

CLAUSE NO.	LIST OF MANDATORY SPARES FOR FUEL OIL		एनटीपीसी NTPC
1.10.00	Shaft Sleeve	1 set for each type of pump	
	ITEM	QUANTITY	
1.11.00	Valves (Each type and size)	a) 1 number, where the total quantity of a particular type and size of valve is less than or equal to 10. b) 2 numbers, where the total quantity of a particular type and size of valve is less than 40 but more than 10. c) 10% of total quantity (to nearest whole number) of a particular type and size of valve, where the total quantity of a particular type and size of valve is more than 40	
1.12.00	Steam Trap	2 numbers for each type and size	
1.13.00	Control valves (complete assy)	one (1) no. complete for floor coil heaters one (1) no. complete for suction heaters	
1.14.00	Pressure reducing valve	One (1) no.	
1.15.00	Neoprene rubber unloading hoses with end connections complete hose)	Ten (10) Nos.	
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATION SECTION-VI, PART-F BID DOC. NO. CS-9585-001-2	MANDATORY SPARES CHAPTER-11 FUEL OIL PAGE 2 OF 4

CLAUSE NO.	LIST OF MANDATORY SPARES FOR FUEL OIL		
2.00.00	CONTROL AND INSTRUMENTATION ITEMS		
2.01.00	MEASURING INSTRUMENTS		
	1	Electronic Transmitters	
		Transmitters of all types and model no. (for the measurement of Pressure, differential pressure flow, level, etc.)	10% or 1 no. of each type and model whichever is more.
	2	Temperature elements	
	(i)	RTD's*, Thermocouples	10% or 2 no. of each type, make and model
	(ii)	Thermowell**	10% or 2 no. of each type, make and model
		* (With head assembly, terminal block and nipple)	
		**(to be divided into various insertion lengths in proportion to main population)	
	3	Local Indicators like temperature gauges, pressure gauges, differential pressure gauges, flow gauges etc.	5% or 1 no. of each type, make and model
	4	Process Actuated Switch Devices Includes all types of Pressure, differential pressure, flow, temperature, level switch Devices	5% or 1 no. of each type, make and model
2.02.00	PROCESS CONNECTION PIPING (FOR IMPULSE PIPING/TUBING, SAMPLING PIPING/TUBING AND AIR SUPPLY PIPING AS APPLICABLE)		
	1	Valves	10% or 1 no. of each type, make and model
	2	2 way, 3way, 5way valve manifolds	10% or 1 no. of each type, make and model
	3	Fittings	10% or 1 no. of each type, make and model
	4	Purge Meters	5% or 1 no. of each type, make and model whichever is more

CLAUSE NO.	LIST OF MANDATORY SPARES FOR FUEL OIL		एनटीपीसी NTPC										
2.03.00	----- <table><tr><th>ITEM</th><th>QUANTITY</th></tr><tr><td colspan="2"> ----- </td></tr><tr><td>5 Filter Regulator</td><td>20% or 2 nos. of each type, make and model whichever is more</td></tr><tr><td colspan="2">ELECTRICAL ACTUATORS</td></tr><tr><td>1 Actuators</td><td>10% (or) 1 no. of each type, model and rating, whichever is more.</td></tr></table>			ITEM	QUANTITY	-----		5 Filter Regulator	20% or 2 nos. of each type, make and model whichever is more	ELECTRICAL ACTUATORS		1 Actuators	10% (or) 1 no. of each type, model and rating, whichever is more.
	ITEM	QUANTITY											

	5 Filter Regulator	20% or 2 nos. of each type, make and model whichever is more											
	ELECTRICAL ACTUATORS												
1 Actuators	10% (or) 1 no. of each type, model and rating, whichever is more.												
Note :													
One (1) set means total numbers as required for one complete replacement for one equipment.													

