base for DC-DB shifting inside HT-13 substation in existing location & new location

1.78. Dismantling of floor/base for T-27M 11KV LBS shifting inside HT-13 substation in existing location & new location (TR-1 existing LBS room)

1.79. Dismantling of floor/base for erection of Emergency PDB

1.80. Dismantling of floor/base for erection of Remote Control Desk at MPH Operator room

1.81. Floor cutting at HT-13 using Hole Saw Cutter for:

1.82. Power & Control cable entry in new 3.3KV switchgear

1.83. DC-DB new location for cable entry

1.84. Battery Bank new location for cable entry

1.85. Battery Charger new location for cable entry

1.86. T-27M 11KV LBS new location

1.87. New Emergency PDB

1.88. Remote Control Desk at MPH Operator room

1.89. Any other equipment foundation as per requirement.

1.90. RCC foundation required for supporting structural cable bridge

1.91. RCC foundation required for structural cable support in HT-13 basement

1.92. Strengthening of existing structural cable support in HT-13 basement

1.93. Construction of PCC approach road to HT-13 substation building

1.94. Necessary job for diversion of dewatering pump Control box at HT-13 substation

1.95. Necessary job for diversion of Ventilation DB at HT-13 substation

1.96. Necessary job for dismantling of TR-1, 2 old LT bus bur & bus duct from transformer room to existing panel & cover up of dismantled wall.

1.97. Necessary job for dismantling of old control panel of 3.3KV Pumps —CWP-1, CWP-4, HWP-2, HWP-3, HWP-4 and PCC/RCC of dismantled area as per requirement.

1.98. Necessary job for erection of new Stop Push Button beside pump of CWP-1, CWP- 4, HWP-2, HWP-3, HWP-4

1.99. Necessary job for erection of new door at HT-13 substation of specific dimension

1.100. STRUCTURAL WORKS:

1.101. The scope of work for the structural steelwork includes supply of raw steel, design, preparation of drawings, supply of materials, fabrication, inspection, erection, painting, testing and commissioning of

structural steelwork on turnkey basis. The scope of work for structural steel works involves the following:

1.102. Modification of existing structures, stairs, ladders, platforms etc. as per requirement

1.103. New structural requirement for erection of new 3.3KV switchgear (08 numbers) — including base frame, support etc.

1.104. Cable Bridge shall be open type without any top cover but well guarded on both sides with steel structural members for safety of workmen of minimum width of 1.5metres for laying the cables for an approximate length of 75metres as per the proposed cable route. The walkway shall be provided with fabricated MS gratings. Necessary stairs and approach platforms to the walkway shall be provided at suitable intervals. The height of cable gallery must be more than 6metres.

1.105. Cable support structure in the basement for cable laying.

1.106. Erection of new door at HT-13 substation of specific dimension (3metres X 2 metres) using Angles, flats and sheets.

1.107. Structural work required to support new cable trays (width — 600mm)

1.108. Inside HT-13 substations

1.109. Inside MPH motor room for 3.3KV pumps.

1.110. Inside/outside MPH motor room for cable laying of 400V I/C BLT(emergency loop)

1.111. Base frame for new PDB & other necessary requirements pertaining to erection of PDB.

1.112. In Cable overhead bridge.

1.113. Structural work required for modification in:

1.114. Cable tray inside basement/cable trench of HT-13.

1.115. Necessary modification for shifting of Battery Charger

1.116. Necessary modification for shifting of DC-DB

1.117. Necessary modification for shifting of T-27M LBS

1.118. Dismantling of TR-111KV LBS room shutter & erection of new transformer room door.

1.119. Necessary modification of transformer room door/structure of TR-1 at HT-13 to accommodate T-113 inside the room

1.120. Necessary structural job for diversion of existing 3.3KV I/C New Sajara & 2nd cable laying for the same feeder from HT-13 to New Sajara

1.121. Structural work required for erection of new PDB inside HT-13 substation

1.122. Structural work required for erection of Remote Control Desk at MPH Operator Room

1.123. Necessary monorails in electrical building for handling facilities (as required).

1.124. Clamps for binding power/control cables in cable tray/gallery/structure etc

1.125. Any other structural job pertaining to the above mentioned job schedule.

1.126. Painting of all the new structures as per specification.

1.127. Necessary structural job for diversion of dewatering pump Control box at HT-13 substation

1.128. Necessary structural job for diversion of Ventilation DB at HT-13 substation

1.129. Necessary structural job for dismantling of TR-1,2 old LT bus bar & bus duct from transformer room to existing panel & necessary modification to cover the wall, floor etc

1.130. Necessary structural job for dismantling of old control panel & erection of new Stop Push Button of 3.3KV Pumps—CWP-1, CWP-4, HWP-2, HWP-3, HWP-4.

2. TECHNICAL SPECIFICATION:

2.1. ELECTRICAL PARAMETERS:

2.2. System Voltage and System Earthing:

2.3. The following are the site conditions and system design parameters suiting which the entire "electrical system and drive automation" equipment shall be designed unless otherwise specifically mentioned in the clauses of the TS against the respective equipment.

2.4. TABLE

| | | |
|---|---|---|
| 1 | HT | 3.3kV (+10%), 3 phase, 50 Hz (+5%), resistance<br>40 kA for 3 seconds |
| 2 | LT | LT 415V (+10%), 3 phase, 50 Hz (+5%), solidly<br>SOKA for 1 second |
| 3 | DC CONTROL | DC control and signal voltage 110V DC |
| 4 | AC CONTROL | AC control and signal voltage 240V |

2.5. The equipment shall be designed in such a manner that the system performance is not affected under the variation of power supply system stated above.

2.6. All equipment shall be dust, vermin and weather proof design and suitable for industrial area.

2.7. Since the site is integrated steel plant which is very dusty environment, all equipment shall be suitable for continuous operation delivering rated output without exceeding permissible temperature rise.

2.8. All the equipment and system shall be designed considering the seismic zone.

2.9. Standards & Stipulations:

2.10. The electrical equipment / items shall be designed, manufactured, installed and tested in accordance with latest IS/ IPSS/ IEC, as applicable to respective equipment.

2.11. All electrical equipment and installations shall also conform to the latest Indian Electricity Rules and CEA regulations as regards safety, earthing and other essential provisions specified therein. All equipment/ items shall also comply with the statutory requirements of the Government of India and the Government of West Bengal.

2.12. The Bidder shall follow the safety rules of Durgapur Steel Plant (DSP) and shall take clearance from DSP or the authorised person by the Employer before starting the work.

2.13. Design and selection of equipment/ items shall be done taking into consideration of easy inspection, testing, maintenance, cleaning etc. to be carried out at site without disrupting process or taking prolonged shutdowns.

2.14. Brief Description of the Electrical System:

2.15. 3.3KV Switchboard:

2.16. The 3.3KV Switchboard must have the following feature:

2.17. The switchgear panel must be of ABB make (from OEM) Type-11KV VHA, suitable for coupling with existing VHA type Switchgear panel at HT-13 substation without any Adaptor Panel or Trunk Chamber

2.18. The breaker cubicles shall be totally enclosed dust and vermin proof, sheet metal clad, floor mounted, free standing, indoor type and shall house circuit breakers, bus bars, control equipment, heat shrinkable cable termination, current transformers, potential transformers, instruments, relays, annunciation system and ether accessories.

2.19. This factory assembled HT switchboard shall be with fully draw out type breaker carriage, compartmentalized design with pressed sheet steel (thickness not I*ss than 2.0 mm) and with IP-4X class of enclosure. For each of the incoming, outgoing and sectionalize cubicles, tie cubicles, the cable connection, HT Bus bars and all low voltage control devices shall be housed in separate chambers.

2.20. Bus bar chambers shall be necessarily isolated from that for main circuit breaker chamber and shall be suitably earthed to offer better safety and protection of working personnel.

2.21. All doors other than cable chamber shall be of hinged and lockable type with suitable gaskets at all joints and the cable chamber shall be fixed with nuts and bolts.

2.22. Gaskets shall be provided for cable chamber.

2.23. Two separate earthing terminals shall be provided for HT cubicles. The cubicles shall be provided with metallic automatic safety shutters, which cover automatically the isolating contacts when circuit breaker is withdrawn from service position.

2.24. The switchboard design shall have following features:

2.25. Permit extension.

2.26. Segregation of all low voltage auxiliary control devices by earthed metallic barriers.

2.27. Requisite electrical safe clearances among live parts and between live parts to earth. All live bus bar parts in switchgear shall be fully sleeved/ shrouded.

2.28. Interchange ability of VCB's (vacuum circuit breaker) among themselves and with existing GCB's (gas circuit breaker).

2.29. All the HT rear covers shall have suitable arrangement for operation and maintenance ease.

2.30. Ventilation openings shall be provided where essential and shall have suitable screen protection.

2.31. The Bus Coupler panel must have provision for Dual Incoming 240V AC & 110V DC source with automatic/manual changeover scheme.

2.32. TECHNICAL PARAMETERS:(TABLE)

| A | B | C |
|---|---|---|
| 1 | Normal System Voltage | 3.3KV 1 10% |
| 2 | System Frequency | 50Hz 1 10% |
| 3 | Rated Current of VCB | 1250Amps |
| 4 | Degree of Enclosure Protection | IP-4X |
| 5 | Standard to be followed | IEC — 62271-100,200 |
| 6 | BIL | 12KV/28KV/75KV |
| 7 | Rated Short Circuit Breaking Capacity | 40KA f‹›r 3sec |

2.33. <u>General Features of Switchgears:</u>

2.34. HT circuit breakers envisaged in the specification shall be designed to control and protect the power distribution system. The circuit breaker shall conform to IEC- 62271-100,200.

2.35. Circuit Breaker must be HPA VD4 type with sliding contacts arrangement connection with Auxillary contact in Test/Service position.

2.36. The circuit breaker shall have adequate capacity insulation and mechanical strength to withstand.

2.37. In-rush magnetizing currents of transformers

2.38. Starting currents of drives

2.39. Transient surges developed during various abnormal operating conditions

2.40. All electro-dynamic stresses developed during abnormalities like faults in the system.

2.41. All circuit breakers shall be of draw-out type construction, with separate lockable doors over their compartment. All secondary connections between the fixed and moving portions of the equipment shall be provided with positive pressure contacts without any possibility of loose connections. The circuit breakers shall he fitted with necessary safety mechanical interlocks against:

2.42. Disconnection/loose connection of breaker trolley from "service" position due to electro dynamic stress under short circuit conditions.

