



भारत हेवी इलेक्ट्रिकल्स लिमिटेड

( भारत सरकार का उपक्रम )

**BHARAT HEAVY ELECTRICALS LIMITED**

(A Govt. of India Undertaking)

**TCN – 01**

Ref: PSER:SCT:NKP-M1645:TCN-01

Date: 16-01-2015

Sub	Tender change notice (TCN) 01	
Job	Design, engineering, manufacturing, supply, erection, testing, commissioning, etc of Ventilation System for 3x660 MW units at North Karanpura Super Thermal Power Project, Jharkhand.	
Ref	1.0	Tender no PSER:SCT:NKP-M1645:14
	2.0	BHEL's NIT, vide reference no PSER:SCT: NKP-M1645:4151, dated 08-01-2015
	3.0	All other pertinent issues till date.

With reference to above, following points/ documents, relevant to tender, may please be noted and complied with while submitting offer.

- 1.0 Addendum No-1 to Technical Specification attached as per Annexure-A.
- 2.0 Revised 'No deviation certificate' as per enclosed Annexure-2. Bidder shall submit no deviation certificate as per enclosed format only.
- 3.0 All other terms & conditions shall remain unchanged.

Thanking you,

Yours faithfully,  
for BHARAT HEAVY ELECTRICALS LTD

SR.ENGR (SCT)

Encl

1.0 As above.

पावर सेक्टर पूर्वी क्षेत्र ( मुख्यालय )

POWER SECTOR EASTERN REGION, DJ-9/1, SECTOR-II, SALT LAKE CITY, KOLKATA - 700 091

फैक्स/Fax : (033) 23211960

फोन/Phone : बोर्ड/EPABX : 23211691, 23211798, 23211796

FORMAT FOR NO DEVIATION CERTIFICATE  
(To be submitted in the bidder's letter head)

BHARAT HEAVY ELECTRICALS LIMITED,  
Power Sector - Eastern Region,  
Plot no 9/1, DJ Block, Sector – II, Salt Lake City,  
Kolkata – 700 091

Sub	No Deviation Certificate.	
Job	Design, engineering, manufacturing, supply, erection, testing, commissioning, etc of Ventilation System for 3x660 MW units at North Karanpura Super Thermal Power Project, Jharkhand.	
Ref	1.0	Tender no PSER:SCT:NKP-M1645:14
	2.0	BHEL's NIT, vide reference no PSER:SCT: NKP-M1645:4151, dated 08-01-2015
	3.0	BHEL's TCN-01, vide reference no PSER:SCT:NKP-M1645:TCN-01, dated 16-01-2015.
	4.0	All other pertinent issues till date.

Dear Sirs,

With reference to above, this is to confirm that as per tender conditions, we have visited site before submission of our offer and noted the job content & site conditions etc. We also confirm that we have not changed/ modified the tender documents as appeared in the website/ issued by you and in case of such observance at any stage, it shall be treated as null and void.

We hereby confirm that we have not taken any deviation from tender clauses together with other references as enumerated in the above referred NIT. We hereby confirm our unqualified acceptance to all terms & conditions, unqualified compliance to technical specification, integrity pact (if applicable) and acceptance to reverse auctioning process.

In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null & void.

We confirm to have submitted offer in accordance with tender instructions and as per aforesaid references.

Thanking you,

Yours faithfully,

(Signature, date & seal of authorized  
representative of the bidder)

पावर सेक्टर पूर्वी क्षेत्र (मुख्यालय)

POWER SECTOR EASTERN REGION DJ-9/1, SECTOR-II, SALT LAKE CITY, KOLKATA - 700 091

फैक्स/Fax : (033) 23211960

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**VENTILATION SYSTEM  
NORTH KARANPURA TPP  
(3X660 MW)**

**SPECIFICATION NO. PE-TS-405-554-A001**

**ADDENDUM No. 1**

**DATE: 13.01.2015**

**ANNEXURE-A TO TCN-01**

Tender no PSER:SCT:NKP-M1645:14

**NORTH KARANPURA TPP**  
**(3 X 660 MW)**

**ADDENDUM No. 1**

(TECH SPEC No. PE-TS-405-554-A001)

**VENTILATION SYSTEM**


*Mukesh*

Mukesh Kr. Singh

*S.A. Khan*

S.A. Khan

*Solomon Kumar Bhatnagar*

	<b>VENTILATION SYSTEM NORTH KARANPURA TPP (3X660 MW)</b>	<b>SPECIFICATION NO.PE-TS-405-554-A001</b>
		<b>ADDENDUM No. 1</b>
		<b>DATE: 13.01.2015</b>

**ADDENDUM No. 1 TO THE TECHNICAL SPECIFICATION PE-TS-405-554-A001**

**VENTILATION SYSTEM OF NORTH KARANPURA TPP (3 X 660 MW)**

**1. AMENDMENT TO EXISTING CLAUSES OF THE TECHNICAL SPECIFICATION**

S.No	Volume, section, page no.	Existing	Amendment
1.	Volume-IIB, Section – C3, Technical specification (Electrical portion) Page no. 202 - Page no. 271	The complete section C3 (volume II-B) (Page no. 202 - Page no. 271) to be ignored.	Annexure A (attached) to be considered in place of section C3 (volume II-B)
2.	Volume-IIB, Section – C4, Technical specification (C&I portion) Page no. 275 - Page no. 277	Page no. 275 to 277 of Section – C4 (Volume-IIB) to be ignored.	Annexure B (attached) to be considered in place of these pages
3.	Volume-III, Section – 3, Main drawing list with schedule submission date Page no. 454 - Page no. 455	Page no. 454 to 455 of Section-3 (Volume-III) to be ignored.	Annexure C (attached) to be considered in place of these pages

Mukesh

Mukesh Kr. Singh

S. A. Khan

S. A. Khan

Solomon Kumar Bhatnagar

# ANNEXURE - A

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*S. A. Khan*  
S. A. Khan

*Solomon Kwana B. B. B.*  
Solomon Kwana B. B. B.



TITLE :  
ELECTRICAL EQUIPMENT SPECIFICATION  
FOR  
VENTILATION SYSTEM  
3X660MW NORTH KARANPURA STPP

SPECIFICATION NO.

VOLUME NO. : II-B

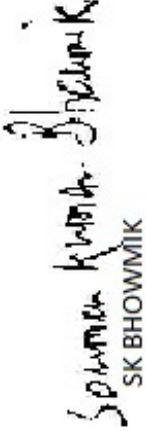
SECTION : C

REV NO. : DATE :

SHEET : 1 OF 3

ANNEXURE-A TO TCN-01  
Tender no PSER:SCT:NKP-M1645:14

TECHNICAL SPECIFICATION  
FOR  
VENTILATION SYSTEM  
(ELECTRICAL PORTION)

  
S. K. BHOWMIK

  
S A Khan

  
Mukesh Kr. Singh



**TITLE :**  
**ELECTRICAL EQUIPMENT SPECIFICATION**  
**FOR**  
**VENTILATION SYSTEM**  
**3X660MW NORTH KARANPURA STPP**

SPECIFICATION NO.