CLAUSE NO.	MANDATORY SPARES		
	MANDATORY SPARES FOR FUEL HANDLING PUMP HOUSE		
Part C			
S.no.	Item Description	Quantity	
1	HFO pressurizing pump motor	1 no.	
2	LDO pressurizing pump motor	1 no.	
3	Drain oil pump motor	1 no.	
	MANDATORY SPARES FOR AIR CONDITIONING SYSTEM		
Part C			
S.no.	Item Description	Quantity	
1	SCREW COMPRESSOR CHILLING UNIT motor	1 no.	
	MANDATORY SPARES FOR VFD for CEP		
S.no.	Item Description	Quantity	
1	HV Bushing with metal parts and gaskets for VFD Transformer	-1 No. of each rating	
2	LV Bushing with metal parts and gaskets for VFD Transformer (if applicable)	-1 No. of each rating	
3	WTI with contacts for VFD transformer	-1 No. of each rating	
4	Electronic cards (a) Control modules (b) I/O module (c) Power supply modules (d) Gate module including gate transformer	1 nos. of each type & rating	
5	Power device (Thyristor, IGBT etc.)	No. of devices in one bridge leg	
6	Over voltage limiter and surge suppressor network	1 Set	
7	Semi conductor fuses for Power device (Thyristor, IGBT etc.)	1 Set	
8	Power & Control fuse	25% of installed quantity	
9	Control Transformer	1 nos. of each type & rating	
10	Contactors/Breaker	1 no.	
11	CT/VT	1 nos. of each type & rating	
12	Indicating lamps	100% of each type & rating	
13	Auxiliary contactors & relays	1 no. of each type & rating	
14	Panel mounted meters	1 no.	
15	Indicating lamp holder full set	15% of each type and colour	
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATION SECTION-VI, PART-F BID DOC. NO. CS-9585-001-2 Page 369 of 606	MANDATORY SPARES CHAPTER-14 ELECTRICAL
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TITLE:
TECHNICAL SPECIFICATION FOR
FUEL OIL UNLOADING AND STORAGE SYSTEM
3 x 800 MW Patratu TPP

SPECIFICATION NO.: PE-TS-434-166-A001

SECTION - IA

REV. NO. 01

DATE: 20.03.2020

3X800MW PVUNL PATRATU TPP PHASE-1

ANNEXURE - VI
(TERMS & CONDITION FOR MS PLATE FREE ISSUE)



TITLE:
TECHNICAL SPECIFICATION FOR
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3 x 800 MW Patratu TPP

SPECIFICATION NO.: PE-TS-434-166-A001
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REV. NO. 01

DATE: 20.03.2020

1.0 SCOPE OF SUPPLY

Bidder's Scope of work shall be as per technical specification no PE-TS-434-166-A001. MS Plates required for Shell, roof and bottom of fuel oil tanks (HFO,LDO,LDO DAY TANK) shall only be free issued by BHEL as specified in this Annexure. Any other plates required for RF pad plates, manholes, wind girder (plate fabricated), anchor chairs, gusset plates, stiffener plates, weir plates, interconnecting platform, etc shall be supplied by bidder.

The bidder shall furnish quantities of MS plate, required from BHEL (free issue), along with his offer as per "Format for MS Plate" attached with this Annexure I. In case the quantities of MS plate quoted by the bidder, exceeds the base quantities as specified, the bidder's bid shall be loaded for the excess quantity at the specified evaluation rate.

During detailed engineering while furnishing the fabrication drawing for BHEL's & Customer Review/approval, Bidder shall furnish the theoretical quantities of MS Plate in Drawing/Documents.

If the total quantity of MS Plate during contract execution is found to be more than the quantities quoted at tender stage or base values, whichever is higher, the additional cost for excess quantity of MS Plate shall be deducted from the bidder's payments at penal rate. No Benefit will be given to bidders, in case of reduction in actual quantity of MS Plate with respect to the quantities considered in bid evaluation.

