






CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
30.00.00	<p>NOISE LEVEL</p> <p>The equivalent 'A' weighted sound pressure level measured at a height of 1.5 m above floor level in elevation and at a distance of one (1) meter horizontally from the nearest surface of any equipment/machine, furnished and installed under these specifications, expressed in decibels to a reference of 0.0002 microbar, shall not exceed 85 dBA except for</p> <ul style="list-style-type: none"> i) Safety valves and associated vent pipes for which it shall not exceed 105 dBA-115 dBA. ii) Regulating drain valves in which case it shall be limited to 90 dBA-115 dBA. iii) Mill noise which will be limited to 85-90 dBA. iv) TG unit in which case it shall not exceed 90 dBA. v) For HP-LP bypass valves and other intermittently operating control valves, the noise level shall be within the limit of 90 dBA. vi) For BFP Motor Noise level shall be within the limit of 90 dBA. 			
31.00.00	<p>PACKAGING, TRANSPORTATION AND STORAGE</p> <p>All the equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. While packing all the materials, the limitation from the point of view of the sizes of railway wagons available in India should be taken account of. The Contractor shall be responsible for any loss or damage during transportation, handling and storage at site due to improper packing and preservation. The Contractor shall ascertain the availability of Railway wagon sizes from the Indian Railways or any other agency concerned in India well before effecting despatch of equipment. Before despatch it shall be ensured that complete processing and manufacturing of the components is carried out at shop, only restricted by transport limitation, in order to ensure that site works like grinding, welding, cutting & preassembly to bare minimum. The Employer's Inspector shall have right to insist for completion of works in shops before despatch of materials for transportation.</p> <p>In addition to above, the contractor shall take all necessary measures for storage of all electronic equipment / systems at site in a dust free Air conditioned space ensuring proper temperature & humidity.</p>			
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p>GENERAL TECHNICAL REQUIREMENTS</p>	<p>PAGE 53 OF 114</p>	

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS																					
32.00.00	ELECTRICAL EQUIPMENTS/ENCLOSURES																					
32.01.00	All electrical equipments and devices, including insulation, heating and ventilation devices shall be designed for ambient temperature and a maximum relative humidity as specified elsewhere in the specifications.																					
33.00.00	INSTRUMENTATION AND CONTROL																					
	All instrumentation and control systems/ equipment/ devices/ components, furnished under this contract shall be in accordance with the requirements stated herein, unless otherwise specified in the detailed specifications.																					
33.01.00	All instrument scales and charts shall be calibrated and printed in metric units and shall have linear graduation. The ranges shall be selected to have the normal reading at 75% of full scale.																					
	<p>All scales and charts shall be calibrated and printed in Metric Units as follows:</p> <table border="0" data-bbox="375 840 1429 1638"> <tr> <td data-bbox="375 840 795 882">1. Temperature</td> <td data-bbox="799 840 1429 882">- Degree centigrade (deg C)</td> </tr> <tr> <td data-bbox="375 886 795 1113">2. Pressure</td> <td data-bbox="799 886 1429 1113">- Kilograms per square centimetre (Kg/cm²). Pressure instrument shall have the unit suffixed with 'a' to indicate absolute pressure. If nothing is there, that will mean that the indicated pressure is gauge pressure.</td> </tr> <tr> <td data-bbox="375 1117 795 1176">3. Draught</td> <td data-bbox="799 1117 1429 1176">- Millimetres of water column (mm wc).</td> </tr> <tr> <td data-bbox="375 1180 795 1281">4. Vacuum</td> <td data-bbox="799 1180 1429 1281">- Millimeters of mercury gauge (mm Hg) or water column (mm Wcl).</td> </tr> <tr> <td data-bbox="375 1285 795 1344">5. Flow (Gas)</td> <td data-bbox="799 1285 1429 1344">- Tonnes/ hour</td> </tr> <tr> <td data-bbox="375 1348 795 1407">6. Flow (Steam)</td> <td data-bbox="799 1348 1429 1407">- Tonnes/ hour</td> </tr> <tr> <td data-bbox="375 1411 795 1470">7. Flow (Liquid)</td> <td data-bbox="799 1411 1429 1470">- Tonnes / hour</td> </tr> <tr> <td data-bbox="375 1474 795 1533">8. Flow base</td> <td data-bbox="799 1474 1429 1533">- 760 mm Hg. 15 deg.C</td> </tr> <tr> <td data-bbox="375 1537 795 1596">9. Density</td> <td data-bbox="799 1537 1429 1596">- Grams per cubic centimetre.</td> </tr> </table>				1. Temperature	- Degree centigrade (deg C)	2. Pressure	- Kilograms per square centimetre (Kg/cm ²). Pressure instrument shall have the unit suffixed with 'a' to indicate absolute pressure. If nothing is there, that will mean that the indicated pressure is gauge pressure.	3. Draught	- Millimetres of water column (mm wc).	4. Vacuum	- Millimeters of mercury gauge (mm Hg) or water column (mm Wcl).	5. Flow (Gas)	- Tonnes/ hour	6. Flow (Steam)	- Tonnes/ hour	7. Flow (Liquid)	- Tonnes / hour	8. Flow base	- 760 mm Hg. 15 deg.C	9. Density	- Grams per cubic centimetre.
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33.02.00	All instruments and control devices provided on panels shall be of miniaturized design, suitable for modular flush mounting on panels with front draw out facility and flexible plan-in connection at rear.																					
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 54 OF 114																			