VOLUME NO. : **II-B**

SECTION : **C**

REV NO. : DATE :

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 Ventilation 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 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 DOCUMENTS :**

*Signature*  
SK BHOWMIK

*Signature*  
S A Khan

*Signature*  
Mukesh Kr. Singh



**TITLE :**  
**ELECTRICAL EQUIPMENT SPECIFICATION**  
**FOR**  
**VENTILATION SYSTEM**  
**3X660MW NORTH KARANPURA STPP**

SPECIFICATION NO.

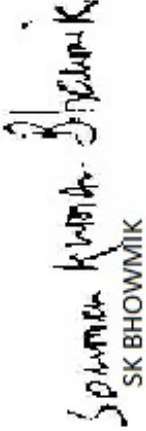
VOLUME NO. : **II-B**

SECTION : **C**

REV NO. : DATE :

SHEET : 3 OF 3

- a. Electrical scope between BHEL & vendor (Annexure –I)
- b. Technical specification for motors.
- c. Datasheets A
- d. Datasheet C (alongwith annexure P)
- e. Electrical Load data format (Annexure –II)
- f. Cable listing format (Annexure III).
- g. Quality plan for motors

  
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## ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR

PACKAGES : VENTILATION SYSTEM  
PROJECT: 3X660 MW NORTH KARANPURA STPP

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 cabling 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 & lightning protection	BHEL	BHEL	

  
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## ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR

PACKAGES : VENTILATION SYSTEM  
PROJECT: 3X660 MW NORTH KARANPURA STPP

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 (excluding power cables) in enclosed excel format shall be submitted by vendor during detailed engineering stage.
17	Electrical Equipment & cable tray layout drawings	Vendor	-	For ensuring cabling requirements are met, vendor shall furnish Electrical equipment layout & cable tray layout drawings (both in print form as well as in AUTOCAD) of the complete plant (including electrical area) indicating location and identification of all equipment requiring cabling, and shall incorporate cable trays routing details marked on the drawing as per PEM interface comments. Cabling arrangement of the same (wherever overhead cable trays, trenches, cable ducts, conduits etc.) shall be decided during contract stage. Electrical equipment layout & cable tray layout drawing shall be subjected to BHEL/ customer approval without any commercial implications to BHEL.
18	Electrical Equipment GA drawing	Vendor	-	For necessary interface review.

  
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ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR

PACKAGES : VENTILATION SYSTEM  
PROJECT: 3X660 MW NORTH KARANPURA STPP

**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.

  
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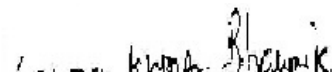
SUB-SECTION - B-07  
**MOTORS**


NORTH KARANPURA STPP  
(3 X 660 MW)  
EPC PACKAGE

TECHNICAL SPECIFICATION  
SECTION-VI, PART-B  
BID DOC.NO.: CS-4410-001-2

  
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CLAUSE NO.	TECHNICAL REQUIREMENTS																		
	<b>MOTORS</b>																		
<b>1.00.00</b>	<b>GENERAL REQUIREMENTS</b>																		
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 equipments 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, equipments, 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	<p>Degree of Protection</p> <p>Degree of protection for various enclosures as per IS:4691, IEC60034-05 shall be as follows :-</p> <table border="0" data-bbox="363 1317 1013 1525"> <tr> <td>i) Indoor motors</td> <td>-</td> <td>IP 54</td> </tr> <tr> <td>ii) Outdoor motors</td> <td>-</td> <td>IP 55</td> </tr> <tr> <td>iii) Cable box-indoor area</td> <td>-</td> <td>IP 54</td> </tr> <tr> <td>iv) Cable box-Outdoor area</td> <td>-</td> <td>IP 55</td> </tr> </table>				i) Indoor motors	-	IP 54	ii) Outdoor motors	-	IP 55	iii) Cable box-indoor area	-	IP 54	iv) Cable box-Outdoor area	-	IP 55			
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<b>2.00.00</b>	<b>CODES AND STANDARDS</b>																		
	<table border="0" data-bbox="363 1630 1236 1944"> <tr> <td>1) Three phase induction motors</td> <td>:</td> <td>IS:325, IEC:60034</td> </tr> <tr> <td>2) Single phase AC motors</td> <td>:</td> <td>IS:996, IEC:60034</td> </tr> <tr> <td>3) Crane duty motors</td> <td>:</td> <td>IS:3177, IEC:60034</td> </tr> <tr> <td>4) DC motors/generators</td> <td>:</td> <td>IS:4722</td> </tr> <tr> <td>5) Energy Efficient motors</td> <td>:</td> <td>IS 12615, IEC:60034-30</td> </tr> </table>				1) Three phase induction motors	:	IS:325, IEC:60034	2) Single phase AC motors	:	IS:996, IEC:60034	3) Crane duty motors	:	IS:3177, IEC:60034	4) DC motors/generators	:	IS:4722	5) Energy Efficient motors	:	IS 12615, IEC:60034-30
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5) Energy Efficient motors	:	IS 12615, IEC:60034-30																	
<b>NORTH KARANPURA STPP</b> (3 X 660 MW) <b>EPC PACKAGE</b>	<b>TECHNICAL SPECIFICATIONS</b> <b>SECTION VI, PART-B</b> <b>BID DOC. NO.:CS-4410-001-2</b>	<b>SUB SECTION B-07</b> <b>MOTORS</b>	<b>Page</b> <b>1 of 9</b>																

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*Soumen Kumar Bhattacharya*  
SK BHATTACHARYA