2.0 FREE ISSUE OF MS PLATE CONDITIONS:

A) GENERAL NOTES:

- 1) MS Plate shall be issued free of cost by BHEL as per approved fabrication drawings. The contractor shall collect these materials from BHEL stores/store yard at specified places at his own cost and store the same at the work site or in his stores as per standard norms. Materials issued will be used only for construction of fuel oil Tanks as per contract requirement.
- 2) BHEL reserves the right to recover from the contractor any loss arising out of damage/ theft or any other causes or during verification/stacking or at any time under the custody of the contractor.
- 3) The contractor shall take care of material issued by BHEL and shall protect the same from damage and weathering.
- 4) The contractor shall in no case be entitled for any compensation on account of any delay in supply or non-supply thereof for all or any such materials. However, in case of non-availability of any specific section(s) which delays the completion of work, such cases shall be recorded separately in monthly planning format) and shall be considered for time extension of contract.
- 5) Contractor will have to make his own arrangement at his own cost for procurement of any other materials except as mentioned above, as required for the works and of such quality as acceptable to BHEL.
- 6) Contractor shall also carryout in complete association with BHEL, the material management functions and execution like day-to-day update of materials, issued to contractor.
- 7) The contractor shall solely be responsible for the safety & security of material after it is handed over and issued to contractor by the BHEL.
- 8) BHEL issued materials, shall not be under any circumstances whatsoever, and shall be taken out of the project site unless otherwise permitted by BHEL for outside job.

B) HANDLING OF MATERIALS ISSUED BY BHEL:

- 1) Materials shall be issued by BHEL based on the weighment basis/linear measurements & sectional weight. However, on specific request of the contractor "as a special case to expedite the job" the consignment received at BHEL stores can directly be diverted to the work site following issuance procedure of BHEL. Such direct issues



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shall be as per the Challan/dispatch document/LR received with the consignment. In such cases, Contractor shall do unloading of materials from trucks/lorry at their own cost.

- 2) All materials issued by BHEL shall be stacked, stored above ground level by use of concrete or wooden sleepers. No materials shall remain on ground at any time. All concrete or wooden sleepers required for stacking the materials shall be arranged by contractor (successful bidder of this package) at his own cost within the quoted rates. All other equipments like winches, D-Shackles, slings of various sizes, max puller, pulley blocks, jacks, trucks, trailers etc. Required for such handling of MS plates from BHEL stores/storage yard etc. Shall be arranged by contractor within quoted/accepted rates.
- 3) The contractor shall take delivery of the materials from the designated place within the project premises at his own cost and store the same at his stores as per standard norms. Open land for such purposes shall be provided by BHEL on free of cost basis. Temporary barbed wire fencing of the open storage yard is to be done by the contractor and is included under the scope of his work. Contractor shall also remove grass, bushes, trees etc wherever required off the land provided to him and shall make proper continuous up keeping of the open yard /land by removing grass, bushes trees etc and same is included under the scope of his work & No extra payment shall be made to the contractor in this regard. The bidder shall make complete arrangement of necessary security personnel's to safeguard all such materials in his custody. Materials issued will be used only for construction of Misc Tanks as per the scope specified in this specification. The contractor shall take care of material issued by BHEL and shall protect the same from theft, damage and weathering. Excessive rusting of steel in custody of agency/contractor must be avoided. In case, due to any cause attributable to the contractor, such rusting of steel occur rendering the same unusable, then such quantity of steel shall be recovered from the interim payment as per the contract conditions specified.i.e.as per the bid evaluation Price.

C) ISSUE OF MS PLATES FREE OF COST:

- 1) The MS Plates shall be issued to the contractor on the following basis:
 - i. MS Plate: Weighment basis (Unit-MT)
- 2) All the MS Plate issued by BHEL shall be properly accounted for. The total quantity of MS Plate required for the work will be calculated from the approved fabrication drawings as per contract.

In case any such sectional weights are not available in the applicable drawing/documents, the manufacturer recommendation shall be binding.

- 3) The MS Plate issued to the contractor shall be mainly in standard length as received from the supplier. However, the contractor shall be bound to accept the MS Plate in length / width as available in the project stores, no claims for extra payment because of issue of non-standard length will be entertained.
- 4) The contractor shall satisfy himself of the quality and quantity of the materials at the time of taking delivery from BHEL stores. No claims whatsoever will be entertained by BHEL because of quality or quantity after the materials are taken by the contractor from BHEL stores.
- 5) The contractor shall submit to BHEL, a statement indicating estimated quantity MS Plate required during a quarter. In addition, the contractor shall also furnish the estimated requirement of MS Plate during a month by the third week of the previous month indicating his requirement.
- 6) Following shall be limit for the maximum quantity of BHEL issue materials that would be with the contractor at any point of time when work is in progress (excluding what has already been incorporated in the works).