2.43. Insertion or withdrawal of mobile Trolley when circuit breaker is closed.

2.44. Probability of closing operation with the trolley in an intermediate position other than service / test. Insertion of breaker carriage with control and protection plugs disengaged.

2.45. The moving carriage of circuit breaker, which shall also carry jaw contacts, shall be provided with earthing contacts continuously so that the breaker remains positively earthed in "service" position and during withdrawal operation "Test" position. The breaker shall have anti-pumping features.

2.46. All circuit breakers shall have three operational positions, such as "Service" "Test" and "Draw-out" position.

2.47. Mechanical indicators for all positions shall be provided. The circuit breakers shall carry a single break per pole, which shall be identical with the other 2 pole chambers of the breaker. Simultaneous closing of the three poles of a breaker on a single

closing command shall be ensured. All circuit breakers shall be interchangeable.

2.48. The HT Breaker shall be provided with electrical and mechanical trip free features and an emergency mechanical push to trip the breaker. All the features of the equipment shall ensure complete safety of the operation and shall be complete with approved safety devices to protect against potential hazards to operating personnel or to the equipment around. The design shall include all reasonable precautions and provisions for the safety.

2.49. All HT Breakers shall be provided with at least 8 potential free Aux. contacts to be used by Employer for their interlocking/ signaling purposes. Contact arrangement may be 6 NO + 6 NC and these shall be rated for 10 amp current duty on the control and auxiliary voltages (both AC & DC). Further, the following features shall be ensured in each HT switch board

2.50. Control plugs provided shall be mounted in horizontal fashion.

2.51. All supporting insulators shall have increased creep age distance as per IS /IEC and shall suit highly polluted atmosphere of steel industry.

2.52. Panels must have VCB Rack IN/OUT Instruction in front side of VCB chamber. Panels must have details of CT/PT in the front LV door (inside/outside).

2.53. Suitable Support Insulators shall be provided & shall suit highly polluted atmosphere of an Integrated Steel Plant.

2.54. Suitable Surge Arrestor shall be provided & Shall Be Metal Oxide, Gapless Type Silicon Rubber Insulated

2.55. Outside Paint Shade: Post Office Red. ( RAL-3573)

2.56. Phase to Phase & Phase to Earth Clearance Shall Be Minimum 110mm in bare portions.

2.57. All Terminal Blocks Related To CT, PT Circuits Shall Be Disconnecting/Isolating Type (Where A Link Has To Be Present For Isolation)All Wiring Related To CT, PT Terminals(Including Connections Is Meters, Relays etc) Must Be 2.5 Square Mm Copper Wire & All Other Control Circuit Wiring Must Be 1.5 Square mm Copper Wire

2.58. Space Heater In Cable Chamber Must Be Strip Type Heater (6” Or 9”) Instead Of Standard Stainless Steel Sheathed Cartridge In Perforated Sheet Metal.

2.59. Panel Illumination Luminaire Must be LED. No Illumination Shall Be Present In VCB/Cable/Bus Bar Chamber

2.60. Panel Must Have A 230V 1-Phase Ac Supply With 5/15A Power Socket In Each Panel.

2.61. Bus Bars:

2.62. The Power Bus Bars of HT switch board shall be made of high conductivity Aluminium of rating 1250A and size 75mm X 12mm (2 numbers).

2.63. BIL- 12KV/28KV/75KVP.

2.64. The continuous current rating of main power bus bar and the short time current rating of bus bars shall be as indicated in the SLD.

2.65. Horizontal and vertical bus bar shall be designed manufactured and supported to withstand thermal and dynamic stress corresponding to rated short time and peak withstand current as specified above.

2.66. Bus bar arrangement shall be as per IS 5578:1984 & IS 11353:1985/latest IEC. Bus bar shall be sleeved with proper grade of insulating sleeves and of proper color code for each phase. All joints and connecting terminals shall be tinned.

2.67. Bus bar shall be housed in a separate bus bar chamber with adequate air clearance and bushing. The insulators/ bushing shall be cast resin type to offer higher mechanical strength, during short circuit fault.

2.68. The bus bar chamber shall be provided with detachable side covers for regular maintenance and inspection and have provision of extension on both sides. Bus bars shall be covered with HT sleeves with shrouding at joints & end terminals.

2.69. All Insulators and Bushings connected with bus bar chamber shall be corrosion resistant material.

2.70. Current Transformers (CT):

2.71. CTs shall be employed for measuring instruments and automatic tripping cf circuit breakers on over load, short circuit protection, earth fault protection, differential protection. For providing any remote ammeter connection ICTs to he provided.

2.72. The CT shall be cast resin insulated type of high mechanical strength. The CT shall have bar primary and wound secondary.

2.73. These CTs shall have minimum burden of 15 VA and a shorting link on secondary side to facilitate isolation of metering devices without opening circuit. CTs shall be mounted on outgoing side of breakers with easy accessibility for maintenance i.e. load side of feeder breakers and line side of incomer breakers. CT secondary terminals shall be accessible from the back of the panel. Class of accuracy for protection shall be 5P20 & class 1.0 shall be used for metering & class PS for differential protection. Earthing of CT circuit shall be provided with proper colour coding inside the relay chamber. CT wires shall be properly glass sleeved. CT shall conform to IS 2705: Part 1:1992 with its latest amendments.

2.74. The differential protection CTs for the Interconnector shall be of P.S. class. These CTs shall match in their magnetizing characteristics and suit the protection of transformer. Short time rating of these differential CTs shall be 40 KA for 1 second and the insulation grade shall be suitable for respective voltages. These differential CTs shall operate in the zone from 25% to 75% of knee point voltage. The Differential protection scheme of power transformers shall be submitted for approval of the Employer by the Bidder prior to manufacture.

2.75. Single Phase ICT (Y-phase) (Ratio 1:1) to be provided for remote side Ammeter provision.

2.76. Every panel must have 3-phase individual CT & the details are as follows:(TABLE)

| Sl. | Type | Feeder | No. of switchgear | CTR | Protection Details |
|---|---|---|---|---|---|
| 1 | Interconnector | I/C NSJ | 01 | 500/1<br>(3-phase CT) | Class 5P20-Protection<br>Class 1.0- Metering<br>Class PS — Differential (Vk>150V, Imag<30mA @ Vk/2, RCT <=60) |
| 2 | Outgoing Transformer | T-113 | 01 | 75/1<br>(3-phase CT) | Class 5P20-Protection<br>Class 1.0- Metering |
| 3 | Outgoing Pumps — CWP | CWP-1<br>CWP-4<br>Spare | 03 | 75/1<br>(3-phase CT) | Class 5P20-Protection<br>Class 1.0- Metering |
| 4 | Outgoing Pumps — HWP | HWP-3<br>HWP-4 | 02 | 30/1<br>(3-phase CT) | Class 5P20-Protection<br>Class 1.0- Metering |
| 5 | Bus Coupler | B/C | 01 | N/A | N/A |
| 6 | For modified panel existing 3.3KV I/C MPH at HT-13 | HWP-2 | To be provided separately without switchgear | 30/1<br>(3-phase CT) | Class 5P20-Protection<br>Class 1.0- Metering |

2.77. Potential Transformers (PT):

2.78. The Line PTs at the 3.3KV interconnector cubicles shall be provided in separate trolleys. HRC Fuse protection of adequate rating shall be provided on HT side and LT side MCB along with HRC fuse of appropriate rating shall be used. Accuracy class of PT shall be 1.0. The primary and secondary of these potential transformers shall be Star connected and shall be used for all protection purposes (like under voltage protection etc.), for measuring line voltages and for other meters viz. energy meters etc. PTs shall conform to IS 4146:1983 with its latest amendments.

2.79. Provision must be provided for PT secondary side broken delta connection & the same to be terminated to a 2-Pole MCB inside the control panel of VCB.

2.80. PTs shall be provided with voltmeter, with selector switch for measuring phase to phase and phase to earth voltages.

2.81. PT ratings - 100VA, 3.3KV/ 1.732 / 110V /1.732, CL 1.0.

2.82. 3.3KV line PT to be provided for Interconnector New Sajara — 3 number line PT as a single unit having facility to change any one PT on requirement, can be isolated or put to service.

2.83. Protective Relays:

2.84. All protective relays shall be state-of-the art numerical relays. The numerical relays shall have built in self-supervision system with auto diagnosis feature. Relays shall be provided such that each relay shall have multiple protection features in a single relay (composite type) to the extent possible. Relays shall have IEC 61850 protocol and shall have provision for connectivity to the RTU system. Relays shall be mounted on top front chamber of CB. Relays must operate in dust and vermin proof enclosure.

2.85. The relays should have following minimum features:

2.86. Provision of recording and display of s°tting values, measured values, recorded fault parameters etc.

2.87. Key pad for browsing and setting the relay menu

2.88. High immunity to electrical interference

2.89. Improved system reliability through built in self-diagnostic /monitoring and system supervision.

2.90. DMT & IDMT curves as per IEC.

2.91. Communication capacity for exchange of data using RJ45/USB.

2.92. Must have inbuilt LED for:

2.93. Protection Relay healthy

2.94. Protection Relay Operated

2.95. Motor Protection Numerical Relay must have at least 5 programmable LED with function assigned & marked with sticker for:

2.96. Thermal Protection

2.97. Over Current Protection

2.98. Earth Fault Protection

2.99. Stalling Protection, Block Rotor & Locked Rotor Protection

2.100. Unbalance / Negative Sequence Protection

2.101. Voltage Protection Numerical Relay must have at least 1 programmable LED with function assigned for Under Voltage Protection

2.102. Programmable inputs and outputs (Minimum 10 DI, 10 DO)

2.103. Dual current rating ( 1 A or 5A nominal ) shall be provided

2.104. Memorization of fault parameters for each protection operations inc)uding external trip and inhibit circuit breaker failure protection

2.105. The relay shall have firm latching / fixing provision in the relay housing

2.106. At least 1 contact for Watch dog must be present

2.107. The protection requirement in each panel of proposed Substation shall be as indicated earlier.

2.108. Each panel shall have an independent high speed hand reset master trip relay VAJH23 type (Alstom make), Trip circuit supervision facility, Fault annunciation relay, DC voltage operated auxiliary relay for remote applications of and other Auxiliary relays and timers as required by the control, protection, alarm, indication and interlocking schemes. These schemes with effective and fault free simulation of the said functions shall be submitted to the Employer for their approval prior to manufacturing clearance of the board.