CLAUSE NO.	TECHNICAL REQUIREMENTS			
3.00.00	<b>TYPE</b>			
3.01.00	<b>AC Motors:</b> <ol style="list-style-type: none"> <li>a) Squirrel cage induction motor suitable for direct-on-line starting.</li> <li>b) Continuous duty LT motors upto 160 KW Output rating (at 50 deg.C ambient temperature), shall be <b>Premium Efficiency class-IE3</b>, conforming to IS 12615, or IEC:60034-30.</li> <li>c) Crane duty motors shall be slip ring/ squirrel cage Induction motor as per the requirement.</li> </ol>			
3.02.00	DC Motors	Shunt wound.		
4.00.00	<b>RATING</b>			
	(a) Continuously rated (S1). However, crane motors shall be rated for S4 duty, 40% cyclic duration factor.			
	(b) Whenever the basis for motor or driven equipment ratings are not specified in the corresponding mechanical specification sub-sections, maximum continuous motor ratings shall be at least 10% above the maximum load demand of the driven equipment under entire operating range including voltage and frequency variations.			
	(c) For BFP motors starting MVA shall be restricted to 60 MVA.			
5.00.00	<b>TEMPERATURE RISE</b>			
	<b>Air cooled motors</b>			
	70 deg. C by resistance method for both thermal class 130(B) & 155(F) insulation.			
	<b>Water cooled</b>			
	80 deg. C over inlet cooling water temperature mentioned elsewhere, by resistance method for both thermal class 130(B) & 155(F) insulation.			
6.00.00	<b>OPERATIONAL REQUIREMENTS</b>			
6.01.00	<b>Starting Time</b>			
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.			
<b>NORTH KARANPURA STPP</b> (3 X 660 MW) <b>EPC PACKAGE</b>	<b>TECHNICAL SPECIFICATIONS</b> <b>SECTION VI, PART-B</b> <b>BID DOC. NO.:CS-4410-001-2</b>	<b>SUB SECTION B-07</b> <b>MOTORS</b>	<b>Page</b> <b>2 of 9</b>	

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*Suman Kumar Bhowmik*  
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CLAUSE NO.	TECHNICAL REQUIREMENTS		
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	<b>Torque Requirements</b>		
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	<p><b>Starting voltage requirement</b></p> <p>(a) 85% below 110 KW</p> <p>(b) 80% from 110 KW to 200 KW</p> <p>(c) 85% above 200 KW to 1000 KW</p> <p>(d) 80% from 1001 KW to 4000 KW</p> <p>(e) 75% above 4000KW</p> <p>Except AOP &amp; JOP motors running on D.G emergency supply, starting voltage shall be 80%.</p>		
7.00.00	<b>DESIGN AND CONSTRUCTIONAL FEATURES</b>		
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	<p>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). Motors and EPB located in hazardous areas shall have flame proof enclosures conforming to IS:2148 as detailed below</p> <p>(a) Fuel oil area : Group – IIB</p>		
<p>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2</p>	<p>SUB SECTION B-07 MOTORS</p>	<p>Page 3 of 9</p>

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CLAUSE NO.	TECHNICAL REQUIREMENTS		
7.03.00	(b) Hydrogen generation  Winding and Insulation  (a) Type  (b) Starting duty  (c) 11kV & 3.3 kV AC motors  (d) 240VAC, 415V AC & 220V DC motors	:Group - IIC or (Group-I, Div-II as per plant area NEC) or ( Class-1, Group-B, Div-II as per NEMA /IEC60034)  : Non-hygroscopic, oil resistant, flame resistant  : Two hot starts in succession, with motor initially at normal running temperature.  : Thermal class 155 (F) insulation. The winding insulation process shall be total Vacuum Pressure Impregnated i.e resin poor method. The lightning Impulse & interturn insulation surge withstand level shall be as per IEC-60034 part-15  : Thermal Class( B ) or better	
7.04.00	Motors rated above 1000KW shall have insulated bearings to prevent flow of shaft currents.		
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 90dB(A). Vibration shall be limited within the limits prescribed in IS:12075 / 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 Separate Insulated Connector (Elastimould or Equivalent make) as per IEEE 386. The offered Elastimould terminations shall be provided with protective cover and trifurcating sleeves. Elastimould 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		
<b>NORTH KARANPURA STPP</b> (3 X 660 MW) <b>EPC PACKAGE</b>	<b>TECHNICAL SPECIFICATIONS</b> <b>SECTION VI, PART-B</b> <b>BID DOC. NO.:CS-4410-001-2</b>	<b>SUB SECTION B-07</b> <b>MOTORS</b>	<b>Page</b> <b>4 of 9</b>

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CLAUSE NO.	TECHNICAL REQUIREMENTS				
<p>7.11.00</p> <p>7.12.00</p> <p>7.13.00</p> <p>7.14.00</p> <p>7.15.00</p> <p>8.00.00</p> <p>(a) Below 110KW</p> <p>(b) From 110 KW &amp; upto 200 KW</p> <p>(c) Above 200 KW &amp; upto 1000KW</p> <p>(d) From 1001KW &amp; upto 4000KW</p> <p>(e) Above 4000KW</p> <p>10.00.00</p> <p>10.01.00</p> <p>10.01.01</p> <p>10.01.02</p>	<p>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.</p> <p>The spacing between gland plate &amp; centre of terminal stud shall be as per Table-I.</p> <p>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.</p> <p>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.</p> <p>For motors rated 2000 KW &amp; above, neutral current transformers of PS class shall be provided on each phase in a separate neutral terminal box.</p> <p>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.</p> <p>The ratio of locked rotor KVA at rated voltage to rated KW shall not exceed the following (without any further tolerance) except for BFP motor.</p> <p>: 10.0</p> <p>: 9.0</p> <p>: 10.0</p> <p>: 9.0</p> <p>: 6 to 6.5</p> <p><b>TYPE TEST</b></p> <p><b>HT MOTORS</b></p> <p>The contractor shall carry out the type tests as listed in this specification on the equipment to be supplied under this contract. The bidder shall indicate the charges for each of these type tests separately in the relevant schedule of Section - VII- (BPS) and the same shall be considered for the evaluation of the bids. The type tests charges shall be paid only for the test(s) actually conducted successfully under this contract and upon certification by the employer's engineer.</p> <p>The type tests shall be carried out in presence of the employer's representative, for which minimum 15 days notice shall be given by the contractor. The contractor shall obtain the employer's approval for the type test procedure before conducting the type test. The type test procedure shall clearly specify the test set-up, instruments to be used, procedure,</p>	<p><b>NORTH KARANPURA STPP</b> (3 X 660 MW) EPC PACKAGE</p>	<p><b>TECHNICAL SPECIFICATIONS</b> SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2</p>	<p><b>SUB SECTION B-07</b> <b>MOTORS</b></p>	<p>Page 5 of 9</p>