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
34.00.00	<p>ELECTRICAL NOISE CONTROL</p> <p>The equipment furnished by the Contractor shall incorporate necessary techniques to eliminate measurement and control problems caused by electrical noise. Areas in Contractor's equipment which are vulnerable to electrical noise shall be hardened to eliminate possible problems. Any additional equipment, services required for effectively eliminating the noise problems shall be included in the proposal. The equipment shall be protected against ESD as per IEC-61000-2. Radio Frequency interference (RFI) and Electro Magnetic Interference (EMI) protection against hardware damage and control system mal-operations/errors shall be provided for all systems as per EN-50082-2 (1995).</p>			
35.00.00	<p>SURGE PROTECTION FOR SOLID STATE EQUIPMENT</p> <p>All solid state systems /equipment shall be able to withstand the electrical noise and surge as encountered in actual service conditions and inherent in a power plant and shall meet the requirements of surge protection as defined in ANSI C37.90.1-1989 on its suitable equivalent class of IEC 254-4. Details of the features incorporated and relevant tests carried out. The test certificates. etc. shall be submitted by the Bidder.</p>			
36.00.00	<p>INSTRUMENT AIR SYSTEM</p> <p>The instrument air supply system as supplied by the Bidder for various pneumatic control & instrumentation devices like pneumatic actuators, power cylinders, E/P converters, piping / tubing etc.</p> <p>Each pneumatic instrument shall have an individual air shut - off valve. The pressure regulating valve shall be equipped with an internal filter, a 50 mm pressure gauge and a built-in filter housing blow down valve.</p>			
37.00.00	<p>TAPPING POINTS FOR MEASUREMENTS</p> <p>Tapping points shall include probes, wherever applicable, for analytical measurements and sampling.</p> <p>For direct temperature measurement of all working media, one stub with internal threading of approved pattern shall be provided along with suitable plug and washer. The Contractor will be intimated about thread standard to be adopted.</p> <p>The following shall be provided on equipment by the Bidder. The standard which is to be adopted, will be intimated to the Contractor.</p> <ul style="list-style-type: none"> i) Temperature test pockets with stub and thermowell ii) Pressure test pockets 			
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>		<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p>GENERAL TECHNICAL REQUIREMENTS</p>	<p>PAGE 55 OF 114</p>

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
38.00.00	<p>SYSTEM DOCUMENTATION</p> <p>The Bidder shall provide drawings, system overview & description, hardware/software details, technical literature, functional & hardware schemes, bill of material, parts list, interconnection diagrams, data sheets, erection/ installation/ commissioning procedures, instruction/ operating manuals, etc. for each of the C& I system / sub-systems/ equipment supplied under this package. The documentation shall include complete details of the C&I systems/ sub-systems/ equipment to enable review by Employer during detailed engineering stage and to provide information to plant personnel for operation & Maintenance (including quick diagnostics & trouble shooting) of these C&I systems/ sub-systems/ equipment at site. The minimum documentation requirements for C&I systems shall be as stipulated under C&I "Technical Data Sheets" Part of specifications. In addition to this, system documentation for DDCMIS shall include as a minimum to that specified elsewhere in the Technical Specification.</p> <p>The exact format, submission schedule and contents of various documents shall be as finalised during detailed engineering stage.</p>			
38.01.00	<p>Bill of material (instrument list) for all C&I equipment/ devices shall be furnished by the bidder in standard formats as approved by the Employer.</p>			
39.00.00	<p>MAINTENANCE MANUALS OF ELECTRONIC MODULES</p> <p>The Contractor shall have to furnish two (2) sets of all maintenance manual of each and every electronic card/module as employed on the various systems and equipment including peripherals etc., offered by him. The Contractor will also have to furnish the data regarding the expected failure rate of various modules and other system components. Further, the contractor shall furnish a set of operating manuals which should include block diagrams, make, model/type, details wiring and external connection drawings etc. as required to do the testing and maintenance of the electronic modules.</p> <p>Backup & Restoration Procedures of DDCMIS, Station LAN & Advance Process Control shall be provided.</p>			
40.00.00	<p>MAKE IN INDIA REQUIREMENTS</p> <p>a) The bidder shall follow Indian laws, regulations and standards. There shall not be any restriction in terms of compliance to codes & standards of foreign origin only. The compliance to equivalent/better Indian as well as other codes & standards, wherever available, shall also be acceptable.</p> <p>b) The technologies/ products offered shall be environmentally friendly, consuming less energy, and safe, energy efficient, durable and long lasting under the prescribed operational conditions.</p>			
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p>GENERAL TECHNICAL REQUIREMENTS</p>	<p>PAGE 56 OF 114</p>	