SL No.	ISSUE OF MATERIALS	MAX QUANTITY IN CONTRACTORS STORE
01	MS Plate	ONE MONTH

- 7) Bidders shall ensure that no lamination material is taken over by them from BHEL.



TITLE:
TECHNICAL SPECIFICATION FOR
FUEL OIL UNLOADING AND STORAGE SYSTEM
3 x 800 MW Patratu TPP

SPECIFICATION NO.: PE-TS-434-166-A001
REPLIES TO PRE-BID QUERIES
ANNEXURE I
REV. NO. 00 **DATE:** 20.02.2019

- 8) The contractor must note that MS Plate required for other parts shall be arranged by the contractor at his own cost.
- 9) Bidder to give requirement of Material in BHEL Scope well in advance of before Three month from requirement. Any delay in raising the requirement of these item leading to delay in placement of order, will be Contractor responsibility and its attributable delay in erection will be responsibility of Bidder only.

D) RETURN OF MATERIAL:

- 1) All surplus MS steel and wastage materials will be taken back on weightment basis.
- 2) Surplus, unused and untampered MS steel shall be sorted section-wise and returned separately for a place directed by BHEL within the project area. Return of such material will not be entitled to any handling and incidental charges.
- 3) All wastages / scrap shall be promptly returned to the BHEL store and a receipt obtained for material accounting purposes. Return of such material will not be entitled to any transportation and incidental charge.

E) CONSUMPTION AND WASTAGE:

- 1) The theoretical consumption of various thickness / sections of MS plate shall be based on approved fabrication drawings. Weight shall be calculated considering the sectional weights as per Indian standards.
- 2) Actual consumption = Issue – Surplus.
- 3) Surplus = Untampered and unused quantity of MS plate returned by the contractor to BHEL store along with relevant documents.
- 4) Wastage = Actual consumption – Theoretical consumption.
- 5) Allowable wastage: Ten percent (10%) of the theoretical consumption shall be considered. Wastage shall be considered as cut pieces and scrap material, measured as per actual weightment basis. Invisible wastage, if any, shall be considered to be included in the specified 10 % allowable wastage.
- 6)

S.No.	MS Plate	Basis of issue & penal recovery
S-1	Theoretical consumption (without considering any wastage, scrap or loss) as per approved fabrication drawing or Quantity mentioned in "FORMAT FOR REQUIRED MS PLATE" whichever is less.	Free
S-2	Wastage limited to plus ten percent (+10%) of the aforesaid theoretical consumption (S-1) towards allowable wastage.	Free
S-3	Wastage beyond Ten percent (10%) of the aforesaid theoretical consumption (S-1)	Penal rate.

F) RECOVERY OF MATERIAL:

If wastage exceeds the specified limit, the recovery of excess wastage shall be at the Penal rate. Penal rate of MS plate shall be Rs 50,000/- per MT (Ex-works).

PATRATU VIDYUT UTPADAN NIGAM LIMITED

3X800MW PVUNL PATRATU TPP PHASE-1

TECHNICAL SPECIFICATION

FOR

FUEL OIL HANDLING SYSTEM

SECTION – IB

**SPECIFIC TECHNICAL SPECIFICATION
ELECTRICAL PORTION**



**BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA**



TITLE :
ELECTRICAL EQUIPMENT SPECIFICATION
FOR
FUEL OIL HANDLING SYSTEM
3X800 MW PVUNL PATRATU TPP PHASE-1

SPECIFICATION NO.
VOLUME NO. : II-B
SECTION :
REV NO. 00 : DATE : 15.06.2018
SHEET : 1 OF 3

TECHNICAL SPECIFICATION

FOR

FUEL OIL HANDLING SYSTEM
(ELECTRICAL PORTION)

	TITLE : ELECTRICAL EQUIPMENT SPECIFICATION FOR FUEL OIL HANDLING SYSTEM 3X800 MW PVUNL PATRATU TPP PHASE-1	SPECIFICATION NO.
		VOLUME NO. : II-B
		SECTION :
		REV NO. 00 : DATE : 15.06.2018 SHEET : 2 OF 3