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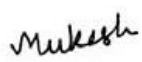
CLAUSE NO.	<b>TECHNICAL REQUIREMENTS</b> 		
<p>10.01.03</p> <p>10.01.04</p> <p>10.01.05</p>	<p>acceptance norms, recording of different parameters, interval of recording, precautions to be taken etc. for the type test(s) to be carried out.</p> <p>In case the contractor has conducted such specified type test(s) within last ten years as on the date of bid opening, he may submit during detailed engineering the type test reports to the Employer for waiver of conductance of such test(s). These reports should be for the tests conducted on the equipment similar to those proposed to be supplied under this contract and test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. The Employer reserves the right to waive conducting of any or all the specified type test(s) under this contract. In case type tests are waived, the type test charges shall not be payable to the contractor.</p> <p>Further the Contractor shall only submit the reports of the type tests as listed in "LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED" and carried out within last ten years from the date of bid opening. These reports</p> <p>should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. However if the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the Employer either at third party lab or in presence of client/Employers representative and submit the reports for approval.</p> <p><b>LIST OF TYPE TESTS TO BE CONDUCTED</b></p> <p><b>The following type tests shall be conducted on each type and rating of HT motor</b></p> <p>(a) No load saturation and loss curves upto approximately 115% of rated voltage</p> <p>(b) Measurement of noise at no load.</p> <p>(c) Momentary excess torque test (subject to test bed constraint).</p> <p>(d) Full load test(subject to test bed constraint)</p> <p>(e) Temperature rise test at rated conditions. During heat run test, bearing temp., winding temp., coolant flow and its temp. shall also be measured. In case the temperature rise test is carried at load other than rated load, specific approval for the test method and procedure is required to be obtained. Wherever ETD's are provided, the temperature shall be measured by ETD's also for the record purpose.</p>		
<p><b>NORTH KARANPURA STPP</b> (3 X 660 MW) EPC PACKAGE</p>	<p><b>TECHNICAL SPECIFICATIONS</b> SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2</p>	<p><b>SUB SECTION B-07</b> <b>MOTORS</b></p>	<p><b>Page</b> <b>6 of 9</b></p>

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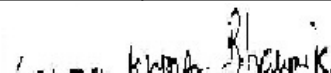
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CLAUSE NO.	TECHNICAL REQUIREMENTS			
10.01.06	<p><b>LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED</b></p> <p>The following type test reports shall be submitted for each type and rating of HT motor</p> <ul style="list-style-type: none"> <li>(a) Degree of protection test for the enclosure followed by IR, HV and no load run test.</li> <li>(b) Terminal box-fault level withstand test for each type of terminal box of HT motors only.</li> <li>(c) Lightning Impulse withstand test on the sample coil shall be as per clause no. 4.3 IEC-60034, part-15</li> <li>(d) Surge-withstand test on interturn insulation shall be as per clause no. 4.2 of IEC 60034, part-15</li> </ul>			
10.02.00	<p><b>LT Motors</b></p>			
10.02.01	<p>LT Motors supplied shall be of type tested design. During detailed engineering, the contractor shall submit for Employer's approval the reports of all the type tests as listed in this specification and carried out within last <i>ten</i> years from the date of bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.</p>			
10.02.02	<p>However if the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the Employer either at third party lab or in presence of client/Employers representative and submit the reports for approval.</p>			
10.02.03	<p><b>LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED</b></p> <p><b>The following type test reports shall be submitted for each type and rating of LT motor of above 50 KW only</b></p> <ul style="list-style-type: none"> <li>1. Measurement of resistance of windings of stator and wound rotor.</li> <li>2. No load test at rated voltage to determine input current power and speed</li> <li>3. Open circuit voltage ratio of wound rotor motors ( in case of Slip ring motors)</li> <li>4. Full load test to determine efficiency power factor and slip .</li> <li>5. Temperature rise test .</li> <li>6. Momentary excess torque test.</li> <li>7. High voltage test .</li> </ul>			
<p>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2</p>	<p>SUB SECTION B-07 MOTORS</p>	<p>Page 7 of 9</p>	

  
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CLAUSE NO.	TECHNICAL REQUIREMENTS																				
10.03.00 10.04.00	<p>8. Test for vibration severity of motor.</p> <p>9. Test for noise levels of motor(Shall be limited as per clause no 7.06.00 of this section)</p> <p>10. Test for degree of protection and</p> <p>11. Over speed test.</p> <p>12. Type test reports for motors located in fuel oil area having flame proof enclosures as per IS 2148 / IEC 60079-1</p> <p>All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.</p> <p>The type test reports once approved for any projects shall be treated as reference. For subsequent projects of NTPC, an endorsement sheet will be furnished by the manufacturer confirming similarity and "No design Change". Minor changes if any shall be highlighted on the endorsement sheet.</p> <p style="text-align: center;"><b>TABLE - I</b></p> <p style="text-align: center;"><b>DIMENSIONS OF TERMINAL BOXES FOR LV MOTORS</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Motor MCR in KW</th> <th style="text-align: right;">Minimum distance between centre of stud and gland plate in mm</th> </tr> </thead> <tbody> <tr> <td colspan="2" style="text-align: center;"><b>UP to 3 KW</b></td> </tr> <tr> <td style="text-align: left;">Above 3 KW - upto 7 KW</td> <td style="text-align: right;">85</td> </tr> <tr> <td style="text-align: left;">Above 7 KW - upto 13 KW</td> <td style="text-align: right;">115</td> </tr> <tr> <td style="text-align: left;">Above 13 KW - upto 24 KW</td> <td style="text-align: right;">167</td> </tr> <tr> <td style="text-align: left;">Above 24 KW - upto 37 KW</td> <td style="text-align: right;">196</td> </tr> <tr> <td style="text-align: left;">Above 37 KW - upto 55 KW</td> <td style="text-align: right;">249</td> </tr> <tr> <td style="text-align: left;">Above 55 KW - upto 90 KW</td> <td style="text-align: right;">277</td> </tr> <tr> <td style="text-align: left;">Above 90 KW - upto 125 KW</td> <td style="text-align: right;">331</td> </tr> <tr> <td style="text-align: left;">Above 125 KW-upto 200 KW</td> <td style="text-align: right;">203</td> </tr> </tbody> </table> <p>For HT motors the distance between gland plate and the terminal studs shall not be less than 500 mm.</p>	Motor MCR in KW	Minimum distance between centre of stud and gland plate in mm	<b>UP to 3 KW</b>		Above 3 KW - upto 7 KW	85	Above 7 KW - upto 13 KW	115	Above 13 KW - upto 24 KW	167	Above 24 KW - upto 37 KW	196	Above 37 KW - upto 55 KW	249	Above 55 KW - upto 90 KW	277	Above 90 KW - upto 125 KW	331	Above 125 KW-upto 200 KW	203
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<b>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</b>	<b>TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2</b>	<b>SUB SECTION B-07 MOTORS</b>	<b>Page 8 of 9</b>																		