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
<p>c)</p> <p>d)</p> <p>e)</p> <p>f)</p> <p>g)</p> <p>h)</p> <p>i)</p> <p>j)</p>	<p>The bidder/its sub vendor/supplier shall ensure supply of spares, materials and technological support for the entire life of the project.</p> <p>The bidder shall list out the products and components producing Toxic E-waste and other waste as specified. It shall have an Extended Producers Responsibility (EPR) so that after the completion of the lifecycle, the materials are safely recycled/ disposed of by the contractor and for this, the bidder has to establish recycling/disposal unit as specified.</p> <p>The equipment/ material sourced from foreign companies will be tested in accredited labs in India before acceptance wherever such facilities are available. The testing shall be carried out in accordance with MOP extant order/guidelines.</p> <p>The bidder shall have to furnish a certificate regarding cyber security/safety of the equipment/process to be supplied/services to be rendered as safe to connect.</p> <p>All applicable safety requirements shall be met. Regular safety audit shall be carried out by the manufacturer/ supplier.</p> <p>Wherever required, the foreign supplier shall establish fully functional service centers in India and shall keep spares/material locally for future needs of Employer.</p> <p>To protect the security, integrity and reliability of equipment in this package, it is essential to remove vulnerabilities arising out of the possibility of cyber-attack through malware/ Trojans etc. embedded in imported equipments. This requirement shall apply to any item imported for end use or to be used as a component, or as a part in manufacturing, assembling of any equipment or to be used in this package. Contractor shall comply all the requirements of Order No 25-11/6/2018-PG, dated 02/07/2020 (attached as Appendix-I), issued by Ministry of Power, Government of India and its subsequent amendments/revisions. Contractor shall furnish declaration of compliance of MOP order dated 02/07/2020 requirements with dispatch of equipment/ item. Further, Contractor shall furnish back up testing certificates, whenever Employer asks the same.</p> <p>All equipment/materials/parts/items required in this package which are domestically manufactured with sufficient domestic capacity as identified in Annexure-I of MOP order dated 16/11/2021 including its subsequent revisions (copy attached as Appendix-II) shall necessarily be sourced from the class-I local suppliers only as per the extant provisions of the Public Procurement (Preference to Make in India) Orders issued by DPIIT and MoP.</p> <p>Any violation w.r.t Make in India and minimum local content (MLC) requirements as specified shall be sole responsibility of the Bidder.</p>			
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p>GENERAL TECHNICAL REQUIREMENTS</p>	<p>PAGE 57 OF 114</p>	

Appendix-I

No.25-11/6/2018-PG
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg, New Delhi – 110001
Tele Fax: 011-23730264

Dated 02/07/2020

ORDER

Power Supply System is a sensitive and critical infrastructure that supports not only our **national defence, vital emergency services** including health, disaster response, **critical national infrastructure** including classified data & communication services, defence installations and manufacturing establishments, logistics services but also the **entire economy** and the **day-to-day life** of the citizens of the country. Any danger or threat to Power Supply System can have catastrophic effects and has the potential to cripple the entire country. Therefore, the Power Sector is a **strategic and critical sector**.

The vulnerabilities in the Power Supply System & Network mainly arise out of the possibilities of cyber attacks through malware / Trojans etc. embedded in imported equipment. Hence, to **protect the security, integrity and reliability of the strategically important and critical Power Supply System & Network** in the country, the following directions are hereby issued -

(1) All equipment, components, and parts imported for use in the Power Supply System and Network shall be tested in the country to check for any kind of embedded malware/trojans/cyber threat and for adherence to Indian Standards.

(2) All such testings shall be done in certified laboratories that will be designated by the Ministry of Power (MoP).

(3) Any import of equipment/components/parts from "prior reference" countries as specified or by persons owned by, controlled by, or subject to the jurisdiction or the directions of these "prior reference" countries will require prior permission of the Government of India.

(4) Where the equipment/components/parts are imported from "prior reference" countries, with special permission, the protocol for testing in certified and designated laboratories shall be approved by the Ministry of Power (MoP).

This order shall apply to any item imported for end use or to be used as a component, or as a part in manufacturing, assembling of any equipment or to be used in power supply system or any activity directly or indirectly related to power supply system.