1.0 EQUIPMENT & SERVICES TO BE PROVIDED BY BIDDER:

- a) Services and equipment as per “Electrical Scope between BHEL and Vendor”.
- b) Any item/work either supply of equipment or erection material which have not been specifically mentioned but are necessary to complete the work for trouble free and efficient operation of the plant shall be deemed to be included within the scope of this specification. The same shall be provided by the bidder without any extra charge.
- c) Supply of mandatory spares as specified in the specifications of mechanical equipments.
- d) Electrical load requirement for FUEL OIL HANDLING SYSTEM .
- e) All equipment shall be suitable for the power supply fault levels and other climatic conditions mentioned in the enclosed project information.
- f) Bidder to furnish list of makes for each equipment at contract stage, which shall be subject to customer/BHEL approval without any commercial and delivery implications to BHEL
- g) Various drawings, data sheets as per required format, Quality plans, calculations, test reports, test certificates, operation and maintenance manuals etc shall be furnished as specified at contract stage. All documents shall be subject to customer/BHEL approval without any commercial implication to BHEL.
- h) Motor shall meet minimum requirement of motor specification.
- i) Vendor to clearly indicate equipment locations and local routing lengths in their cable listing furnished to BHEL.
- j) Cable BOQ worked out based on routing of cable listing provided by the vendor for “ both end equipment in vendor’s scope”shall be binding to the vendor with +10 % margin to take care of slight variation in routing length & wastages.

2.0 EQUIPMENT & SERVICES TO BE PROVIDED BY PURCHASER FOR ELECTRICAL & TERMINAL POINTS:

Refer “Electrical Scope between BHEL and Vendor”.

3.0 DOCUMENTS TO BE SUBMITTED ALONG WITH BID

- 3.1 The electrical specification without any deviation from the technical/quality assurance requirements stipulated shall be deemed to be complied by the bidder in case bidder furnishes the overall compliance of package technical specification in the form of

	TITLE : ELECTRICAL EQUIPMENT SPECIFICATION FOR FUEL OIL HANDLING SYSTEM 3X800 MW PVUNL PATRATU TPP PHASE-1	SPECIFICATION NO.
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compliance certificate/No deviation certificate.

- 3.2 No technical submittal such as copies of data sheets, drawings, write-up, quality plans, type test certificates, technical literature, etc, is required during tender stage. Any such submission even if made, shall not be considered as part of offer.

4.0 List of enclosures :

- a) Electrical scope between BHEL & vendor
- b) Customer (NTPC) specification for Motors
- c) Customer (NTPC) cabling spec (to be referred by vendor for their scope of work (as per Electrical scope between BHEL & vendor)).
- d) Quality plan for motors & NTPC quality assurance
- e) Datasheet A & C (Annexure- I)
- f) List of Mandatory Spares (refer mechanical specification)
- g) Sub vendor List for Motors & other Electrical items (Annexure-III)
- h) Electrical Load data format (Annexure –IV)
- i) BHEL cable listing format (Annexure –V)

STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR**PACKAGE : FUEL OIL SYSTEM****SCOPE OF VENDOR: SUPPLY, ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT****PROJECT: 3X800 MW PATRATU STPS EXPANSION PH-I**