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CLAUSE NO.	TECHNICAL REQUIREMENTS											
	<p><b>PHASE TO PHASE/ PHASE TO EARTH AIR CLEARANCE:</b></p> <p>NOTE: Minimum inter-phase and phase-earth air clearances for LT motors with lugs installed shall be as follows:</p> <table border="1" data-bbox="363 461 1074 719"> <thead> <tr> <th>Motor MCR in KW</th> <th>Clearance</th> </tr> </thead> <tbody> <tr> <td>UP to 110 KW</td> <td>10mm</td> </tr> <tr> <td>Above 110 KW and upto 150 KW</td> <td>12.5mm</td> </tr> <tr> <td>Above 150 KW</td> <td>19mm</td> </tr> </tbody> </table>				Motor MCR in KW	Clearance	UP to 110 KW	10mm	Above 110 KW and upto 150 KW	12.5mm	Above 150 KW	19mm
Motor MCR in KW	Clearance											
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<p>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2</p>	<p>SUB SECTION B-07 MOTORS</p>	<p>Page 9 of 9</p>									

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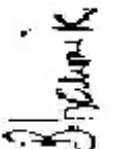
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<b>TITLE</b>  <b>LV MOTORS</b>  <b><u>DATA SHEET-A</u></b>  <b><u>3 x 660 MW NORTH KARANPURA STPP</u></b>	<b>SPECIFICATION NO.</b>	
	VOLUME	II B
	SECTION	C
	REV NO.	DATE
	SHEET	1 OF 1

1. Design ambient temperature : 50 °C
2. Maximum acceptable kW rating of LV motor : ≤200KW
3. Installation (Indoors/ Outdoors) : As required
4. Degree Of Protection (Indoor/Outdoor) : IP54/IP55
5. Type of Cooling : TEFC/CACA/TETV
6. Details of supply system
  - a) Rated voltage (with variation) : 415V ± 10%
  - b) Rated frequency (with variation) : 50 Hz (Variation: +3% to -5%)
  - c) Combined voltage & freq. variation : 10%
  - d) System fault level at rated voltage : 50 kA for 1 sec
  - e) Short time rating for terminal boxes
    - 110kW & Above : 50 kA for 1 sec  
(Breaker controlled)
    - Below 110kW : 50 KA for 0.20 sec  
(SFU+ Contactor controlled)
  - f) LV System grounding : Solidly
7. Class of insulation : Class 'F' with temp rise limited to class B.  
(Refer clause 5.00.00 of Motors)
8. Minimum voltage for starting : 85% below 110KW  
(As percentage of rated voltage) 80% from 110KW to 200 KW
9. Power cables data : Shall be given during detailed engg.
10. Earth Conductor Size & Material : Shall be given during detailed engg.
11. Space heater supply : 240 V, 1Φ, 50 Hz
12. Rating up to which Single phase motor : Acceptable upto 0.20 kW
13. Tests : As per Customer motor spec. (enclosed)
14. Special requirement : Continuous duty LT motors upto 160kW  
output rating (at 50 deg C) shall be  
Premium Efficiency class – IE3  
conforming to IS 12615 / IEC 60034-30
15. Ratio of locked rotor KVA at rated voltage : Below 110 KW - 10.0  
to rated KW : From 110KW to upto 200KW - 9.0

- **Also detail Customer spec. for Motors to be referred as enclosed with spec.**

  
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	<b>TITLE</b>  <b>MOTOR DATA SHEET – C 3 x 660 MW NORTH KARANPURA STPP</b>	<b>SPECIFICATION NO.</b>
		<b>VOLUME</b> <b>II B</b>
		<b>SECTION D</b>
		<b>REV NO. 00 DATE</b>
		<b>SHEET</b> 1 <b>OF</b> 2

S. No.	Description	Data to be filled by successful bidder
<b>A.</b>	<b>General</b>	
1	Manufacturer & country of origin	
2	Motor type	
3	Type of starting	
4	Name of the equipment driven by motor & Quantity	
5	Maximum Power requirement of driven equipment	
6	Rated speed of Driven Equipment	
7	Design ambient temperature	
<b>B.</b>	<b>Design and Performance Data</b>	
1	Frame size & type designation	
2	Type of duty	
3	Rated Voltage	
4	Permissible variation for	
5	a) Voltage	
6	b) Frequency	
7	c) Combined voltage & frequency	
8	Rated output at design ambient temp (by resistance method)	
9	Synchronous speed & Rated slip	
10	Minimum permissible starting voltage	
11	Starting time in sec with mechanism coupled	
12	a) At rated voltage	
13	b) At min starting voltage	
14	Locked rotor current as percentage of FLC (including IS tolerance)	
15	Torque	
	a) Starting	
	b) Maximum	
16	Permissible temp rise at rated output over ambient temp & method	
17	Noise level at 1.0 m (dB)	
18	Amplitude of vibration	
19	Efficiency & P.F. at rated voltage & frequency	
	a) At 100% load	
	c) At 75% load	

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

  
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	<b>TITLE</b>  <b>MOTOR DATA SHEET – C 3 x 660 MW NORTH KARANPURA STPP</b>	<b>SPECIFICATION NO.</b>	
		<b>VOLUME</b>	<b>II B</b>
		<b>SECTION D</b>	
		<b>REV NO. 00</b>	<b>DATE</b>
		<b>SHEET</b>	<b>2 OF 2</b>

S. No.	Description	Data to be filled by successful bidder
	c) At starting	
<b>C.</b>	<b>Constructional Features</b>	
1	Method of connection of motor driven equipment	
2	Applicable Standard	
3	DOP of Enclosure	
4	Method of cooling	
5	Class of insulation	
6	Main terminal box	
	a) Type	
	b) Power Cable details (Conductor, size, armour/unarmour)	
	c) Cable Gland & lugs details (Size, type & material)	
	d) Permissible Fault level ( kArms & duration in sec)	
7	Space heater details (Voltage & watts)	
8	Flame proof motor details (if applicable)	
	a) Enclosure	
	b) suitability for hazardous area	
	i Zone	O / I / II
	ii Group	IIA / IIB / IIC
9	No. of Stator winding	
10	Winding connection	
11	Kind of rotor winding	
12	Kind of bearings	
13	Direction of rotation when viewed from NDE	
14	Paint Shade & type	
15	Net weight of motor	
16	Outline mounting drawing No (To be enclosed as annexure)	
<b>D.</b>	<b>Characteristic curves/ drawings</b> (To be enclosed for motors of rating $\geq 55KW$ )	
	a) Torque speed characteristic	
	b) Thermal withstand characteristic	
	c) Current vs time	
	d) Speed vs time	

- Filled in Annexure – P to be furnished by vendor along with datasheet C of motor.