This issues with the approval of Hon'ble Minister of State for Power and New & Renewable Energy (Independent Charge).


(Goutam Ghosh)
Director
Tel: 011-23718674

To:

1. All Ministries/Departments of Government of India (As per list)
2. Secretary (Coordination), Cabinet Secretariat
3. Vice Chairman, NITI Aayog
4. Comptroller and Auditor General of India
5. Chairperson, CEA
6. CMDs of CPSEs/Chairman of DVC & BBMB/MD, EESL/DG, NPTI/DG, CPR/DG, BEE/
7. All ASs/JSs/EA, MoP

Copy

1. PS to Hon'ble PM, Prime Minister's Office
2. PS to Hon'ble MOS(IC) for Power and NRE
3. Sr. PPS to Secretary(Power)

Appendix-II

No. A-1/2021-FSC-Part(5)
Government of India
Ministry of Power

Shram Shakti Bhawan, New Delhi
Dated: 16th November, 2021

ORDER

Subject: Public Procurement (Preference to Make in India) to provide for Purchase Preference (linked with local content) in respect of Power Sector.

Reference: Department for Promotion of Industry and Internal Trade (DPIIT) Notification No. P-45021/2/2017-PP (BE-II) dated 16.09.2020.

The Government of India, Department for Promotion of Industry and Internal Trade (DPIIT) issued Public Procurement (Preference to Make in India), Order 2017, for encouraging 'Make in India' and promoting manufacturing and production of goods and services in India with a view to enhancing income and employment. Subsequently, DPIIT vide order No. P-45021/2/2017-PP (BE-II) dated 4th June, 2020 and further vide order dated 16th September, 2020 have issued the revised Public Procurement (Preference to Make in India) Order 2017.

2. In light of the Public Procurement (Preference to Make in India) Order 2017, this Ministry had notified purchase preference (linked with local content) for Hydro and Transmission sectors vide Order No. 11/05/2018-Coord dated 20.12.2018, for Thermal sector vide Order dated 28.12.2018 and for Distribution sector vide Order dated 17.03.2020. Further, a combined order dated 04.04.2020 was also issued in supersession of all previous orders to indicate equipment/material/components for which there was sufficient local capacity and competition and also to indicate conditions for including suitably in the tenders to be issued by the procurers. In furtherance of Para 19 of the DPIIT Notification No. P-45021/2/2017-PP(BE-II) dated 04.06.2020, Ministry of Power (MoP) issued a revised comprehensive Order dated 28.07.2020 (Annexure-I amended by order dated 17.09.2020).

3. DPIIT Notification No. P-45021/2/2017-PP(BE-II) dated 16.09.2020 has further revised its order dated 04.06.2020. Therefore, in supersession of all the aforementioned orders including order No.10/1/2019-St.Th. (Part-II) dated 20.03.2020 issued by this Ministry, the following has been decided:

- i. For the purpose of this order, the definitions of various terms used in the order, and provisions relating to (i) Eligibility of 'Class-I local supplier'/'Class-II local supplier'/'Non-local suppliers' for different types of procurement, (ii) purchase preference (iii) exemption to small purchases and (iv) margin of purchase preference shall be the same as in DPIIT order dated 16.09.2020, referred to above and extracts of the same is given at **Appendix**.
- ii. In procurement of all goods and services or works in respect of which there is sufficient local capacity and local competition as in **Annexure-I**, only "Class-I local supplier" shall be eligible to bid irrespective of purchase value. "Class-I local supplier" is a supplier or service provider whose goods, services or works offered for procurement meets the Minimum Local Content (MLC) as prescribed in Annexure-I of this order. "Class-II local supplier" means a



supplier, as defined by DPIIT in its Order No. P-45021/2/2017-PP (BE-II) dated 16-09-2020.

iii. In the procurement of all goods and services or works other than those listed in Annexure-I, only "Class-I local supplier" and "Class-II local supplier" as defined in the order of this Ministry herewith shall be eligible to bid in procurement undertaken by procuring entities, except when Global Tender Enquiry has been issued. In Global tender enquiries, "Non-local suppliers" shall also be eligible to bid along with "Class-I local suppliers" and "Class-II local suppliers". In procurement of all goods, services or works not covered by sub-para 3(ii) above, and with estimated value of purchases less than Rs. 200 crores, in accordance with Rule 161(iv) of GFR, 2017, Global Tender Enquiry(GTE) shall not be issued except with the approval of the competent authority as designated by Department of Expenditure.

iv. For the purpose of this order, 'Works' means all works as per Rule 130 of GFR- 2017, and will also include 'turnkey works', Engineering, Procurement and Construction (EPC) contracts and service contracts including System Integrator (SI) contracts.

4. The list of items, in respect of which, local capacity with sufficient competition exists as per Annexure-I, will be reviewed at regular intervals with a view to increase number of items in this list and also to increase the MLC for each item, wherever it is less than 100%.