2.109. Insulation of relays should withstand 2.5 kV A.C. (RMS) at 50 Hz for one second between all circuits and the case, and between all circuits not intended to be connected together. The relay should also withstand 1.25 kV. AC. (RMS) at 50 HZ for 1 sec between rating contacts in open position.

2.110. Latest Software (Trial Version Not Accepted) For Communication Of Numerical Relay With Laptop (Laptop Is Not To Be Provided) & Communicating Cord T‹a Be Provided Free Of Cost. Any future update if required for communicating the Numerical Relay must be provided free of cost.

2.111. For Interconnector & Bus Coupler switchgear Voltage Selection Scheme to be provided using auxiliary relay & Contact Multiplier Relay as required. Check Synchronizing & Dead Bus Charging Scheme also to be provided and it should be connected with the existing Voltage selection scheme. For Interconnector & Bus Coupler switchgear Voltage Selection Scheme to be provided using auxiliary relay & Contact Multiplier Relay as required. Check Synchronizing & Dead Bus Charging Scheme also to be provided and it should be connected with the existing Voltage selection scheme. 3-way selector switch to be provided for Synchronizing/Dead Bus/Bypass operation. The bypass mode shall operate without any VCB contacts/interlock.

2.112. Voltage Protection relay must trip VCB directly (trip pulse to be given directly to trip coil) without operation of Master Trip Relay (VAJH 23). Interlocking contact must also to provided in the Closing circuit scheme of VCB, so that the VCB cannot be made ON when the Voltage Protection relay contacts are actuated. On restoration of system voltage (110V AC), the Voltage Protection relay contacts must reset automatically, however the indication may be manually/automatic reset type

2.113. The relay details for Individual Switchgear are as mentioned: -(TABLE)

| Sl. | Type | Feeder | No. of switchgear | Relay Details |
|---|---|---|---|---|
| 1 | Interconnector | Interconnector New Sajara | 01 | Directional Numerical Relay O/C & E/F relay with IDMT/DMT feature |
| | | | | Check Synchronizing Relay |
| | | | | High speed tripping relay (VAJH23) |
| | | | | Necessary relay for Voltage Selection Scheme |
| 2 | Outgoing PUM feeder/ Spare Feeder | CWP-1<br>CWP-4<br>HWP-3<br>HWP-4<br>Spare | 05 | Numerical Motor Protection Relay- Thermal, Stalling, O/C & E/F relay with IDMT/DMT feature, Blocked Rotor, Locked Rotor, Unbalance/Negative Sequence |
| | | | | Under voltage relay |
| | | | | High speed tripping relay (VAJH23) |
| 3 | Outgoing Transformer Feeder | T-113 | 01 | Non -Directional Numerical Relay O/C & E/F relay with IDMT/DMT feature |
| | | | | Electromechanical Inter trip Relay (VAWA) |
| | | | | High speed tripping relay (VAJH23) |
| 4 | B/C | B/C | 01 | N/A |
| 5 | For modified panel existing 3.3KV incoming MPH at HT-13 | HWP-2 | To be provided separately without switchgear | Numerical Motor Protection Relay- Thermal, Stalling, O/C & E/F relay with IDMT/DMT feature, Blocked Rotor, LockedRotor, Unbalance/Negative Sequence |
| | | | | Under voltage relay |
| | | | | High speed tripping relay (VAJH23) |

2.114. Indicating Instruments:

2.115. Each panel shall be provided with Multifunction digital energy meter and this shall have communication(Modbus protocol) provision with RTU for all electrical parameters like current, voltage, kW, kVA, KVAR, power factor, frequency and. In addition to multifunction meters, analogue type Ammeters, voltmeters meters as mentioned below shall also be provided in each panel.

2.116. Latest Software (Trial Version Not Accepted) For Communication of Multifunction digital energy meter With Laptop (Laptop is not to be provided) & Communicating Cord (communication through RJ45/USB/HDMI mode only) to Be Provided Free Of Cost. Any future

update if required for communicating the Numerical Relay must be provided free of cost.

2.117. All analog ammeter/ voltmeter shall be of 144mm x 144 mm (for Remote Control Desk appropriate size may be given in consultation with EA, DSP-PMD) and shall be flush mounted type with anti-glare glass, with 120measuring linear scale and zero adjustment device. All indicating instruments shall conform to IS 1248: Part 1 to 9:2003, and IS 2419:2012 and shall be capable to withstand system fault current taking into consideration CT saturation.

2.118. Accuracy class of meters shall be class 1.0 or better.

2.119. All indicating instruments shall have connection at backside, and shall be totally enclosed dust and vermin proof construction. The scale shall be uniform at about full load current whose value shall be marked in red. These meters shall be provided with necessary test terminal blocks.

2.120. Scale for Ammeter & Voltmeter must be according to CTR/VTR as mentioned (for CTR refer 3.2.4.5.6 & for VTR refer 3.2.4.6)

2.121. Indicating Instrument details are as follows:- (TABLE)

| Sl. | Type | **Feeder** | No.of switchgear | **Indicating Instruments** |
|---|---|---|---|---|
| 1 | Interconnector | I/C NSJ | 01 | Ammeter, Voltmeter, MFM(with energy meter) |
| 2 | Outgoing Transformer Feeder/ Pump Feeder / Spare Feeder | T-113<br>cwP-1,4<br>HWP 3 4<br>Spare | 06 | Ammeter, MFM(with energy meter) |
| 3 | Bus Coupler | B/C | 01 | N/A |
| 4 | For modified panel existing 3.3KV I/C MPH at HT-13 | HWP-2 | To be provided separately without switchgear | Ammeter, MFM(with energy meter) |
| 5 | Remote Control Desk | CWP-1 | To be provided along with Control Desk | Ammeter |
| | | CWP-4 | | Ammeter |
| | | HWP 2 | | Ammeter |
| | | HWP-3 | | Ammeter |

2.122. Earthing **of HT Switchgear:**

2.123. The following norms shall be adopted for earthing of HT Switchgear:

2.124. Continuous copper earth bus bar shall be provided. However, the cross section shall be checked to carry the peak short circuit and short time fault current of the system.

2.125. Earthing bus bar shall be positively connected/ welded with different sections of HT switchgear, individual functional units and non-current carrying metallic units.

2.126. Hinged door shall be earthed through stranded copper galvanized earthing braid.

2.127. For positive earthing of withdraw able units, silver plated copper strapping earthing contacts of “make before” / “break after” type shall be used ensuring earth continuity from “service” to “test” position of draw-out type breakers on both the sides.

**2.128.** Annunciation and Control **Scheme:**

2.129. The signaling and annunciation scheme shall include the following:

2.130. ON-OFF-TRIP and spring charged indications shall be provided through RED- GREEN-AMBER and BLUE signal lamps for every panel. The green lamp shall be energized through an auxiliary relay, which shall also confirm to the readiness of CB for getting en. The loss of voltage in the bus bars shall be indicated by flag operated relays in the respective PT panels. Trip supervision lamps shall also be provided.

2.131. VCB in test/service position indication lamp should also be provided.

2.132. PT in service position indication lamp should also be provided.

2.133. VCB in test/service position indication lamp should also be provided.

2.134. PT in service position indication lamp should also be provided.

2.135. TABLE

| SI No | Type | Feeder | No. of switchgear | Indicating **lamps** with **Colors** |
|---|---|---|---|---|
| 1 | Interconnector | I/C NSJ | 01 | ON — Red<br>OFF —<br>Green<br>VCB Service —<br>Amber VCB Test-<br>White Spring<br>Charged — Blue<br>Trip Circuit Healthy-White<br>PT Service-Amber<br>CB tripped on fault — Amber<br>Space Heater ON - Amber |
| 2 | Outgoing Transformer Feeder/ Pump Feeder / Spare Feeder | T-113<br>cwP-1,4<br>HWP 3t4<br>Spare | 06 | ON — Red<br>OFF —<br>Green<br>VCB Service — Amber<br>VCB Test- White<br>Spring Charged — Blue<br>Trip Circuit Healthy — White<br>CB tripped on fault — Amber<br>Space Heater ON — Amber |
| 3 | Bus Coupler | B/C | 01 | ON — Red<br>OFF — Green<br>VCB Service — Amber VCB Test-<br>White Spring Charged — Blue<br>Space Heater ON — Amber |
| 4 | For modified panel existing 3.3KV I/C MPH at HT-13 | HWP-2 | To be provided separately without switchgear | ON — Red<br>OFF — Green<br>VCB Service — Amber VCB Test-<br>White |
| | | | | Spring Charged — B)ue |
| | | | | Space Heater ON — Amber |
| | | | | Master Trip Relay Operated — Amber |

| SI No | Type | Feeder | No. of switchgear | Indicating **lamps** with **Colors** |
|---|---|---|---|---|
| 5 | Remote Control Desk | CWP-1 | To be provided along with Control Desk | ON — Red<br>OFF — Green<br>Trip From Remote — Amber |
| | | CWP-4 | | ON — Red<br>OFF — Green<br>Trip From Remote — Amber |
| | | HWP-2 | | ON — Red<br>OFF — Green<br>Trip From Remote — Amber |
| | | HWP-3 | | ON — Red<br>OFF — Green<br>Trip From Remote — Amber |
| | | HWP-4 | | ON — Red<br>OFF — Green<br>Trip From Remote — Amber |

2.136. Cluster type LEDs shall be provided for indication.

2.137. The signaling and annunciation scheme shall operate on 110V DC.

2.138. Solid state (IC CMOS based) audio-visual annunciator shall be provided however exact number of windows shall be finalized during detailing. The annunciator shall be provided with flasher units, audible alarm, test, reset, Accept features as elaborated above.