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	415V MCC	BHEL	BHEL	240 V AC (supply feeder)/415 V AC (3 PHASE 4 WIRE) supply shall be provided by BHEL based on load data provided by vendor at contract stage for all equipment supplied by vendor as part of contract. Any other voltage level (AC/DC) required will be derived by the vendor.
2	Local Push Button Station (for motors)	BHEL	BHEL	Located near the motor.
3	Power cables, control cables and screened control cables for a) both end equipment in BHEL's scope b) both end equipment in vendor's scope c) one end equipment in vendor's scope	BHEL BHEL BHEL	BHEL Vendor BHEL	1. For 3.b) & c): Sizes of cables required shall be informed by vendor at contract stage (based on inputs provided by BHEL) in the form of cable listing. Finalisation of cable sizes shall be done by BHEL. Vendor shall provide lugs & glands accordingly. 2. Termination at BHEL equipment terminals by BHEL. 3. Termination at Vendor equipment terminals by Vendor.
4	Junction box for control & instrumentation cable	Vendor	Vendor	Number of Junction Boxes shall be sufficient and positioned in the field to minimize local cabling (max 10-12 mtrs) and trunk cable.
5	Any special type of cable like compensating, co-axial, prefab, MICC, optical fibre etc.	Vendor	Vendor	Refer C&I portion of specification for scope of fibre Optical cables if used between PLC/ microprocessor & DCS.
6	Cable trays, accessories & cable trays supporting system 100/ 50 mm cable trays/ Conduits/ Galvanised steel cable troughs for local cabling	BHEL Vendor	BHEL Vendor	Local cabling from nearby main route cable tray (BHEL scope) to equipment terminal (vendor's scope) shall be through 100/ 50 mm. cable trays/ conduits/ Galvanised steel cable troughs, as per approved layout drawing during contract stage.
7	Cable glands ,lugs and bimetallic strip for equipment supplied by Vendor	Vendor	Vendor	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type heavy duty tinned copper lugs for power and control cables.
8	Conduit and conduit accessories for cabling between equipment supplied by vendor	Vendor	Vendor	Conduits shall be medium duty, hot dip galvanised cold rolled mild steel rigid conduit as per IS: 9537.
9	Lighting	BHEL	BHEL	
10	Equipment grounding (including electronic earthing) & lightning protection	BHEL	BHEL	Refer note no. 4 for electronic earthing

STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR

PACKAGE : FUEL OIL SYSTEM

SCOPE OF VENDOR: SUPPLY, ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT

PROJECT: 3X800 MW PATRATU STPS EXPANSION PH-I

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
11	Below grade grounding	BHEL	BHEL	
12	LT Motors with base plate and foundation hardware	Vendor	Vendor	Makes shall be subject to customer/ BHEL approval at contract stage.
13	Mandatory spares	Vendor	-	Vendor to quote as per specification.
14	Recommended O & M spares	Vendor	-	As specified elsewhere in specification
15	Any other equipment/ material/ service required for completeness of system based on system offered by the vendor (to ensure trouble free and efficient operation of the system).	Vendor	Vendor	
16	a) Input cable schedules (Control & Screened Control Cables) b) Cable interconnection details for above c) Cable block diagram	Vendor Vendor Vendor	- - -	Cable listing for Control and Instrumentation Cable and electronic earthing cable in enclosed excel format shall be submitted by vendor during detailed engineering stage.
17	Electrical Equipment & cable tray layout drawings	Vendor	-	a. In case, vendor's Fuel oil pump house building is located as combined with Heating & Pumping building (BHEL-TRICHY), cable tray/trench layout inside combined building shall be prepared by BHEL-PEM. Vendor to furnish drawing (both in print form as well as in AUTOCAD) of Fuel oil pump house layout clearly indicating all pumps, panels, JB's etc. which require cabling along with their terminal box/location/ Foundation etc. b. In case, vendor's Fuel oil pump house building is separate from Heating & Pumping building (BHEL-TRICHY), vendor shall prepare & submit cable tray/trench & equipment layout (both in print form as well as in AUTOCAD) of the complete Fuel oil pump house building indicating location and identification of all equipment requiring cabling for BHEL review & approval. Vendor to ensure the cable tray lay out shall confirm to NFPA (National fire prevention act)/TAC (Tariff advisory committee) applicable for hazardous area classification.

STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR**PACKAGE : FUEL OIL SYSTEM****SCOPE OF VENDOR: SUPPLY, ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT****PROJECT: 3X800 MW PATRATU STPS EXPANSION PH-I**

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
18	Electrical Equipment GA drawing	Vendor	-	For necessary interface review.

NOTES:

1. Make of all electrical equipment/ items supplied shall be reputed make & shall be subject to approval of BHEL/customer after award of contract.
2. All QPs shall be subject to approval of BHEL/customer after award of contract without any commercial implication.
3. In case the requirement of Junction Box arises on account of Power Cable size mis-match due to vendor engineering at later stage, vendor shall supply the Junction Box for suitable termination.
4. Vendor shall indicate location of Electronic Earth pit in their Civil assignment drawing.