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

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**MOTOR**

TESTS/CHECKS  TEMS/COMPONENTS	Visual	Dimensional	Make/Type/Rating /General Physical Inspection	Mech/Chem. Properties	NDT /DP/MP/UT	Metallography	Electrical Characteristics	Welding/Brazing(WPS/PQR)	Heat Treatment
Plates for stator frame, end shield, spider etc.	Y	Y	Y	Y	Y				Y
Shaft	Y	Y	Y	Y	Y	Y			Y
Magnetic Material	Y	Y	Y	Y			Y		
Rotor Copper/Aluminium	Y	Y	Y	Y			Y		Y
Stator copper	Y	Y	Y	Y			Y		Y
SC Ring	Y	Y	Y	Y	Y		Y	Y	Y
Insulating Material	Y		Y	Y			Y		
Tubes, for Cooler	Y	Y	Y	Y	Y				Y
Sleeve Bearing	Y	Y	Y	Y	Y				Y
Stator/Rotor, Exciter Coils	Y	Y	Y				Y	Y	
Castings, stator frame, terminal box and bearing housing etc.	Y	Y	Y	Y	Y			Y	
Fabrication & machining of stator, rotor, terminal box	Y	Y			Y			Y	Y
Wound stator	Y	Y					Y	Y	
Wound Exciter	Y	Y					Y	Y	
Rotor complete	Y	Y					Y		
Exciter, Stator, Rotor, Terminal Box assembly	Y	Y					Y		
Accessories, RTD, BTD,CT, Space heater, antifriction bearing, gaskets etc.	Y	Y	Y						
Complete Motor	Y	Y	Y						

**Note:** 1. This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality Plan indicating the practices & Procedure followed along with relevant supporting documents during QP finalization. However, No QP for LT motor upto 50KW.  
 2. Additional routine tests for Flame proof motors shall be applicable as per relevant standard  
 3. Makes of major bought out items for HT motors will be subject to NTPC approval.  
 Y1 = for HT Motor / Machines only.

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**MOTOR**

TESTS/CHECKS	Magnetic Characteristics	Hydraulic/Leak/Pressure Test	Thermal Characteristics	Run out	Dynamic Balancing	Routine & Acceptance tests as per IS-325/IS-4722 /IS- 9283/IS 2148/IEC60034/IEC 60079-I	vibration	Over speed	Tan delta, shaft voltage & polarization index test	Paint shade, thickness & adhesion
ITEMS/COMPONENTS										
Plates for stator frame, end shield, spider etc.										
Shaft										
Magnetic Material	Y		Y							
Rotor Copper/Aluminium										
Stator copper			Y							
SC Ring										
Insulating Material			Y							
Tubes for Cooler		Y								
Sleeve Bearing		Y								
Stator/Rotor, Exciter Coils										
Castings, stator frame, terminal box and bearing housing etc.										
Fabrication & machining of stator, rotor, terminal box										
Wound stator										
Wound Exciter										
Rotor complete				Y	Y					
Exciter, Stator, Rotor, Terminal Box assembly										
Accessories, RTD, BTD, CT, , Space heater, antifriction bearing, gaskets etc.										
Complete Motor						Y	Y	Y	Y1	Y

**Note:** 1. This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality Plan indicating the practices & Procedure followed along with relevant supporting documents during QP finalization. However, No QP for LT motor upto 50KW.  
 2. Additional routine tests for Flame proof motors shall be applicable as per relevant standard  
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# ANNEXURE - B

  
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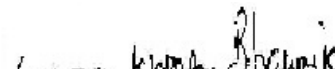
**3X660 MW NORTH KARANPURA STPP  
(UNIT NO. 1, 2 & 3)**

SCOPE OF C&I FOR VENTILATION SYSTEM

1. Ventilation System shall be operated from Air conditioning DCS (BHEL's scope) for area Main plant, Water system control room and Air Conditioning PLC (Bidder's scope) for Admin, Auditorium & service building .
2. The Contractor shall provide complete Instrumentation for control, monitoring and operation of entire Ventilation. The requirements given are to be read in conjunction with detailed Technical specification enclosed in the specification. Further in case of any discrepancy in the requirement within the same section noted by the bidder in the specification, the same will be brought to the notice of BHEL in the form of pre- bid clarification. In absence of any pre-bid clarification, the more stringent requirement as per interpretation of customer shall prevail without any commercial implication.
3. The Ventilation IO shall be provided to Air conditioning Control system vendor i.e to DCS & PLC Vendor
4. Plant schematic for monitoring & operation shall be available on OWS, bidder to further submit list of important signal along with applicable schematic for monitoring in DCS.
5. The PLC based control system shall include all Primary and Secondary Instruments, Local control panels. All instruments required for the package shall be supplied, mounted on the gauge board racks, along with accessories like impulse pipe, fittings & valve manifolds etc..
6. The UPS load for ventilation system to be provided to DCS & PLC vendor
7. Vendor shall provide at least 20% or minimum one no. spare channels as hot-on-rail spares in each configured cards/modules. In addition to this 10% or minimum one no. extra assigned complete spare cards mounted on rails in sub-racks for each type of I/O modules shall also to be provided.
8. In PLC based system annunciation system shall be driven by PLC
9. Connected data cable for PLC to remote I/O panels shall be through redundant cable/optic fibers with redundant I/O.
10. VMS (VIBRATION MONITORING SYSTEM) for HT drive shall be in bidder scope, detail is included in specification
11. The make/model of various instruments/items/systems shall be as per NTPC approved vendor list. No commercial and delivery implication in this regard shall be acceptable. In case of any conflict and repetition of clauses in the specification, the more stringent requirements among them are to be complied with.
12. All instruments shall be terminated on JB/LCP in field and both instrument and JB/LCP are in bidder scope.
13. For cable scope refer to electrical scope between BHEL and vendor defined in electrical specification.
14. Bidder to provide mandatory spares as per mandatory spares list
15. Electrical Actuators with integral starter shall be provided for all on/off and inching type valves along with necessary interface units for linking to corresponding Control System as applicable, typical Hook-up diagram of drives is included for reference
16. The specifications for instruments mentioned in the specification are minimum requirements. The detail specifications shall be finalized during detail engineering.
17. The bidders shall specifically mention any deviation they would like to take on the C&I specification. In absence of only deviation a No deviation certificate is to be furnished.
18. The quantity of instruments for the system shall be as per tender P &ID wherever provided of the respective system as a minimum, for bidding purpose. However, Bidder shall also include in his proposal all the instruments and devices that are needed for the completeness of the plant auxiliary system/ equipment supplied by the bidder,

  
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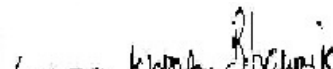
**3X660 MW NORTH KARANPURA STPP  
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even if the same is not specifically appearing in the P & ID. During detail engineering if any additional instruments are required for safe & reliable operation of plant, bidder shall supply the same without any price implication.