2.139. For all abnormal conditions hooter/bell of central audio & visual annunciator in PT panel shall sound. Hooter / Bell shall be discriminated for trip and non-trip abnormalities.

2.140. Push buttons shall be provided for the following operations: Fault Accept/Reset/Hooter Test/Visual lamp test.

2.141. Audio & visual annunciator shall operate on emergency under the following

circumstances:

2.142. Tripping of each circuit Breaker i.e. operation of master trip relay

2.143. Trip circuit Unhealthy

2.144. Operation of Numerical Relay.

2.145. Temperature rise of various transformers

2.146. Buchholz signal of various transformers

2.147. Trip from remote

2.148. All other faults not mentioned above, but considered necessary may also be included in the annunciation scheme.

2.149. Selection & control switches and other miscellaneous items:

2.150. All selection switches for voltage & current measurements shall be suitable for 3 phases and phase to neutral measurements. The remote/ local selector switches provided on the switchboard shall be lockable in each position. The control switches shall be pistol grip, spring loaded and trip-neutral-close type with sequence device. The switchgear and control panels shall have inscription plates for all panels with anodized lettering.

2.151. Separate LOCAL/REMOTE selector switch to be provided for Outgoing Pump feeders & Spare Feeder & converted panel of existing 3.3KV Interconnector MPH (to be converted to 3.3KV Outgoing Pump — HWP-2)

2.152. Control bus shall be continuous copper conductors insulated throughout for full voltage. Push-in type insulation box shall be provided at tapping points.

2.153. The control wiring in the switchgear shall be carried out with single core stranded copper conductor PVC cable of 1.5 sq. mm size (min.) with 6 sq. mm open type terminals. Protection circuit wiring shall be carried out with 2.5 sq. mm size (min.) copper conductor adopting 10 sq. mm open type terminals. Separate terminal blocks shall be provided for each voltage class and carry the specific terminal number and voltage indicated thereon. Separate terminal blocks shall be provided for external connections in the relay chamber. At least 20% spare terminals shall be provided for future purposes. Control cable terminations shall be provided in the front portion of the cubicle only in the relay chamber. All devices, wires and the terminal blocks within the panel shall be clearly identified by durable and legible tags (stickers shall not be acceptable) corresponding to those used in the applicable schematic drawings or wiring diagrams. All panels shall be provided with space heaters with ON/OFF switch along with a thermostat and a 10 amp. Plug socket for hand lamp connection. Space heater wattage shall be mentioned for each panel. Inter-partition separators on control terminal block shall be provided for control terminals of each circuit breaker. Drive panels shall however be controlled from Drive end or its control panel.

2.154. Cable Chambers:

2.155. The cable end termination chamber for each panel shall have adequate space for the termination of required number, type and size of cables and shall be provided with suitable bracings to support the weight of the cables without undue stress on the terminals. These chambers shall be complete with all accessories and shall form integral part of the cubicle and shall be freely accessible for cable connection.

2.156. POWER & CONTROL CABLE: & The HT power cables shall comply with the latest revision of the following Indian Standard Specifications and to the specific standards mentioned, if any, in the respective clauses:

2.157. IS 7098 :Part-1: 1988 Cross linked polyethylene insulated PVC sheathed cables: Part 1 For working voltage up to and including 1100V Including latest amendment and Reaffirmed

2.158. IS 7098 :Part-2: 2011 Cross linked polyethylene insulated thermoplastic sheathed cables — specification : Part 2 For working voltages 3.3 Kv

2.159. IS 8130: 2013 Conductors for insulated electric cables and flexible cords - Including latest amendment and reaffirmed

2.160. IS 5831: 1984 PVC insulation and sheath of electric cables - Including latest amendment and reaffirmed

2.161. IS 10810 Methods of testing of cables & The detailed Technical specification are as follows:-

2.162. For 3.3 KV Cables:(TABLE):

| Sl No | Technical Specification | |
|---|---|---|
| 1 | Type | XLPE |
| 2 | Cores | 3 — Cores |
| 3 | Conductor | Circular conductor made of stranded and compacted electrical grade aluminium wires as per IS 8130: 2013 |
| 4 | Conductor Screened | Extruded semiconducting compound. |
| 5 | Insulation | High quality crossed linked polyethylene compound (XLPE) applied by extrusion process. |

| Sl No | Technical Specification | |
|---|---|---|
| 6 | Insulation Screened | Individual core shielded with extruded semiconducting compound followed by semiconducting & copper tape |
| 7 | Inner Sheath | Individual core shielded with extruded semiconducting compound followed by semiconducting & copper tape |
| 8 | Armouring | Steel flat stripped armoured |
| 9 | Outer Sheath | Extruded type, FRLS PVC outer sheath (type ST2 ) |

2.163. Power Cable requirements are as follows:(TABLE)

| si. | Feeder Name | VoltageGrade | Numberof Cores | Cable Size |
|---|---|---|---|---|
| 1 | 3.3KV InterconnectorNew Sajara (existing cable) | 3.3KV | 03 | 185 $mm^2$ |
| 2 | 3.3KV Interconnector New Sajara (new 2nd cable) | 3.3KV | 03 | 185 $mm^2$ |
| 3 | CWP-1 | 3.3KV | 03 | 95 $mm^2$ |
| 4 | CWP-4 | 3.3KV | 03 | 95 $mm^2$ |
| 5 | HWP-2 | 3.3KV | 03 | 95 mm2 |
| 6 | HWP-3 | 3.3KV | 03 | 95 mm2 |
| 7 | HWP-4 | 3.3KV | 03 | 95 mm2 |
| 8 | T-113 | 3.3KV | 03 | 95 m2 |

2.164. The above mentioned feeders are having single run cable.

2.165. Necessary Cable related job for shifting of T-27M 11KV LBS to be done.

2.166. The LT power & control cables shall comply with the latest revision of the following Indian Standard Specifications and to the specific standards mentioned, if any, in the respective clauses:

2.167. IS 1554 :Part 1: 1988 PVC insulated (Heavy duty) electric cables

2.168. IS 7098 :Part 1: 1988 Cross linked polyethylene insulated PVC sheathed cables: Part 1 For working voltage up to and including 1100 V

2.169. IS 8130: 2013 Conductors for insulated electric cables and flexible cords

2.170. IS 5831 : 1984 PVC insulation and sheath of electric cables

2.171. IS 10810 Methods of testin

2.172. LT Power Cables:

2.173. LT power cables shall be 1.1 kV grade multi core heavy duty PVC insulated, PVC inner sheathed, FRLS PVC outer sheathed, steel flat/round armoured with stranded aluminium conductor as per IS 1554 :Part-1: 1988/ IS 7098 :Part-1:1988. The inner and outer sheath shall be of extruded PVC (ST2) as per IS 5831:1984.

2.174. The details of LT power cables are as follows:(TABLE)

| Sl. | Feeder Name | | Voltage Grade | Number of Cores | Cable Size |
|---|---|---|---|---|---|
| 1 | T-113 | | 415V | 3.5 | 120 $mm^2$ |
| 2 | 415V I/CBLT | | 415V | 3.5 | 120 $mm^2$ |
| 3 | MPH old Substation - Auxiliary | | 415 V | 3.5 | 50 mm |
| 4 | MPH lighting — motorroom | | 415V | 3.5 | 50 mm* |
| 5 | MPH rooftop lighting | | 415 V | 3.5 | 50 mrn[a] |
| 6 | MPH lighting— Operator room | | 415 V | 3.5 | 50 mm2 |
| 7 | Battery Bank to Battery Charger | | 415 V | 3.5 | 120 mm2 |
| 8 | Battery Charger | Auxiliary Supply | 415V | 3x5 | 25 $mm^2$ |
| | | To DC-DB—3.3 KV-1st | 415V | 3.5 | 25 $mm^2$ |
| | | To DC-DB— 3.3KV — 2nd | 415 V | 3'5 | 25 mm* |
| | | To DC-DB — 3.3KV— new—1“ | 415 V | 3.5 | 25 $mm^2$ |
| | | To DC-DB — 3.3KV— new-2nd | 415 V | 3 5 | 25 mm* |
| | | To DC-DB — 415V_ Est | 415V | 3.5 | 25 $mm^2$ |
| | | To DC-DB — 415V— 2nd | 415V | 3.5 | 25 $mm^2$ |
| 9 | DC-DB | Auxillary Supply | 415V | 3.5 | 25 $mm^2$ |
| | | To 3.3KV -1°' | 415V | 3.5 | 25 mm* |
| | | To 3.3KV -2nd | 415 V | 3.5 | 25 mm* |
| | | To 3.3KV — new _1st | 415 V | 3.5 | 25 mm‘ |
| | | To 3.3KV — new-2nd | 415V | 3.5 | 25 mm* |
| | | To 415V — 1st | 415V | 3.5 | 25 mm‘ |

2.175. LT Control Cables:

2.176. LT control cables shall be 1.1 kV grade multi core heavy duty PVC insulated, PVC inner sheathed, FRLS PVC outer sheathed, steel round /flat armoured with 2.5 sq. mm stranded copper conductor as per IS 1554 :Part 1:1988. The inner & outer sheaths shall be of extruded PVC as per IS 5831:1984. Individual cores shall have core identification numbers at regular intervals.

2.177. All CT control cables shall be 2.5 sq. mm stranded copper.

2.178. All LT control cable terminations are in the scope of the Bidder.

2.179. The details of LT control cables are as follows: - (TABLE)

| Sl. | Feeder Name | Numberof Cores |
|---|---|---|
| 1 | CWP-1 — HT-13 to RemoteControl Desk | 24 |
| | CWP-1 — Motor to RemoteControl Desk | 05 |
| 2 | CWP-4 — HT-13 to RemoteControl Desk | 24 |
| | CWP-4 — Motor to RemoteControl Desk | 05 |
| 3 | HWP-2 — HT-13 to RemoteControl Desk | 24 |
| | HWP-2 — Motor to RemoteControl Desk | 05 |
| 4 | HWP-3 — HT-13 to RemoteControl Desk | 24 |
| | HWP-3 — Motor to RemoteControl Desk | 05 |
| 5 | HWP-4 — HT-13 to RemoteControl Desk | 24 |
| | HWP-4 — Motor to RemoteControl Desk | 05 |

2.180. Cable Termination and Jointing:

2.181. Termination and jointing of cables shall be made with double compression type brass cable glands and crimping type heavy duty cable lugs. Aluminium conductor cables shall be terminated with aluminium lugs and copper conductor cables shall be terminated with tinned copper lugs. Straight through joints shall be heat shrink/ resin type with complete kits. Termination of cables shall be made with heat shrink type termination kits of appropriate voltage grade.