SUB-SECTION – B-07

MOTORS

**EPC PACKAGE FOR
PATRATU SUPER THERMAL POWER STATION EXPANSION
PHASE –I (3X 800MW)**

**TECHNICAL SPECIFICATION
SECTION – VI, PART-B
BID DOC NO. : CS-9585-001-2**

CLAUSE NO.	TECHNICAL REQUIREMENTS			
	MOTORS			
1.00.00	GENERAL REQUIREMENTS			
1.01.00	For the purpose of design of equipment/systems, an ambient temperature of 50 deg. Centigrade and relative humidity of 95% (at 40 deg C) shall be considered. The equipment shall operate in a highly polluted environment.			
1.02.00	All equipment shall be suitable for rated frequency of 50 Hz with a variation of +3% & -5%, and 10% combined variation of voltage and frequency unless specifically brought out in the specification.			
1.03.00	Contractor shall provide fully compatible electrical system, equipment, accessories and services.			
1.04.00	All the equipment, material and systems shall, in general, conform to the latest edition of relevant National and international Codes & Standards, especially the Indian Statutory Regulations.			
1.05.00	Paint shade shall be as per RAL 5012 (Blue) for indoor and outdoor equipment.			
1.06.00	The responsibility of coordination with electrical agencies and obtaining all necessary clearances for contractors equipment and systems shall be under the contractor scope.			
1.07.00	Degree of Protection			
	Degree of protection for various enclosures as per IEC60034-05 shall be as follows:-			
	i)	Indoor motors	-	IP 54
	ii)	Outdoor motors	-	IP 55
	iii)	Cable box-indoor area	-	IP 54
	iv)	Cable box-Outdoor area	-	IP 55
2.00.00	CODES AND STANDARDS			
	1)	Three phase induction motors	:	IS/IEC:60034
	2)	Single phase AC motors	:	IS/IEC:60034
	3)	Crane duty motors	:	IS:3177, IS/IEC:60034
	4)	DC motors/generators	:	IS/IEC:60034
	5)	Energy Efficient motors	:	IS 12615, IEC: 60034-30
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)		TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO. : CS-9585-001-2		SUB-SECTION-B-07 MOTORS
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CLAUSE NO.	TECHNICAL REQUIREMENTS			
	41 deg.C over inlet cooling water maximum temperature of 39 deg.C for thermal class 90 (Y) wet wound Boiler circulation pump motor.			
6.00.00	OPERATIONAL REQUIREMENTS			
6.01.00	Starting Time			
6.01.01	For motors with starting time upto 20 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 2.5 secs. more than starting time.			
6.01.02	For motors with starting time more than 20 secs. and upto 45 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 5 secs. more than starting time.			
6.01.03	For motors with starting time more than 45 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be more than starting time by at least 10% of the starting time.			
6.01.04	Speed switches mounted on the motor shaft shall be provided in cases where above requirements are not met.			
6.02.00	Torque Requirements			
6.02.01	Accelerating torque at any speed with the lowest permissible starting voltage shall be at least 10% motor full load torque.			
6.02.02	Pull out torque at rated voltage shall not be less than 205% of full load torque. It shall be 275% for crane duty motors.			
6.03.00	Starting voltage requirement			
	(a) Up to 85% of rated voltage for ratings below 110 KW			
	(b) Up to 80% of rated voltage for ratings from 110 KW to 200 KW			
	(c) Up to 85% of rated voltage for ratings from 201 KW to 1000 KW			
	(d) Up to 80% of rated voltage for ratings from 1001 KW to 4000 KW			
	(e) Up to 75 % of rated voltage for ratings above 4000KW			
	Except AOP & JOP motors running on D.G emergency supply, starting voltage shall be 80%.			
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CLAUSE NO.	TECHNICAL REQUIREMENTS				
7.00.00	DESIGN AND CONSTRUCTIONAL FEATURES				
7.01.00	Suitable single phase space heaters shall be provided on motors rated 30KW and above to maintain windings in dry condition when motor is standstill. Separate terminal box for space heaters & RTDs shall be provided. However for flame proof motors, space heater terminals inside the main terminal box may be acceptable.				
