


**Sub: Qualifying Requirement (QR) for Vendor Enlistment for supply of HT Motors (3.3 kV)**


A)	MEG DETAILS		
	1.0	MEG NO.	86
	2.0	MEG DESCRIPTION	HT MOTORS (3.3 kV)
	3.0	MEG RESPONSIBILITY	VDC
B)	<p><b>Technical Criteria of QR:</b></p> <ol style="list-style-type: none"> <li>1) The Applicant should be a Manufacturer of 3.3 kV or above Voltage Grade Motor as per IS/IEC 60034 &amp; supplied during last five years prior to the date of application which should have been in successful operation for a period not less than one year.</li> <li>2) The Applicant should have in house Testing facility for Routine test as per Relevant IS/IEC.</li> </ol>		
C)	<p><b>Documents required in support of meeting QR :</b></p> <ol style="list-style-type: none"> <li>1. Latest annual report OR NSIC / SSI / MSME registration certificate / BIS license / ISO certificate / Certificate of registration from the concerned excise department / any other statutory document as a proof of being manufacturer of the 3.3 kV Motors. Brief details of manufacturing facilities or Standard published catalogue for 3.3 kV motors also to be given.</li> <li>2. The PO in support of award and completion certificate/copies of invoice to establish successful execution of the supply of 3.3 kV Motors as per QR.</li> </ol>		
D)	<p><b>Documents to be submitted to find executed value of orders :</b></p> <p>In addition to the documents required in support of meeting technical requirements as stated above, following documents are required to be submitted by the Applicants applying for enlistment:-</p> <ol style="list-style-type: none"> <li>1. Three (3) POs of the highest executed values of similar work (see definition at point E:Note- 1 below) during previous five (5) years from the date of application. Copy of Invoice / Completion certificate from the concerned buyer/s in support of successful execution of supply against the POs to be submitted. These will be required for calculation of execution capability.</li> <li>2. Audited balance sheet including Profit &amp; Loss statement for the previous three (3) completed financial year's reckoned from the date of application. In case where the audited results for the last financial years as on the date of application are not available, the financial result certified by a practicing Chartered accountant shall be considered acceptable.</li> <li>3. GSTIN certificate ,PAN ,Power of attorney, Letter of undertaking ,works information etc as mentioned in enlistment application pages of website <a href="http://www.vendor.ntpc.co.in">www.vendor.ntpc.co.in</a></li> <li>4. NTPC can request for other documents as necessary during the course of evaluation.</li> </ol>		
E)	NOTE-1	Similar works means: "Supply of 3.3 KV or above voltage rating motor as per IS/IEC 60034".	
	NOTE-2	The executed value means Basic value of quantity of similar works executed/supplied against the reference PO (also applicable to partly executed POs as on date of application).Where PO value is composite(i.e. including Taxes etc.),the applicant to give item-wise break-up of Composite PO value mentioning Basic Value, Taxes etc.	


Sub: Technical Specifications for Vendor Enlistment for **supply of HT Motors (3.3 kV)**


A)	MEG DETAILS		
	1.0	MEG NO.	86
	2.0	MEG DESCRIPTION	HT MOTORS (3.3 kV)
	3.0	MEG RESPONISBILITY	VDC
B)	Technical Specifications and Quality Assurance Plan: As per attached annexure below		