2.182. Cable termination at Transformer end must using Copper Lug & Solder Method:

2.183. The details of Cable Terminations & Cable Joints are as follows: (TABLE)

| Sl. | Feeder Name | Voltage Grade | Cable Size | Number of Termination (UE) | Number of Joints (UE) |
|---|---|---|---|---|---|
| 1 | T-27M — 11KV LBS | 11KV | 240 $mm^2$ | 03 | |
| Sl. | Feeder Name | Voltage Grade | Cable Size | Number of Termination (UE) | Number of Joints (UE) |
| 2 | 3.3KV Interconnector New Sajara (existing cable) | 3.3 KV | 185 mm2 | 01 | 01 |
| 3 | 3.3KV Interconnector New Sajara (new 2nd cable) | 3.3 KV | 185 mm2 | 02 | |
| 4 | CWP-1 | 3.3KV | 95mm2 | 02 | |
| 5 | CWP-4 | 3.3KV | 95 mm | 02 | |
| 6 | HWP-2 | 3.3KV | 95mm2 | 02 | |
| 7 | HWP-3 | 3.3 KV | 95 mm | 02 | |
| 8 | HWP-4 | 3.3 KV | 95 mm2 | 02 | |
| 9 | T-113 | 3.3KV | 95mm 2 | 02 | |
| 10 | T-113 | 415V | 120 mm | 02 | |
| 11 | 415VI/CBLT | 415V | 120 mm‘ | 01 | 01 |
| 12 | MPH Substation old Auxiliary | 41s V | 50 | 02 | |
| 13 | MPH lighting — motor rOOM | 41s v | 50 $^2$ | 02 | |
| 14 | MPH rooftop lighting | 415 V | 50 m $^2$ | 02 | |
| 15 | MPH lighting — Operator rOOm | 41s V | 50 $^2$ | 02 | |
| 1s | Battery Bank to Battery Charger | 415 V | 120 mm‘ | 02 | |
| 17 | Battery Charger | 415 V | 25 $mm^2$ | 14 | |
| 18 | DCDB | 415 V | 25 $mm^2$ | 14 | |

2.184. EMERGENCY PDB:

2.185. Emergency Power Distribution Board 415V with Incoming 400A & Outgoing 200/100/70A and must have the following features: -

2.186. 415v Power Distribution Board Indoor Type 3 Phase 4 Wire, 415v +/- 10%, 50Hz +/- 5%, Short Time Rating SOKA For 1 second.

2.187. PDB must be complete With 2 Incomers & 10 Outgoing Feeders and details are as follows: -

2.188. Incomers - 2 numbers 400A MCCB

2.189. Outgoing Feeders - 3 numbers 200A MCCB

2.190. Outgoing Feeders - 3 numbers 100A MCCB

2.191. Outgoing Feeders - 4 numbers 70A MCCB

2.192. Detailed Specification: -

2.193. MCCB: 400A/200A/100A/70A TP+N (3 Pole + Neutral Link) SOKA with Overcurrent, Short Circuit Protection, Operating Handle Mechanism, ON/OFF Indication Lamp.

2.194. Panel should be complete with Analog Ammeter & Voltmeter with Selector Switch for Incomers only.

2.195. Material of construction-CRCA Sheet Steel, thickness of material-2mm for all load bearing members including Gland Plates and 1.6mm for non-load bearing section like partitions, doors etc. with necessary stiffeners as required, support free standing, self-supported.

2.196. PDB must be floor mounting, single front, compartmented, provision for lifting arrangement.

2.197. PDB must have cable entry from bottom with undrilled detachable land plate & separate cable alley.

2.198. Cable termination chamber shall be fully separated from live Bus bars.

2.199. Cable terminals shall have full rating of MCCB.

2.200. Space heaters to be provided as per norms.

2.201. Provision to be given for connection of 50 X 6 mm GI earth strip,

2.202. Neutral must be solidly grounded

2.203. Paint - Internal White, external green of shade 221 Of IS-5

2.204. Phase & Neutral Aluminium Bus bar- TP/TPN - Aluminum electrolytic grade Bus bar Shall Be Provided, With DMC / FRP bus bar supports & fully insulated with heat shrinkable sleeve.

2.205. Enclosure Protection: IP54, compartmented design, minimum clearance Phase to Phase: 25mm, Phase to Earth: 19mm

2.206. Power wiring shall be with 1.1KV grade PVC multi strand Copper flexible cable.

2.207. PDB shall conform to IS 8623 Part 1-3:1993.

2.208. REMOTE CONTROL DESK:

2.209. Remote Control Desk is required for 05 number Pumps (CWP-1, CWP-4, HWP-2, HWP-3, HWP-4) at Mill Pump House Operator room for starting & stopping of pumps to be configured such that its operation is viable only when the LOCAL/REMOTE selector switch is given in REMOTE at VCB/GCB panel. The ON indication lamp must glow when the Pumps are running & OFF indication lamp must glow when the pumps are OFF. Ammeter must show the Load current whenthe pumps are ON. If the pump feeder VCB/GCB trips on Motor Protection/ Voltage Protection relays, TRIP from REMOTE indication lamp must glow.

2.210. DC supply required for indication lamps shall be provided from HT-13 substation individual panels of the Pump.

2.211. It shall have the following features:

2.212. Dedicated space in Control Desk for each pump

2.213. Dedicated set of Ammeter(1-ph), ON & OFF indication lamp, ON & OFF Push Button for each pump

2.214. Dedicated set of 18 numbers Terminal Block erected in separate channel for each pump

2.215. 24 Core Control Cable termination from each VCB/GCB panel to Terminal Block in Control Desk with Cross Ferrule to be given for proper identification. Individual marking for

Ammeter(1-ph), ON & OFF indication lamp, ON & OFF Push Button to be done using suitable sticker beside Terminal Blocks

2.216. Control Desk must be metallic

2.217. Indicating Instruments are as follows: - (TABLE)

| Sl. | Type | Feeder | Indicating Instruments |
|---|---|---|---|
| 1 | Remote Control Desk | CWP-1 | Ammeter |
| | | cWP-4 | Ammeter |
| | | HWP-2 | Ammeter |
| | | HWP-3 | Ammeter |
| | | HWP-4 | Ammeter |

2.218. OTHER ACCESSORIES:

2.219. Supply of 3.3KV Switchboard shall necessarily include the following spares & accessories to be provided with the switchboard

2.220. TABLE

| Sl. | Description | Quantity |
|---|---|---|
| 1 | Device for hand spring charging of breakers | 2 numbers |
| 2 | Breaker rack in / rack out device | 5 numbers |
| 3 | CB handling trolley | 3 numbers |
| 4 | Panel key for LV compartment (if any) | 5 numbers |
| 5 | Panel key for HV compartment (if any) | 5 numbers |
| 6 | VCB auxiliary contact (full set) | 2 numbers |
| 7 | Tripping Coil | 2 numbers |
| 8 | Closing Coil | 2 numbers |
| 9 | Spring charging motor | 1 number |
| 10 | Special tools & tackles | 1 set |

2.221. Following equipment's to be provided: (TABLE)

| | | |
|---|---|---|
| 1 | Discharge Rod | 1 number |
| 2 | Trolley for attending relays & meters | 1 number |

2.222. Commissioning and Performance Guarantee :

2.223. Preliminary acceptance: After completion of Works, final checking of the work will be done by the Contractor to ensure that all the Works has been done according to specifications and as approved by the Employer. All the Works will be thoroughly inspected keeping in view the following main points:

2.224. All bolts are properly tightened and punched/tack welded.

2.225. All equipment are properly installed.

2.226. All other requirement to complete the Work are properly installed.

2.227. Commissioning:- The system will be deemed to be commissioned after 72 hours of uninterrupted satisfactory operation of the complete power system in an integrated manner.

2.228. Testing and Commissioning of the following items to be done:08 numbers 11KV switchgear of same make & model (from OEM) of existing 3.3 KV HT-13 switchgear

2.229. The commissioning tests of the following items to be carried out:

2.230. VCB testing - IR, CRM(100A), HV test, Coil Resistance, Timing test, Operational Schematics, VCB Interlocks.

2.231. CT testing - IR, Polarity, WRM, Knee Point test, Magnetizing Current, Ratio test(Using CT analyzer), Primary Injection Test(up to Relay, Ammeter & MFM)

2.232. PT testing - IR, Polarity, WRM, Ratio Test

2.233. Surge Diverter — IR, HV test

2.234. Numerical Relay testing - Secondary Injection test, Trip Test, Sync test.

2.235. Bus Bar testing— IR, CRM (100A), HV test (up to SKV AC).

2.236. Power Cables — IR, HV test (up to 17KV DC)

2.237. Voltage selection scheme testing using 110V AC

2.238. Dual Panel AC/DC changeover verification.

2.239. Integrated system will be deemed commissioned provided the following activities are completed:

2.240. Shifting of transformer T-113

2.241. Construction of cable bridge from MPH motor room to HT-13 substation shutter

2.242. Power Cable and Control Cable laying & termination/joint for 05 number Pumps, Interconnector New Sajara, PDB related LT cables, LT control cables for Remote Control Desk

2.243. Commissioning of 08numbers new 3.3KV switchgear at HT-13

2.244. Commissioning of Remote Control Desk in MPH Operator room

2.245. Commissioning of Emergency PDB

2.246. Performance Guarantee :

2.247. General:

2.248. All the equipment will be guaranteed to be free from defects in workmanship and quality as per relevant clauses indicated in SBD. If any defect is detected within the guaranteed period then the Contractor will either rectify the defect or replace the defective item with a new one as per the choice of the Purchaser and to the satisfaction of the Purchaser free of cost.