5. Purchase preference shall be given to local suppliers in accordance with para 3A of DPIIT Order dated 16.09.2020, and extracts of the same are given at Appendix.

6. Further, it has been decided to constitute a committee for independent verification of self-declarations and auditor's / accountant's certificates on random basis and in the case of complaints. The composition of the committee is given below:

Member (Planning), Central Electricity Authority (CEA)	Chairperson
Chief Engineer (PSETD), CEA	Member
Chief Engineer (HETD), CEA	Member
Chief Engineer (TETD), CEA	Member
Chief Engineer (DP&R), CEA	Member
As may be co-opted by CEA	External Expert
Chief Engineer (R&D), CEA	Convener

7. Further, it has also been decided to constitute a committee to examine the grievances in consultation with stakeholders and recommend appropriate actions to the Competent Authority in MoP. The composition of the Committee is given below:

Chairperson, CEA	Chairperson
Member (Hydro), CEA	Member



Member (Power System), CEA	Member
Member (Thermal), CEA	Convener

8. The complaint fee of Rs. 2 Lakhs or 1% of the value of the local item being procured (subject to maximum of Rs. 5 Lakhs), whichever is higher, shall be paid in the form of Demand Draft, drawn in favour of **PAO, CEA, New Delhi**. In case the complaint is found to be incorrect, the complaint fee shall be forfeited. In case, the complaint is upheld and found to be substantially correct, the deposited fee of the complainant would be refunded without any interest.

9. All other conditions, not stipulated in this order, shall be as laid down in the DPIIT's order No. P-45021/2/2017-PP (BE-II) dated 16.09.2020.

10. This order shall be applicable in respect of the procurement made by all attached or subordinate offices or autonomous bodies under the Government of India including Government Companies as defined in the Companies Act, and /or the States and Local Bodies making procurement under all Central Schemes/ Central Sector Schemes where the Scheme is fully or partially funded by the Government of India. The aforesaid orders shall also be applicable in respect of projects wherein funding of goods, services or works is by Power Finance Corporation (PFC) /Rural Electrification Corporation (REC) and any Financial Institution in which Government of India/ State Government share exists. This order shall be applicable to Tariff Based Competitive Bidding (TBCB) projects also. Procuring entities as defined in the DPIIT's Order dated 16.09.2020 are advised to revise their tender documents to fully comply with the said DPIIT's Order and the subsequent Orders that would be issued in this regard by DPIIT/ this Ministry from time to time.

11. All tenders for procurement by Central Government Agencies or the States and Local Bodies, as the case may be, have to be certified for compliance of the Public Procurement (Preference to Make in India) 'PPP-MII' Order by the concerned procurement officer of the Government Organization before uploading the same on the portal.

12. Exemption from meeting the stipulated local content is allowed as per clause 13 and 13A of PPP-MII Order dated 16.09.2020, if the manufacturer declares that the item is manufactured in India under a License from a foreign Manufacturer who holds Intellectual Property Rights (IPRs) and there is Transfer of Technology (ToT) with phasing to increase Minimum Local Content. For such items, if any CPSE under the administration of Ministry of Power requests exemption for any item, it shall be considered by Ministry of Power, on case to case basis.

13. In order to further encourage Make in India initiatives and promote manufacturing and production of goods and services in India, general guidelines as enclosed at **Annexure-II** may be adopted in an appropriate manner according to the circumstances by the procuring entities in their tendering process.

14. The procurers may specify the higher values of MLC than those specified in this Order in respect of goods, services or works covered in their tenders and award the weightage to the product of higher MLC for which they have to specify the criteria beforehand in their tender. The values given in Annexure-I are the minimum prescribed values for becoming a class-I local supplier for the products indicated therein.



CLAUSE NO.

GENERAL TECHNICAL REQUIREMENTS



15. This issues with the approval of Hon'ble Minister for Power and New & Renewable Energy.

(S. Majumdar)

Under Secretary to the Government of India
Tele No. 011- 23356938

To:

1. Secretary to Government of India (All Ministries/ Departments of Government of India) (As per list)
2. Secretary (Coordination), Cabinet Secretariat
3. CEO, NITI Aayog
4. Chief Secretaries of all States/ UTs
5. Comptroller and Auditor General of India
6. Secretary, DPIIT, Chairman of Standing Committee for implementation of Public Procurement Order, 2017
7. Director General, Bureau of Indian Standards (BIS)
8. Joint Secretary, DPIIT, Member-Convener of Standing Committee for implementation of Public Procurement Order, 2017
9. Chairperson, CEA
10. CMDs of CPSEs, CMD NLC, Chairman of DVC/ BBMB/ EESL, DGs of BEE/ CPRI/ NPTI
11. All Additional Secretaries/ JSs/ EA/ CE, Ministry of Power

Copy to:

Director (Technical), NIC with a request to publish the Order on the website of Ministry of Power

TALCHER THERMAL POWER PROJECT
STAGE-III (2X660 MW)
EPC PACKAGE

TECHNICAL SPECIFICATIONS
SECTION VI, PART-C
BID DOC. NO.:CS-4540-001A-2

GENERAL TECHNICAL
REQUIREMENTS

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APPENDIX

Extracts of important provisions contained in DPIIT Order No. P-45021/2/2017-PP (BE-II) dated 16-09-2020

1. Definitions (Para 2 of DPIIT order):

'Local content' means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

'Class-I local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-I local supplier' under this Order.