19. Bidder to terminate all instrumentation and control elements in junction boxes. Bidder to provide input/output list, drives list, junction box schedule and termination details, recommended control logics / write-up etc. the list of documents to be submitted after award of contract is to be referred by bidder.
20. All the transmitters supplied by Bidder shall be rack mounted. The transmitter racks shall be in Bidder's scope of supply. All transmitters shall be HART compatible.
21. Bidder to perform tests of C&I items/instruments/systems as per Quality plans/type test attached in the specification. However, if any test not specified in the quality plan but specified in specification Tests for I&C equipment included elsewhere in specification will have to perform by Bidder without any cost implication.
22. Instrument installation and accessories required for the same shall be in Bidder's scope and shall be submitted after award of contract. However any instrument/ analyzer installation not covered in the same shall be subject to customer and BHEL approval during detailed engineering.
23. All Temperature sensors shall be Duplex type and temperature transmitter shall be provided for all temperature measurement applications.
24. Bidder to furnish electrical load/UPS load data during detailed engineering
25. Bidder to provide temperature transmitter along with compensating cable, JB/Rack & other erection hardware
26. 230 V AC UPS Power supply shall be provided by BHEL at a single point, further distribution to various instruments/equipment of the system shall be in bidder scope. Bidder to include necessary power distribution board in his scope. Any power supply other than the above, if required by any instrument/equipment has to be derived by the bidder from the above supply & all necessary hardware for the same shall be in bidder scope. Bidder to submit the power requirement along with the bid.
27. Bidder's presence is required for 3 Man days (Excluding travel time) at EDN Bangalore during FAT of DDCMIS for certifying correctness & completeness of implementation of Control logic. Intimation to attained FAT shall be informed in 2 days advance. All the expenses like boarding, lodging and travel, Air fare etc. shall be in bidder's scope.
28. Contractor's C&I representative shall be present at BHEL-PEM for 3 man-days, for preparation of Control scheme of AC. All the expenses like boarding, lodging and travel, Air fare etc. shall be in bidder's scope.
29. Bidder's presence is required for 15 Man days (in three visit) at site during commissioning of DDCMIS for assistance related to process correctness. Three visit with total 15 Man days (Excluding travel time) in which one visit shall be of 5 Man days each. All the expenses like boarding, lodging and travel, Air fare etc. shall be in bidder's scope.
30. Contractor shall furnish Instrument Schedule, I/O list, Drive list, Cable Schedule, Cable interconnection, JB grouping, Annunciation list, SOE list, List of Instruments/devices for HART in BHEL approved format. Also reusable database format like MS Excel, MS Access etc. of these documents shall also be provided by Contractor in BHEL approved format. Soft copy of the formats shall be provided to the successful bidder.
31. Interface of MCC, HT SWGR, field instruments, Actuators etc. with DDCMIS based control system shall be as per Drive Control Philosophy enclosed in specification.
32. Local control panel if any required for operation shall be in bidder scope.
33. The solenoid operated valves/Dampers/Gate shall have a limit switch for open/close feedback. Solenoid Valve shall be rated for 24V Dc only.

  
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34. Bidder to include IO from fire protection system also for closing the dampers in the event of fire, the no of IO & other specifications in this regard shall be finalized during detail engineering.
35. All field instruments enclosure shall be IP65 local panel/cabinet enclosure shall be IP 55, unless otherwise specified.
36. Diaphragm seal shall be provided with Instruments having contact with corrosive media.
37. Redundancy of sensors shall be provided by bidder
  - (i) Triple redundancy for all analog and binary inputs required for protection of system/drives.
  - (ii) For all other control functions dual redundancy of the sensors shall be provided by the bidder.
38. Double root valve shall be provided for all pressure tapings where the pressure exceeds 40kg/cm<sup>2</sup>.
39. Use of process actuated shall be avoided unless unavoidable.
40. Number of pairs to be selected for Screen Control cable (Size : 0.5 mm<sup>2</sup>)
  - F-Type: 2P/4P/8P/12P/20P
  - G-Type: 2P/4P/8P/12P
41. Number of Junction Boxes shall be sufficient and positioned in the field to minimize local cabling(max 10-12 mtrs) and trunk cable

  
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# ANNEXURE - C

  
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**VENTILATION SYSTEM**

**DOCUMENTS TO BE FURNISHED BY VENDOR**

S. NO.	DRAWING NO	DRG./ DOC. TITLE	SCH. WEEK	PURPOSE
1	PE-V0-405-554-A201	TECHNICAL DATA SHEET OF PRESSURE GAUGE	14	I
2	PE-V0-405-554-A202	TECHNICAL DATA SHEET & TYPE TEST REPORT OF PRESSURE TRANSMITTER	14	A
3	PE-V0-405-554-A203	TECHNICAL DATA SHEET OF TEMPERATURE GAUGE	14	I
4	PE-V0-405-554-A204	TECHNICAL DATA SHEET, TYPE TEST REPORT & GA DRAWING FOR LEVEL TRANSMITTER	14	A
5	PE-V0-405-554-A205	TECHNICAL DATA SHEET & TYPE TEST REPORT OF JUNCTION BOX	14	A
6	PE-V0-405-554-A206	TECHNICAL DATA SHEET, GA DRAWING AND PERFORMANCE CURVES OF MOTOR FOR CENTRIFUGAL FAN & PUMPS	15	A
7	PE-V0-405-554-A207	TECHNICAL DATA SHEET, GA DRAWING & PERFORMANCE CURVES OF MOTOR FOR AXIAL FLOW & ROOF EXTRACTOR FANS	15	A
8	PE-V0-405-554-A208	TECHNICAL DATA SHEET & GA DRAWING FOR ROOF EXTRACTOR ALONGWITH FIXING DETAILS	12	A
9	PE-V0-405-554-A209	TECHNICAL DATA SHEET & GA DRAWING OF CENTRIFUGAL FAN FOR AIR WASHER	12	A
10	PE-V0-405-554-A210	TECHNICAL DATA SHEET & GA DRAWING OF AIR WASHER	12	A
11	PE-V0-405-554-A211	TECHNICAL DATA SHEET & GA DRAWING FOR CENTRIFUGAL PUMP FOR AIR WASHER	12	A
12	PE-V0-405-554-A212	TECHNICAL DATA SHEET & GA DRAWING FOR AXIAL FANS ALONGWITH FIXING DETAILS	12	A
13	PE-V0-405-554-A213	TECHNICAL DATA SHEET FOR POT TYPE STRAINER	8	A
14	PE-V0-405-554-A214	TECHNICAL DATA SHEET & G.A.DRWG. FOR CAST IRON VALVES(GATE VALVE,CHECK VALVE, GLOBE VALVE)	8	A
15	PE-V0-405-554-A215	TECHNICAL DATA SHEET FOR GM GATE VALVE	8	A
16	PE-V0-405-554-A216	TECHNICAL DATA SHEET FOR THERMAL & ACCOUSTIC INSULATION FOR DUCTING	8	A