2.249. The Contractor will stand guarantee against obsolescence of equipment under their scope of supply for a minimum period of 10 (ten) years after expiry of warranty period. The Contractor will also guarantee that discontinuity of production of any item offered, as a part of the system will not affect the maintainability of the system.

2.250. **Performance Guarantee Parameter:** The performance guarantee (PG) test on the system shall be carried out by the Bidder to establish satisfactory functioning of the system as a whole and of each equipment as part of the system. In order to qualify for acceptance, the equipment must operate for 15 consecutive days, 24 hours a day at 99% uptime efficiency.

2.251. The uptime efficiency shall be calculated as given below:

2.252. Uptime X 100 Uptime

2.253. Efficiency = --- ----------

2.254. Total time available

2.255. Where, Uptime shall be equal to total available time — total down time. Total down time shall be calculated by summing up times for which the system was down.

2.256. The system shall be considered as down, even if single functionality of the offered equipment is non-functional.

2.257. The total time shall not include the following:

2.258. Time lost due to external power failure.

2.259. Time lost due to failure of the environmental conditions

2.260. Time taken to recover the equipment to normal functioning after time lost as per above.

2.261. In case, the uptime efficiency is not obtained as mentioned above i.e. not meeting 99%, it will run for additional number of days till the required uptime efficiency is achieved. However, the maximum allowable time for this will b°. 60 days.

2.262. The bidder shall inform the Purchaser his readiness to start the PGT at least 7 days in advance. A team consisting of representative of both bidder and Purchaser will be responsible for conducting the PG test.

2.263. **LIQUIDATED DAMAGES(LD):** During PG test, in case the desired uptime efficiency is not achieved, the system will be accepted with imposition of LD as per details given below:

2.264. TABLE

| Uptime efficiency achieved | LD | Remarks |
|---|---|---|
| >= 99% | Nil | |
| >= 98% < 99% | 1.5% of Contract price | |

| Uptime efficiency achieved | LD | Remarks |
|---|---|---|
| >= 97% < 98% | 3.5% of Contract price | |
| >= 96% < 97% | 5.5% of Contract price | |
| >= 95% < 96% | 7.5% of Contract price | |
| < 95% | | Not Acceptable |

2.265. Instruction to Tenderer:

2.266. DOCUMENTS:

2.267. Full and comprehensive instruction manuals shall be furnished, giving step-by-step procedures for all operation, maintenance and repair. Each type of equipment shall be described in detail for operation and maintenance. Maintenance instructions shall contain diagnostic troubleshooting, checking, testing and replacement procedure along with recommended schedule, for trouble free operation.

2.268. On completion of work the tenderer shall submit Six (6) sets of prints and also soft copy of the as built drawings/ documents/ data sheet etc. as per list indicated below. Software related documents, if any shall be supplied in four sets of CD/DVD.

2.269. The following drawings and documents shall be submitted by the successful bidder for Purchaser / Consultant's approval as per provisions of SBD:-

2.270. R Master Drawing List.

2.271. •+ Equipment schedule/BOM R Layout of equipment's.

2.272. •+ Catalogue/ drawings/ documents of all bought out items. Technical literature, catalogue and publications of all major equipment and components.

2.273. •g• Quality Assurance Plan (QAP).

2.274. R Earthing drawings showing earthing of proposed system equipment's with earthing system.

2.275. Approval of drawings, design/data sheets by the Employer will not relieve the Bidder of his responsibilities for correctness, adequacy of the system and completeness of his

work as per the contract. The Contractor will also submit the design calculation for civil and structural jobs for approval.

2.276. Other instructions:

2.277. The Bidder shall design and prepare all drawings. All general arrangement drawings and design drawings shall be submitted for approval. Successful Bidder shall also submit the respective detailed drawings along with bill of material (BOM) to the Employer for reference purposes.

2.278. All necessary site measurements for developing the design and drawings shall also be deemed to be under the Scope.

2.279. Fabrication, erection of fabricated structures (including supply of tools, tackles, levelling pads, labour, cranes, handling equipment and any staging or false work required for erection), alignment, levelling, fixing, bolting / welding, inspection and testing of weld.

2.280. The Bidder shall supply all material for structural steelwork, paint materials, materials for fabrication, loading, transportation, unloading, delivery and storage of all steel structures, including site bolts, electrodes, fixtures, all consumables, handling equipment, labour etc. complete in all respects.

2.281. Inspection, testing and commissioning of all steel structural work.

2.282. DELIVERY :

2.283. The equipment shall be supplied, erected and completely commissioned in all respects within 12 months from the date of singing of contract.

2.284. The project will be executed on turnkey basis.

2.285. The bidder shall submit completion time for implementation of important milestones of the project.

2.286. The Bidder shall submit a tentative bar chart indicating all necessary activities including equipment shutdown time with the offer. The overall bar-chart schedule/PERT chart should be planned in months.

2.287. Site preparation:

2.288. Site cleaning, preparation, transfer of benchmarks & geodetic lines, checking & fixing, aligning of structures, initial and final cleaning of site after completion of the work shall be under the scope of the Bidder. No separate payment shall be made towards these and the cost, if any, shall be deemed to be included in the contract price.

2.289. Any other work not specifically mentioned but required for completeness of the job considering technical / technological aspects shall also be included in the scope of work for the Bidder.

2.290. Safety:

2.291. Since the execution of the proposed project shall take place in and around the running plant, all possible care shall be taken to ensure no disruption of production. The movement of men and material for the work shall be coordinated to ensure this objective.

2.292. Safety shall be an in-built feature at all the stages of project implementation right from design stage till the successful commissioning of all the plant & facilities covered in this specification. All equipment and systems shall be equipped with adequate safety devices wherever a potential hazard to operating / maintenance personnel exists.

2.293. Safe accesses shall be provided in and around the equipment to ensure smooth and safe operation as well as maintenance. Clearance of statutory authorities to satisfy safe installation and operation shall be obtained by the Contractor and facilities required to meet the relevant safety norms, standards and regulations shall be provided by the Contractor. All erection and laying shall be done in a safe manner so as not to cause accident/injury to plant or personnel including Contractor's workmen and employees. The Contractor shall comply with all the latest "Safety Rules & Regulations" as per Indian norms for design, installation and operation of plant and facilities. Wherever Indian rules and regulations are not specific, the International norms shall be followed.

2.294. The Tenderer shall be responsible for observance of plant safety procedures of the Purchaser. The Tenderer shall be responsible for the safety *of* his workmen and employees and shall ensure the use of requisite personal protective equipment by the workmen.

2.295. The bidder shall provide all the PPEs (Personal Protective Equipment's) and safety appliances required to carry out the job to all the workmen deployed at site & also ensure that every workman use the PPE & other safety appliances very strictly.

2.296. Whenever work at height is involved, the successful bidder must obtain height passes f‹›rm Safety Department for those persons required to dc› the work at height without which he will not be allowed to start the job.

2.297. Prior to commencement of work, the contractor shall obtain a clearance from the Safety Engineering Department and Town Maintenance Department to start the job.

2.298. Site Visit:

2.299. The Bidders shall visit the site, discuss with the Employer/ Consultant, regarding any technical clarification, shut down procedures for job execution and extent of work involved. The Tenderer shall take up due note on site conditions etc. and satisfy himself in all respect before quoting. The scope of supply to be ascertained by the bidder based on site visit and available data and mentioned in the TS. Site visit & site survey report, after discussion and certification from the Executing Authority, to be submitted with the offer in original. The site can be inspected any time during working hours on any working day. No extra shall be payable for non-awareness of the site conditions and constraints. Bidder has to carry out total survey of the existing job for assessment of job and submitting of detailed survey report.

2.300. Transportation:

2.301. The tenderer shall arrange for transportation, unloading, storing and handling all equipment/ materials at site. Before transporting, all the equipment/ materials shall be suitably and securely packed /boxed.

2.302. Storage:

2.303. Site for storing the equipment/ materials shall be allotted to the tenderer within a reasonable distance from the construction site. The tenderer may construct the required store for housing the materials before and during the erection. Transportation of materials/ equipment to construction site shall be the responsibility of the tenderer.

2.304. Warranty:

2.305. The Tenderer shall give warranty for design and performance of individual equipment as well as complete system supplied by the bidder for a minimum period of one year.

2.306. Onsite warranty of the system shall start from the date of issue of Commissioning Certificate and shall be for a period of one year. The warranty shall be comprehensive in nature including all items/spares required for smooth and trouble free operation of the system supplied. During warrantee period the contractor has to keep adequate amount of vital spares, consumables and Tools & Tackles. Bidder shall be fully responsible for the manufacturer's warranty in respect of proper design, quality and workmanship of all the equipment and accessories. The warranty shall include free of cost repair/replacement of all defective hardware, software, cables & accessories etc. at site, including technological support and servicing, software and hardware related any changes as demanded by DSP during the warranty period shall be in the scope of the bidder.

2.307. Inspection:

2.308. The supplier shall intimate purchaser at least two weeks in advance for inspection of materials. Witnessing of inspection, however, will not relieve the supplier of his obligations regarding responsibility of showing performance guarantee of the integrated unit as a whole. The Tenderer shall include and provide in his offer all facilities, which shall enable inspection by the purchaser or his authorized representative at Tenderer's premises. List of tests to be carried out at factory premises or at site shall be furnished by Tenderer in the form of

2.309. The inspection by the purchaser/ his authorized representative shall not relieve the Tenderer of liability for rectification of any defects, which may subsequently appear or be detected during and after commissioning. All such defects shall be rectified by the successful Tenderer without any extra cost to the purchaser.

2.310. Successful Tenderer shall submit test certificate for all the tests conducted during manufacture and inspection in three copies along with suppliers. The successful Tenderer shall also furnish test certificate from original manufacturer/ supplier for all the major items supplied.

2.311. In case purchaser is not able to depute inspectors, Bidder may call for written waiver for inspection.

2.312. Offer:

2.313. The tenderer shall give clause-wise clarification of all points in his offer and also clearly mention all the items that are covered in the scope of supply of the equipment.