'Class-II local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-II local supplier' but less than that prescribed for "Class-I Local supplier" under this Order.

'Non-Local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, has local content less than that prescribed for 'Class-II local supplier' under this Order.

'L1' means the lowest tender or lowest bid or the lowest quotation received in a tender, bidding process or other procurement solicitation as adjudged in the evaluation process as per the tender or other procurement solicitation.

'Margin of purchase preference' means the maximum extent to which the price quoted by a 'Class-I local supplier' may be above the L1 for the purpose of purchase preference.

'Nodal Ministry' means the Ministry or Department identified pursuant to this order in respect of a particular item of goods or services or works.

'Procuring entity' means a Ministry or department or attached or subordinate office of, or autonomous body controlled by, the Government of India and includes Government companies as defined in the Companies Act.

'Works' means all works as per Rule 130 of GFR- 2017, and will also include 'turnkey works'.

2. Eligibility of 'Class-I local supplier'/ 'Class-II local supplier'/ 'Non-local suppliers' for different types of procurement (Para 3 of DPIIT order)

(a) In procurement of all goods, services or works in respect of which the Nodal Ministry / Department has communicated that there is sufficient local capacity and local competition, only 'Class-I local supplier', as defined under the Order, shall be eligible to bid irrespective of purchase value.

(b) Only 'Class-I local supplier' and 'Class-II local supplier', as defined under the Order, shall be eligible to bid in procurements undertaken by procuring entities, except when Global tender enquiry has been issued. In global tender enquiries, 'Non-local suppliers' shall also be eligible to bid along with 'Class-I local suppliers' and 'Class-II local suppliers'. In procurement of all goods, services or works, not covered by 3(a) above, and with estimated value of purchases less than Rs 200 crores, in accordance with Rule 161(iv) of GFR, 2017 Global tender enquiry shall not



be issued except with the approval of competent authority as designated by Department of Expenditure.

(c) For the purpose of this Order, works includes Engineering, Procurement and Construction (EPC) contracts and services include System Integrator (SI) contracts.

3. Purchase Preference (Para 3A of DPIIT order)

(a) Subject to the provisions of this Order and to any specific instructions issued by the Nodal Ministry or in pursuance of this Order, purchase preference shall be given to 'Class-I local supplier' in procurements undertaken by procuring entities in the manner specified here under.

(b) In the procurements of goods or works, which are covered by para 3(b) of DPIIT Order No. P-45021/2/2017-PP(BE-II) dated 16-09-2021 and which are divisible in nature, the " Class-I local supplier" shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

- i. Among all qualified bids, the lowest bid will be termed as L1 If L1 is 'Class-I local supplier', the contract for full quantity will be awarded to L1.
- ii. If L1 bid is not a 'Class-I local supplier', 50% of the order quantity shall be awarded to L1. Thereafter, the lowest bidder among the 'Class-I local supplier' will be invited to match the L1 price for the remaining 50% quantity subject to the Class-I local supplier's quoted price falling within the margin of purchase preference, and contract for that quantity shall be awarded to such 'Class-I local supplier' subject to matching the L1 price. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price or accepts less than the offered quantity, the next higher 'Class-I local supplier' within the margin of purchase preference shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In case some quantity is still left uncovered on Class-I local suppliers, then such balance quantity may also be ordered on the L1 bidder.

(c) In the procurements of goods or works, which are covered by para 3(b) of DPIIT Order No. P-45021/2/2017-PP(BE-II) dated 16-09-2021 and which are not divisible in nature, and in procurement of services where the bid is evaluated on price alone, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

- iii. Among all qualified bids, the lowest bid will be termed as L1. If L1 is 'Class-I local supplier', the contract will be awarded to L1,
- iv. If L1 is not 'Class-I local supplier', the lowest bidder among the 'Class-I local supplier', will be invited to match the L1 price subject to Class-I local supplier's quoted price falling within the margin of purchase preference, and the contract shall be awarded to such 'Class-I local supplier' subject to matching the L1 price.
- v. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price, the 'Class-I local supplier' with the next higher bid within the margin of purchase preference shall be invited to match the L1 price and so on and contract shall be awarded accordingly. In case none of the 'Class-I local supplier' within the margin of purchase preference matches the L1 price, the contract may be awarded to the L1 bidder.