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**3X660 MW NORTH KARANPURA TPS**

**VENTILATION SYSTEM**

**DOCUMENTS TO BE FURNISHED BY VENDOR**

S. NO.	DRAWING NO	DRG./ DOC. TITLE	SCH. WEEK	PURPOSE
17	PE-V0-405-554-A217	TECHNICAL DATA SHEET & G.A. DRAWING OF PRE-FILTER,FINE FILTER&WATER REPELLANT FILTER	8	A
18	PE-V0-405-554-A218	TECHNICAL DATA SHEET OF G.I SHEET	5	A
19	PE-V0-405-554-A219	TECHNICAL DATA SHEET OF PIPES	5	A
20	PE-V0-405-554-A220	DATA SHEET & GA OF FIRE DAMPER WITH ACTUATOR DETAILS	8	A
21	PE-V0-405-554-A221	TECHNICAL DATA SHEET & GA DRAWING OF CENTRIFUGAL FAN FOR UAF	10	A
22	PE-V0-405-554-A222	TECHNICAL DATA SHEET & GA DRAWING OF UAF UNIT	10	A
23	PE-V0-405-554-A223	TECHNICAL DATA SHEET & GA DRAWING FOR CENTRIFUGAL PUMP FOR UAF UNIT	10	A
24	PE-V0-405-554-A701	INSTRUMENT SCHEDULE WITH TAG NUMBER	22	I
25	PE-V0-405-554-A702	I/O LIST FOR VENTILATION SYSTEM	20	I
26	PE-V0-405-554-A703	DRIVE LIST FOR VENTILATION SYSTEM	20	I
27	PE-V0-405-554-A704	INTERCONNECTION OF FIELD INSTRUMENTS UPTO JUNCTION BOX	20	I
28	PE-V0-405-554-A705	LOGIC DRAWING FOR VENTILATION SYSTEM	18	A
29	PE-V0-405-554-A706	ELECTRICAL FEEDER LIST FOR VENTILATION SYSTEM	18	A
30	PE-V0-405-554-A001	MOTOR TYPE TEST REPORT (ABOVE 50 KW)	15	A
31	PE-V0-405-554-A002	MQP FOR AXIAL/ RE FAN	14	A
32	PE-V0-405-554-A003	MQP FOR AIR WASHER,UAF& INTERNALS	12	A
33	PE-V0-405-554-A004	MQP FOR L T MOTOR >50KW	15	A
34	PE-V0-405-554-A005	MQP FOR HORIZONTAL CENTRIFUGAL PUMPS & PUMP TEST PROCEDURE	12	A
35	PE-V0-405-554-A006	MQP FOR CENTRIFUGAL FANS	13	A
36	PE-V0-405-554-A007	FQP - ERECTION	13	A
37	PE-V0-405-554-A008	FQP - RECEIPT & STORAGE	13	A
38	PE-V0-405-554-A009	WPS	10	A
39	PE-V0-405-554-A010	MQP FOR CI GATE ,GLOBE & CHECK	10	A
40	PE-V0-405-554-A011	MQP FOR THERMAL INSULATION	10	A
41	PE-V0-405-554-A012	MQP FOR PRE & FINE FILTER	10	A
42	PE-V0-405-554-A013	MQP FOR PIPE	10	A
43	PE-V0-405-554-A014	MQP FOR PRESSURE TRANSMITTER / LEVEL TRANSMITTER	10	A
44	PE-V0-405-554-A601	SCHEME OF AIR DISTRIBUTION IN POWER HOUSE BUILDING & ESP/VED	5	A

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**3X660 MW NORTH KARANPURA TPS**

**VENTILATION SYSTEM**

**DOCUMENTS TO BE FURNISHED BY VENDOR**

S. NO.	DRAWING NO	DRG./ DOC. TITLE	SCH. WEEK	PURPOSE
45	PE-V0-405-554-A602	SINGLE LINE FLOW DIAGRAM FOR AIR WASHER UNIT FOR POWER HOUSE	8	A
46	PE-V0-405-554-A603	STANDARD DRAWING FOR DUCT FABRICATION & SUPPORTING ARRANGEMENT	7	I
47	PE-V0-405-554-A604	STANDARD DRAWING FOR ERECTION & APPLICATION DETAIL OF INSULATION	7	I
48	PE-V0-405-554-A605	TG HALL VENTILATION DUCT LAYOUT FROM A-ROW SIDE AIR WASHER	12	A
49	PE-V0-405-554-A606	TG HALL VENTILATION DUCT LAYOUT FROM B-C BAY AIR WASHER	12	A
50	PE-V0-405-554-A607	EQUIPMENT LAYOUT OF AIR WASHER UNIT ALONGWITH FOUNDATION DETAIL ALONG A-ROW	12	A
51	PE-V0-405-554-A608	EQUIPMENT LAYOUT OF AIR WASHER UNIT ALONGWITH FOUNDATION DETAIL ALONG BC-BAY	12	A
52	PE-V0-405-554-A707	WRITE UP & CONTROL PHILOSOPHY FOR VENTILATION SYSTEM	14	A
53	PE-V0-405-554-A901	BBU OF MAIN SUPPLY ITEMS	22	A
54	PE-V0-405-554-A902	BBU OF MANDATORY SPARES	22	A
55	PE-V0-405-554-A903	OPERATION & MAINTENANCE MANUAL	25	I
56	PE-V0-405-554-A904	PG TEST PROCEDURE	12	A
57	PE-V0-405-554-A609	EQUIPMENT LAYOUT OF UAF UNIT ALONGWITH FOUNDATION DETAIL FOR ESP BUILDING.	11	A
58	PE-V0-405-554-A610	VENTILATION DUCT LAY OUT OF UAF UNIT FOR ESP/VFD BUILDING	12	A
59	PE-V0-405-554-A015	ITEM CATEGORISATION AND SUB VENDOR LIST	4	A
60	PE-V0-405-554-A101	VENTILATIN FAN SCHEDULE	22	A

**Notes**

- 1 Submission schedule (Week) is from date of LOI to Package vendor.
- 2 A-CUST - The document shall be submitted to customer for approval .
- 3 I-CUST - Shall be sent to customer for information only after completion of engineering.
- 4 This MDL is tentative and shall be finalised during detail Engineering.
- 5 The drawings/ documents submitted by vendor shall be complete in all respects with revised
- 6 All layout drawing and GA shall be submitted in the form of 3D.
- 7 documents listed here and all other documents under C&I specification shall be treated as basic
- 8 Drawing/ documents shall be submitted through wrench / DMS. Procedure for the same will be

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