7.02.00	All motors shall be either Totally enclosed fan cooled (TEFC) or totally enclosed tube ventilated (TETV) or Closed air circuit air cooled (CACA) type. However, motors rated 3000KW or above can be Closed air circuit water cooled (CACW). The method of movement of primary and secondary coolant shall be self-circulated by fan or pump directly mounted on the rotor of the main motor as per IEC 60034-6. However VFD driven motors can be offered with forced cooling type with machine mounted fan or pump driven by separate electric motor. Motors and EPB located in hazardous areas shall have flame proof enclosures conforming to IS: 2148 as detailed below				
7.03.00	(a)	Fuel oil area	:	Group – IIB	
	(b)	Hydrogen generation	:	Group - IIC or (Group-I, Div-II as per plant area NEC) or (Class-1, Group-B, Div-II as per NEMA / IEC60034)	
	Winding and Insulation				
	(a)	Type	:	Non-hygroscopic, oil resistant, flame resistant	
	(b)	Starting duty	:	Two hot starts in succession, with motor initially at normal running temperature.	
7.04.00	(c)	11kV & 3.3 kV AC motors	:	Thermal class 155 (F) insulation. The winding insulation process shall be total Vacuum Pressure Impregnated i.e. resin poor method. The lightning Impulse & intertern insulation surge withstand level shall be as per IEC-60034 part-15. However winding insulation for wet wound Boiler circulation pump motor shall be thermal class 90 (Y) or better.	
	(d)	240VAC, 415V AC & 220V DC motors	:	Thermal Class (B) or better	
	Motors rated above 1000KW shall have insulated bearings to prevent flow of shaft currents.				
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CLAUSE NO.	TECHNICAL REQUIREMENTS				
7.05.00	Motors with heat exchangers shall have dial type thermometer with adjustable alarm contacts to indicate inlet and outlet primary air temperature.				
7.06.00	Noise level for all the motors shall be limited to 85dB (A) except for BFP motor for which the maximum limit shall be 90 dB(A). Vibration shall be limited within the limits prescribed in IS/IEC 60034-14. Motors shall withstand vibrations produced by driven equipment. HT motor bearing housings shall have flat surfaces, in both X and Y directions, suitable for mounting 80mmX80mm vibration pads.				
7.07.00	In HT motors, at least four numbers simplex / two numbers duplex platinum resistance type temperature detectors shall be provided in each phase stator winding. Each bearing of HT motor shall be provided with dial type thermometer with adjustable alarm contact and preferably 2 numbers duplex platinum resistance type temperature detectors.				
7.08.00	Motor body shall have two earthing points on opposite sides.				
7.09.00	11 KV motors shall be offered with Separable Insulated Connector (SIC) as per IEEE 386. The offered SIC terminations shall be provided with protective cover and trifurcating sleeves. SIC termination kit shall be suitable for fault level of 25 KA for 0.17 seconds.				
7.10.00	3.3 KV motors shall be offered with dust tight phase separated double walled (metallic as well as insulated barrier) Terminal box. Suitable termination kit shall be provided for the offered Terminal box. The offered Terminal Box shall be suitable for fault level of 250 MVA for 0.12 sec. Removable gland plates of thickness 3 mm (hot/cold rolled sheet steel) or 4 mm (non-magnetic material for single core cables) shall be provided.				
7.11.00	The spacing between gland plate & center of terminal stud shall be as per Table-I.				
7.12.00	All motors shall be so designed that maximum inrush currents and locked rotor and pullout torque developed by them at extreme voltage and frequency variations do not endanger the motor and driven equipment.				
7.13.00	The motors shall be suitable for bus transfer schemes provided on the 11kV, 3.3 kV /415V systems without any injurious effect on its life.				
7.14.00	For motors rated 2000 KW & above, neutral current transformers of PS class shall be provided on each phase in a separate neutral terminal box.				
7.15.00	The size and number of cables (for HT and LT motors) to be intimated to the successful bidder during detailed engineering and the contractor shall provide terminal box suitable for the same.				
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