(d) "Class-II local supplier" will not get purchase preference in any procurement, undertaken by procuring entities.



4. Applicability in tenders where contract is to be awarded to multiple bidders (Para 3B of DPIIT order)-

In tenders where contract is to be awarded to multiple bidders subject to matching of L1 rates or otherwise, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

a) In case there is sufficient local capacity and competition for the items to be procured, as notified by the Nodal Ministry, only 'Class-I local supplier' shall be eligible to bid. As such, the multiple supplier who would be awarded the contract, should be all and only 'Class-I local suppliers'.

b) In other cases, 'Class-II local suppliers' and 'Non-Local suppliers' may also participate in the bidding process along with 'Class-I local supplier' as per provisions of this order.

c) If 'Class-I local supplier' qualify for award of contract for at least 50% of the tendered quantity in any tender, the contract may be awarded to all the qualified bidders as per award criteria stipulated in the bid documents. However, in case 'Class-I local supplier' do not qualify for award of the contract for at least 50% of the tendered quantity, purchase preference should be given to the 'Class-I local supplier' over 'Class-II local supplier'/'Non-local suppliers' provided that their quoted rate falls within 20% margin of purchase preference of the highest quoted bidder considered for award of contract so as to ensure that the 'Class-I local suppliers' taken in totality or considered for award of contract for at least 50% of the tendered quantity.

d) First purchase preference has to be given to the lowest quoting 'Class-I local supplier', whose quoted rates fall within 20% margin of purchase preference subject to its meeting the prescribed criteria for award of contract as also the constraints of maximum quantity that can be sourced from any single supplier. If the lowest quoting 'Class-I local supplier', does not qualify for purchase preference because of aforesaid constraints or does not accept the offered quantity, an opportunity may be given to next higher 'Class-I local supplier' falling within 20% margin of purchase preference, and so on.

e) To avoid any ambiguity during bid evaluation process, the procuring entities may stipulate its own tender specific criteria for award of contract amongst different bidders including the procedure for purchase preference to 'Class-I local supplier' within the broad policy guidelines stipulate in sub-paras above.

5. Exemption of small purchases (Para 4 in DPIIT order): Procurements where the estimated value to be procured is less than Rs. 5 lakhs shall be exempt from this Order. However, it shall be ensured by procuring entities that procurement is not split for the purpose of avoiding the provisions of this Order.

6. Minimum Local Content (Para 5 in DPIIT order): The 'local content' requirement to categorize a supplier as 'Class-I local supplier' is minimum 50%. For 'Class-II local supplier', the local content requirement is minimum 20%. Nodal Ministry/Department may prescribe only a higher percentage of minimum local content requirement to categorize a supplier as 'Class-I local supplier'/'Class-II local supplier'. For the item for which Nodal Ministry/Department has not prescribed higher minimum local content notification under the order, it shall be 50% and 20% for 'Class-I local supplier'/'Class-II local supplier' respectively.



7. Vide DPIIT OM No. P-45021/102/2019-BE-IIPart(1) (E-50310) dated 4.03.2021 services such as transportation, insurance, installation, commissioning, training and after sales service support like AMC/CMC etc. shall not be considered as local value addition. Bidders offering imported products will fall under the category of Non- local suppliers. They can't claim themselves as Class-I local suppliers/Class-II local suppliers by claiming the services such as transportation, insurance, installation, commissioning, training and after sales service support like AMC/CMC etc. as local value addition.
8. **Margin of Purchase Preference (Para 6 of DPIIT order):** The margin of purchase preference shall be 20%.
9. **Specifications in Tenders and other procurement solicitations (Para 10 of DPIIT order):**
- a. Every procuring entity shall ensure that the eligibility conditions in respect of previous experience fixed in any tender or solicitation do not require proof of supply in other countries or proof of exports.
 - b. Procuring entities shall endeavour to see that eligibility conditions, including on matters like turnover, production capability and financial strength do not result in unreasonable exclusion of 'Class-I local supplier/' 'Class-II local supplier' who would otherwise be eligible, beyond what is essential for ensuring quality or creditworthiness of the supplier.
 - c. Procuring entities shall, within 2 months of the issue of this Order review all existing eligibility norms and conditions with reference to sub-paragraphs 'a' and 'b' above.
 - d. **Reciprocity Clause:**
 - i. When a Nodal Ministry/Department identifies that Indian suppliers of an item are not allowed to participate and/ or compete in procurement by any foreign government, due to restrictive tender conditions which have direct or indirect effect of barring Indian companies such as registration in the procuring country, execution of projects of specific value in the procuring country etc. it shall provide such details to all its procuring entities including CMDs/CEOs of PSEs/PSUs, State Governments and other procurement agencies under their administrative control and GeM for appropriate reciprocal action.
 - ii. Entities of countries which have been identified by the nodal Ministry/Department as not allowing Indian companies to participate in their Government procurement for any item related to that nodal Ministry shall not be allowed to participate in Government procurement in India for all the items related to that nodal Ministry/Department, except for the list of items published by the Ministry/Department permitting their participation.
 - iii. The stipulation in (ii) above shall be part of all tenders invited by the Central Government procuring entities stated in (i) above. All purchase on GeM shall also necessarily have the above provisions for items identified by nodal Ministry/Department.
 - iv. State Governments should be encouraged to incorporate similar provisions in their respective tenders.
 - v. The term 'entity' of a country shall have the same meaning as under the FDI Policy of DPIIT as amended from time to time.
 - e. Specifying foreign certification/ unreasonable technical specifications/ brands/ models in the bid document is restrictive and discriminatory practice against local