CLAUSE NO.	<p style="text-align: center;"><b>TECHNICAL SPECIFICATION</b></p> 		
	<p><b>MOTORS</b></p>		
	<p><b>1.00.00 GENERAL REQUIREMENTS</b></p>		
1.01.00	<p>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.</p>		
1.02.00	<p>All equipment's shall be suitable for rated frequency of 50 Hz with a variation of +3% &amp; -5%, and 10% combined variation of voltage and frequency unless specifically brought out in the specification.</p>		
1.03.00	<p>All the equipment, material and systems shall, in general, conform to the latest edition of relevant National and international Codes &amp; Standards, especially the Indian Statutory Regulations.</p>		
1.04.00	<p>Paint shade shall be as per RAL 5012 (Blue) for indoor and outdoor equipment.</p>		
1.05.00	<p>Degree of Protection</p>		
	<p>Degree of protection for various enclosures as per IEC60034-05 shall be as follows :-</p>		
	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	<p><b>CODES AND STANDARDS</b></p>		
	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:4722, IS/IEC:60034
	5) Energy Efficient motors	:	IS 12615, IEC:60034-30
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CLAUSE NO.	<p style="text-align: center;"><b>TECHNICAL SPECIFICATION</b></p> 		
<p><b>6.00.00</b></p> <p>6.01.00</p> <p>6.01.01</p> <p>6.01.02</p> <p>6.01.03</p> <p>6.01.04</p> <p>6.02.00</p> <p>6.02.01</p> <p>6.02.02</p> <p>6.03.00</p>	<p><b>OPERATIONAL REQUIREMENTS</b></p> <p><b>Starting Time</b></p> <p>For motors with starting, time up to 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.</p> <p>For motors with starting, time more than 20 secs. and up to 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.</p> <p>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.</p> <p>Speed switches mounted on the motor shaft shall be provided in cases where above requirements are not met.</p> <p><b>Torque Requirements</b></p> <p>Accelerating torque at any speed with the lowest permissible starting voltage shall be at least 10% motor rated torque.</p> <p>Pull out torque at rated voltage shall not be less than 205% of rated torque. It shall be 275% for crane duty motors.</p> <p><b>Starting voltage requirement</b></p> <p>(a) Up to 85% of rated voltage for ratings from 201 KW to 1000 KW</p> <p>(b) Up to 80% of rated voltage for ratings from 1001 KW to 4000 KW</p> <p>(c) Up to 75 % of rated voltage for ratings above 4000KW</p>	<p><b>7.00.00</b></p> <p>7.01.00</p> <p>7.02.00</p>	<p><b>DESIGN AND CONSTRUCTIONAL FEATURES</b></p> <p>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 &amp; RTDs shall be provided. However, for flameproof motors, space heater terminals inside the main terminal box may be acceptable.</p> <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). 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</p>
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7.03.00	<p>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</p> <p>(a) Fuel oil area : Group – IIB</p> <p>(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)</p> <p>Winding and Insulation</p> <p>(a) Type : Non-hygroscopic, oil resistant, flame resistant</p> <p>(b) Starting duty : Two hot starts in succession, with motor initially at normal running temperature.</p> <p style="text-align: center;">THERMAL CLASS 155 (F) INSULATION.</p> <p>The winding insulation process shall be total Vacuum Pressure Impregnated i.e resin poor method. The lightning Impulse &amp; interturn insulation surge withstand level shall be as per IEC-60034 part 15.</p>				
7.04.00	Motors rated above 1000KW shall have insulated bearings/housing 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 85 dB (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 and minimum 2 numbers duplex platinum resistance type temperature detectors.				
7.08.00	Motor body shall have two earthing points on opposite sides.				
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7.09.00	<p>3.3 KV motors shall be offered with dust tight phase separated double walled (metallic as well as insulated barrier) Terminal box. Contractor shall provide termination kit 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 (nonmagnetic material for single core cables) shall be provided.</p>		
7.10.00	<p>The spacing between gland plate &amp; centre of bottom terminal stud shall be as per 10.02.</p>		
7.11.00	<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>		
7.12.00	<p>The motors shall be suitable for bus transfer schemes provided on the 11kV, 6.6 KV, 3.3 kV /415V systems without any injurious effect on its life.</p>		
7.13.00	<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>		
8.00.00	<p>The ratio of locked rotor KVA at rated voltage to rated KW shall not exceed the following (without any further tolerance):</p> <p>(a) Above 200 KW &amp; upto 1000KW : 10.0</p> <p>(b) From 1001KW &amp; upto 4000KW : 9.0</p> <p>(c) Above 4000KW : 6 to 6.5</p>		
	<p><b>TYPE TEST</b></p>		
10.00.00	<p><b>HT MOTORS</b></p>		
10.01.00			
10.01.01	<p>The Contactor shall carry out the type tests as listed in this specification on the equipment to be supplied. 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>		
10.01.02	<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 Contactor. The Contactor shall obtain the Employer's approval for the type test procedure before conducting</p>		
	<p><b>TECHNICAL SPECIFICATION</b></p>	<p><b>MOTORS</b></p>	<p><b>PAGE 5 OF 7</b></p>

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<p>10.01.03</p> <p>10.01.04</p> <p>10.01.05</p>	<p>the type test. The type test procedure shall clearly specify the test set-up, instruments to be used, procedure, 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 Contactor 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 Contactor.</p> <p>Further the Contactor 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 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 Contactor 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 Contactor 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> <ul style="list-style-type: none"> <li>(a) No load saturation and loss curves upto approximately 115% of rated voltage</li> <li>(b) Measurement of noise at no load.</li> <li>(c) Momentary excess torque test (subject to test bed constraint).</li> <li>(d) Full load test(subject to test bed constraint)</li> <li>(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.</li> </ul>		
	<p><b>TECHNICAL SPECIFICATION</b></p>	<p><b>MOTORS</b></p>	<p><b>PAGE 6 OF 7</b></p>



CLAUSE NO.	<b>TECHNICAL SPECIFICATION</b> 		
<p>10.01.06</p>	<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 inter-turn insulation shall be as per clause no. 4.2 of IEC 60034, part-15</li> </ul> <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>10.02</p>	<p>For HT motors the distance between gland plate and the terminal studs shall not be less than 500 mm.</p>		
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**QUALITY ASSURANCE**

**MOTOR**

TESTS/CHECKS	Visual	Dimensional	Make/Type/Rating/General Physical Inspection	Mech/Chem. Properties	NDT /DP/MP/UT	Metallography	Electrical Characteristics	Welding/Brazing(WPS/PQR)	Heat Treatment	Magnetic Characteristics	Hydraulic/Leak/Pressure Test	Thermal Characteristi	Run out	Dynamic Balancin	Routine & acceptance tests as per IS 60034 / IEC 60034 / IS 12615 /IS 2148/ IEC 60079-1 / IS 9283 / IS 4722	vibration	Over speed	Tan delta, shaft voltage & polarization index test	Paint sha e, thickness & adhesion
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			Y		Y							
Rotor Copper/Aluminium	Y	Y	Y	Y			Y		Y										
Stator copper	Y	Y	Y	Y			Y		Y			Y							
SC Ring	Y	Y	Y	Y	Y		Y	Y	Y										
Insulating Material	Y		Y	Y			Y					Y							
Tubes, for Cooler	Y	Y	Y	Y	Y				Y		Y								
Sleeve Bearing	Y	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						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												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 tender enquiry. 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.
4. Y1 = for HT Motor I Machines only.