2.314. After Sales Service:

2.315. The supplier must ensure availability spares for a period of 3 years after supply of the equipment. The Bidder has to provide efficient and quick after sales service in case of breakdown of equipment during and after warranty period.

2.316. Training:

2.317. The tenderer shall give necessary training to DSP Personnel for the switch board, Operations & Maintenance and trouble-shootings at the DSP Premises.

2.318. Other Instructions:

2.319. Based on site survey, the exact BOM to be made by the Party.

2.320. Any other related jobs not specifically mentioned herein but necessary for completion of work shall also be under the scope of successful Bidder. No separate payment shall be made towards this and the cost if any shall be deemed to be included in the contract price.

2.321. It will be sole responsibility of the tenderer to deploy sufficient manpower and resources as may be required for execution of activities of Contract.

2.322. This is a brown field construction work, so utmost care & co-ordination shall be taken into account by the successful Bidder while implementing this project. Bidder shall be handed over the site on “as is where is” basis.

2.323. Bidder will submit material test certificates for the equipment/components used for the system.

2.324. Site for storing the materials will be allotted to the Bidder within 100 meters distance from the erection site. Any temporary shed/covered store required for proper keeping of the materials will have to be constructed by the Bidder at his cost. Transportation of materials to this store and there from to the erection site will be the exclusive responsibility of the Bidder. Before transportation all materials will be suitably and securely packed and boxed.

2.325. The Bidder will develop the necessary enabling facility including office premises, if any, construction of water and power supply line (source made available by the Employer to the Bidder at one point) and any other facility as may be required to ensure smooth progress of work as per schedule. Disruption of supply (by the purchaser) of construction power, however, will not be considered as a case of delayed project execution. The Bidder should accordingly take care of such contingencies.

2.326. Transportation and dumping of all debris on day — to — day basis arising out of dismantling, construction, fabrication and erection to the area as directed by the executing authority will be done by the Bidder.

2.327. <u>Shutdown time:</u>

2.328. Details of Indicative shutdown activities and Duration:

2.329. TABLE

| Sl No | Feeder | Activity | Duration | Areas affected | Alternate Power |
|---|---|---|---|---|---|
| 1 | T-27M | Shifting of 11KV LBS to new location | 2days | N/A | 3.3KV I/C HT-13 — MPH will remain on load |
| 2 | T-113 | Shifting of transformer, erection, testing & commissioning | 7days | N/A | 415V I/C HT-13-MPH will remain on load |
| 3 | 3.3KV bus at HT-13 | Coupling of new 3.3KV switchgear | 12 hours | CWP-2, CWP-3, CWP-5, HWP-1 | Pumps CWP-1, CWP-4, HWP-2, HWP-3, HWP-4 from MPH will be available |
| 4 | 3.3KV I/C NSJ-HT-13 | Diversion of 1st cable & Commissioning of 2nd cable | Sdays | N/A | T-20 will feed power to MPH T-27M will feed power to HT-13 |
| 5 | 3.3KV CWP-1 | Commissioning of new switchgear & new 3.3KV cable | 2days | CWP-1 | All other pumps will remain available |
| 6 | 3.3KV CWP-4 | Commissioning of new switchgear & new 3.3KV cable | 2days | CWP-4 | All other pumps will remain available |
| 7 | 3.3KV HWP-2 | Commissioning of new switchgear & new 3.3KV cable | 2days | HWP-2 | All other pumps will remain available |
| 8 | 3.3KV HWP-3 | Commissioning of new switchgear & new 3.3KV cable | 2days | HWP-3 | All other pumps will remain available |
| 9 | 3.3KV CWP-4 | Commissioning of new switchgear & new 3.3KV cable | 2days | HWP-4 | All other pumps will remain available |

2.330. NOTE:

2.331. Shutdown shall be arranged by DSP on prior intimation to the department.

2.332. Indicative Schedule of Quantities :

2.333. Part —A - Indicative Activity List including **supply of** items:

2.334. TABLE

| sl. | Job Description |
|---|---|
| 1 | Supply of 3.3 KV switchgear of ABB make & model of existing 3.3KV HT-13 switchgear |
| 2 | Supply and laying of 3.3 KV grade 3 core x 185 mm2 Power Cable |
| 3 | Supply and laying of 3.3 KV grade 3 core x 95 mm2 Power Cable |
| 4 | Supply and laying 415V grade 3.5 core x 120 mm2 Power Cable |
| 5 | Supply and laying of 415V grade 3.5 core x 50 mm2 Power cable |
| 6 | Supply and laying of 415V grade 3.5 core x 25 mm2 Power cable |
| 8 | Supply and laying of 5 core & 24 core x 2.5 mm2 Copper Control Cable |
| 9 | Supply and laying of 5 core & 24 core x 2.5 mm2 Copper Control Cable |
| 10 | Supply of 3.3 KV grade 3c x 185mm2 straight through cable joint kit including Jointing |
| 11 | Supply and termination of 11KV grade 3C x 240 mm2 end termination kit |
| 12 | Supply and termination of 3.3 KV grade 3C x 185 mm2 end termination kit |
| 13 | Supply and termination of 3.3 KV 3C x 95 mm2 end termination kit |
| 14 | Supply and termination of 3.3 KV 3.5C x 120 mm2 LT cable |
| 15 | Supply and jointing of 415 V grade 3.5 core x 120 mm2 LT cable |
| 16 | Termination of 415 V grade 3.5 core x 50 mm2 LT cable including supply of gland<br>and lugs |
| 17 | Termination of 415 V grade 3.5 core x 25 mm2 LT cable including supply of gland and lugs |
| 18 | Termination of Control 24 core 2.5 mm2 including supply of gland, lugs, Ferrule etc. |
| 19 | Termination of Control cable 05 core 2.5 mm2 including supply of gland, lugs, Ferrule etc. |
| 20 | Supply and installation of Power Distribution board |
| 21 | Supply and installation of Control Desk |
| 22 | Supply of Discharge Rod |
| 23 | Supply & Installation of Fire fighting utilities, portable fire extinguishers of DCP(6kg)<br>stand bucket etc. |
| 24 | Supply and installation of current transformer |
| 25 | Supply and installation of ICT |
| 26 | Supply and installation of Motor protection relay |
| 27 | Supply and installation of Under protection relay |
| 28 | Supply and installation of high speed tripling relay(VAJH 23) |
| 29 | Supply and Installation of Ammeter with selector switch |
| 30 | Supply and Installation of MFM |

2.335. Part —B - Indicative Activity List:

2.336. TABLE

| Sl. | Job Description |
|---|---|
| 1 | Erection, Testing & Commissioning of 3.3 KV switchgear of ABB make & model of existing 3.3 KV HT-13 switchgear |
| 2 | Necessary cable related job for shifting of T-27M 11KV LBS |
| 3 | Dismantling, shifting and installation of Battery charger, Battery bank ,DC-DB LBS of T-27M,dewatering pump control box and ventilation DB to new location of HT-13 substation |
| 4 | Modification of foundation of T-113 transformer modification of transformer room door at HT-13 |
| 5 | Construction of cable bridge from MPH motor room to HT-13 substation shutter including supply of materials & including earthing of the bridge at two points using two numbers new earth pit |
| 6 | RCC foundation for construction of 7m3 cable bridge including supply of materials |
| 7 | Shifting of Transformers T-113 and necessary cable related job , erection, testing & commissioning |
| 8 | Modification of existing structures, stairs, ladders platforms, cable support structure in the basement for cable laying , Erection of new door at HT-13 Substation |
| 9 | Structural work required to support new cable tray inside HT-13 S/S , inside MPH motor room for 3.3 KV Panel |
| 10 | Painting of all new Structure and base frame including supply of materials |
| 11 | Structural work required for erection of new PDB remote control desk, base frame of 3.3 KV HT Panel Battery charger, DCDB etc. |
| 12 | Renovation /repairing work including of brickwork as per requirement for cable laying related job at MPH motor room inside/outside HT-13 S/S, T-113 related job as per your specification, Dismantling of Floor base of all Dismantled equipment |
| 13 | Civil work such as chipping /cutting of floor for making grooves of laying pipe/cable ,making holes/opening through wall, ceiling or floor , grouting of frames hook on wall/ceiling etc. |
| 14 | Earth excavation for cable trench for 2nd cable laying 3.3 KV 1/c new Sajara to HT-13(After overhead structural route) including supply of slab and sand |

2.337. Notes:

2.338. Bill of quantity of equipment as indicated above is indicative only and may vary as per the actual site requirement. Party may visit the site to access the actual quantity of job & any

other job specifically not mentioned but required to complete the job. The bidder will have supply any other equipment (hardware/software) necessary for successful completion of the project.

2.339. The successful bidder shall refer the Annexure-1 for acceptable makes for applicable equipment/ item of the package.

2.340. Items not included in the above list shall require prior approval of purchaser/ consultant before supply.

2.341. List of Acceptable Makes:

2.342. The List of acceptable makes of equipment's and supplies is given below

2.343. Notes:

2.344. Bill of quantity of equipment as indicated above is indicative only and may vary as per the actual site requirement. Party may visit the site to access the actual quantity of job & any other job specifically not mentioned but required to complete the job. The bidder will have supply any other equipment (hardware/software) necessary for successful completion of the project.

2.345. The successful bidder shall refer the Annexure-1 for acceptable makes for applicable equipment/ item of the package.

2.346. Items not included in the above list shall require prior approval of purchaser/ consultant before supply.

2.347. List of Acceptable Makes:

2.348. The List of acceptable makes of equipment's and supplies is given below

2.349. TABLE

| Sl. | ITEM | MAKE |
|---|---|---|
| 1 | 3.3 KV Switchgear | ABB (OEM of existing 3.3KV swit‹-.hgear at HT-13 substation) |
| 2 | CT & PT | Pragati, ECS, Kappa, AE |
| 3 | Analog Meters | Rishabh, AE |
| 4 | Digital Meters | Schneider, L&T, Satec |
| 5 | Numerical Motor Protection & Voltage Relay | ABB, Schneider, GE |
| 6 | MCCB, MCB, Power Contactors, Electronics Over current & Short Circuit Protective Device | ABB, BCH, C&S, L&T, Schneider, Siemens |
| 7 | Control Switches | ABB, BCH, Switron, Kaycee, L&T, Schneider, Siemens |
| 8 | 3.3KV Power Cables | CCI, Crystal, KEI, Univ.ersal |
| 9 | LT Power Cables & Control Cables | CCI, Crystal, KEI, Universal |
| 10 | Jointing & Termination Kit (UE) | 3M, Raychem |

| Sl. | ITEM | MAKE |
|---|---|---|
| 11 | Annunciator | Minilec, Alan |
| 12 | Surge Arrestor | Oblum, Elpro, GE |
| 13 | Terminals | Connectwell, Wago |
| 14 | Protective / Auxiliary / Timer relays | Alstom, GE, Schneider, ABB |

**End of Clauses**

SOB I 6/000 EO" I I 8/E'd

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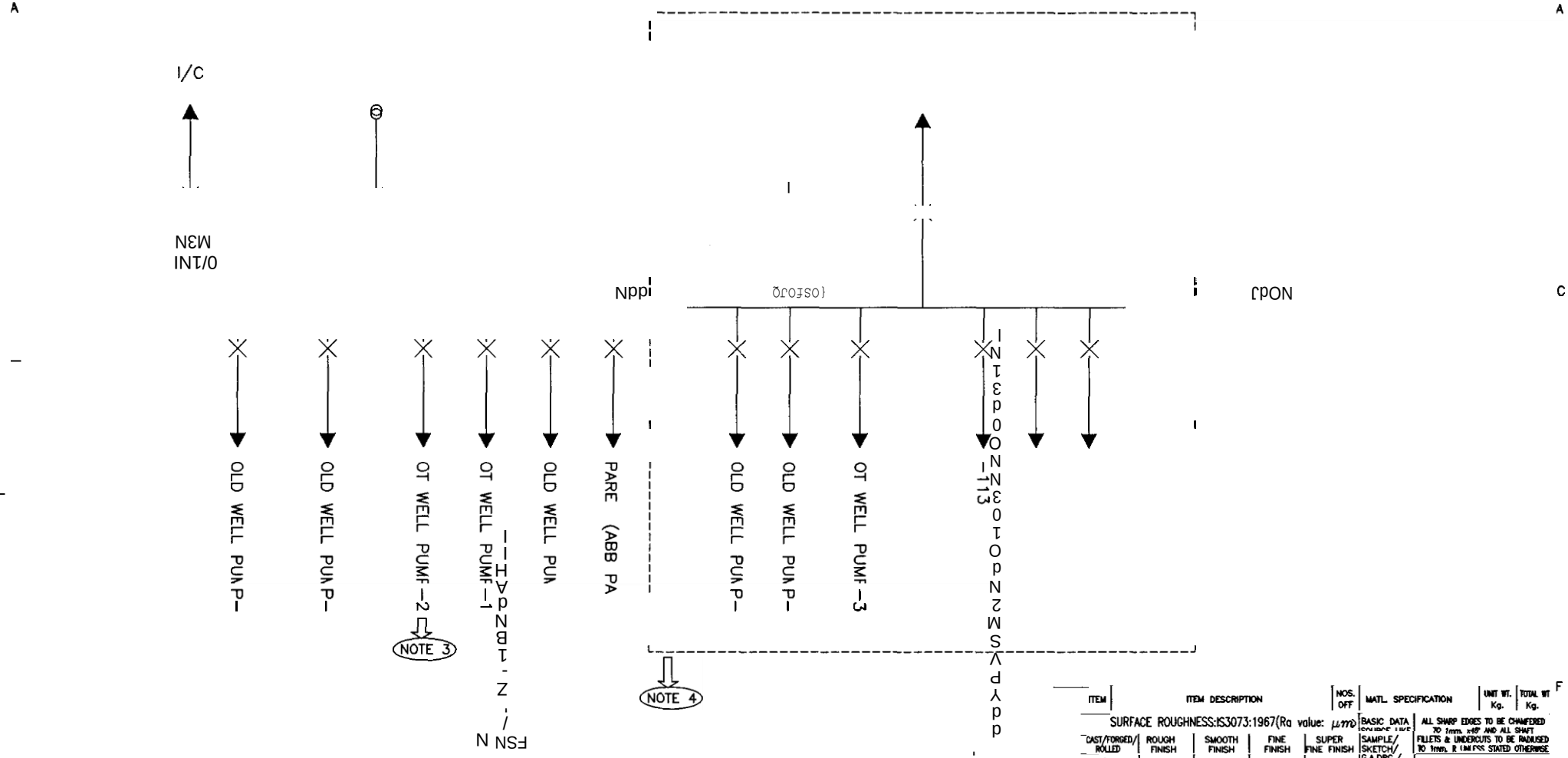


2. VCB 11KV 1250A

| ITEM | ITEM DESCRIPTION | NOS. OFF | MATL. SPECIFICATION | UNIT WT. Kg. | TOTAL WT Kg. |
|---|---|---|---|---|---|

SURFACE ROUGHNESS:IS3073:1967(Ra value: μm)

| CAST/FORGED/ ROLLED | ROUGH FINISH | SMOOTH FINISH | FINE FINISH | SUPER FINE FINISH |
|---|---|---|---|---|
| ~ | ▼ | ▼▼ | ▼▼▼ | ▼▼▼▼ |

BASIC DATA | SAMPLE/ SKETCH/ G.A.DRG./ ANY OTHER

ALL SHARP EDGES TO BE CHAMFERED TO 1mm x 45° AND ALL SHAFT FILLETS & UNDERCUTS TO BE RADUSED TO 1mm, R 1MM PSS STATED OTHERWISE

& ANGULAR M/C DIMENSIONS TO BE PER IS:2102(PART 1):1993 CLASS 'm

DRAFTING CODE REFERENCE
1) IS 10714:1983
2) IS 9609(Part1):1983

DURGAPUR STEEL PLANT
DESIGN

| REV. NO. | ZONE | ABRIDGED DESCRIPTION OF REVISION | SIGNATURE & DATE | JOB ORDER NO |
|---|---|---|---|---|
| D | | | | |
| B | | | | |
| A | | | | |

AutoCAD FILE NAM | JOB OR | NO. | A3

| | | | | | |
|---|---|---|---|---|---|
| DRN. | A.ROY | APP. | B.K. | ANGLE OF PROJECTION | LINEAR DIMENSION UNIT: M.M. |
| TRD. | | DATE | 1.10.21 | | |
| CHD. | J.A. | SCALE | | | |

DRG:NO.,ITEM NO. & MANUFACTURER'S IDENTIFICATION MARK TO BE PROVIDED ON EACH ITEM AT SUITABLE LOCATION OR AT PLACES MARKED 'M'

DRG. No. A3/211.03.000/91205 REV.

2

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NOTE: —

1) DIMENSION GIVEN ARE INDICATIVE ONLY AND TO BE REFERED AT SITE.

SURFACE ROUGHNESS:153073:1967(Ra value: m)@ i 'u
eou>i i su‹xmi nwc T su R
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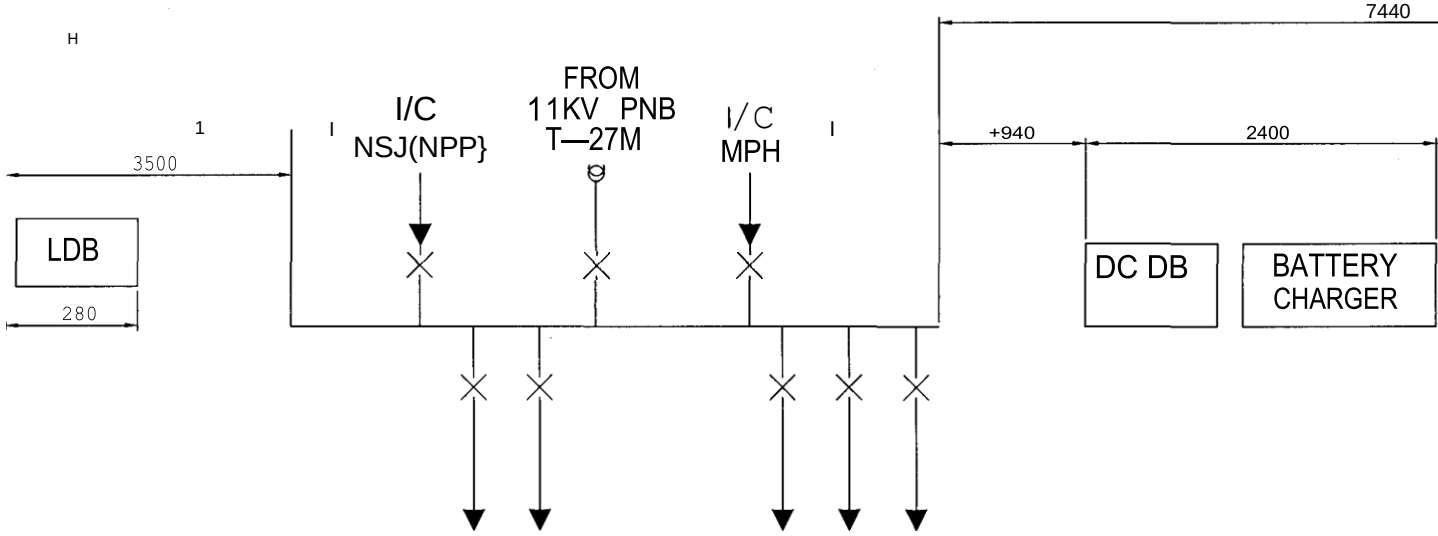
STEEL AUTHORITY OF INDIA LTD. "'@/@›cC
DURGAPUR STEEL PLANT 8g iBY%1:›••

LAYOUT OF 3.3KV HT—13 SUBSTATION.

CO I1Z




| REV. NO. | ZONE | ABRIDGED DESCRIPTION OF REVISION | SIGNATURE & DATE | JOB ORDER NO |
|---|---|---|---|---|
| D | | | | |
| C | | | | |
| B | | | | |
| A | | | | |

CAST/FORGED/ ROLLED

P.M.D.

AutoCAD FILE NAME A3

JOB ORDER NO. 41564