Annexure-I

Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficient local capacity and competition	Class-I Local Supplier (Minimum Local Content (%))
(A) Common items for Transmission, Distribution and Generation Sector		
1	Power Transformers (up to 765 kV, including Generator transformers)	60
2	Instrument Transformer (up to 765 kV)	60
3	Transformer Oil Dry Out System (TODOS)	60
4	Reactors up to 765 kV	60
5	Oil Impregnated Bushing (up to 400 kV)	60
6	Resin Insulated Paper (RIP) bushings (up to 145 kV)	50
7	Circuit Breakers (up to 765 kV AC - Alternating Current)	60
8	Disconnectors/Isolators (up to 765 kV AC)	60
9	Wave trap (up to 765 kV AC)	60
10	Oil Filled Distribution Transformers up to & including 33 kV [Cold Rolled Grain Oriented (CRGO)/Amorphous, Aluminium/Copper wound]	60
11	Dry Type Distribution Transformer upto and including 33 kV (CRGO/Amorphous, Aluminium/Copper wound)	60
12	Conventional Conductor	60
13	Accessories for Conventional conductors	60
14	High Temperature/High Temperature Low Sag (HTLS) conductors (such as Composite core, GAP, ACSS, INVAR, AL59) and Accessories	60
15	Optical ground wire (OPGW) – all designs	60
16	Fiber Optic Terminal Equipment (FOTE) for OPGW	50
17	OPGW related Hardware and Accessories	60
18	Remote Terminal Unit (RTU)	50
19	Power Cables and accessories up to 33 kV	60
20	Control cables including accessories	60
21	XLPE Cables up to 220 kV	60
22	Substation Structures	60
23	Transmission Line Towers	60
24	Porcelain (Disc/Long Rod) Insulators	60
25	Bus Post Insulators (Porcelain)	60
26	Porcelain Disc Insulators with Room Temperature Vulcanisation (RTV) coating	50
27	Porcelain Longrod Insulators with Room Temperature Vulcanisation (RTV) coating	50
28	Hardware Fittings for Porcelain Insulators	60
29	Composite/Polymeric Long Rod Insulators	60
30	Hardware Fittings for Polymer Insulators	60
31	Bird Flight Diverter (BFD)	60
32	Power Line Carrier Communication (PLCC) System (up to 800 kV)	60
33	Gas Insulated Switchgear (up to 400 kV AC)	60
34	Gas Insulated Switchgear (above 400 kV AC)	50
35	Surge/Lightning Arrester (up to 765 kV AC)	60
36	Power Capacitors	60
37	Packaged Sub-station (6.6 kV to 33 kV)	60
38	Ring Main Unit (RMU) (up to 33 kV)	60
39	Medium Voltage (MV) GIS Panels (up to 33 kV)	60
40	Automation and Control System/Supervisory Control and data Acquisition (SCADA) System in Power System	50
41	Control and Relay Panel (including Digital/Numerical Relays)	50
42	Electrical Motors 0.37 kW to 1 MW	60
43	Energy Meters excluding smart meters	50
44	Control & power cables and Accessories (up to 1.1 kV)	60
45	Diesel Generating (DG) set	60

Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficient local capacity and competition	Class-I Local Supplier (Minimum Local Content (%))
46	DC system (DC Battery & Battery Charger)	60
47	AC & DC Distribution Board	60
48	Indoor Air Insulated Switchgear (AIS) upto 33 kV	60
49	Poles (PCC, PSCC, Rolled Steel Joist, Rail Pole, Spun, Steel Tubular)	60
50	Material for Grounding/earthing system	60
51	Illumination system	60
52	Overhead Fault Sensing Indicator (FSI)	50
53	Power Quality Meters	50
54	Auxiliary Relays	50
55	Load Break Switch	50
(B) Hydro Sector		
56	Hydro Turbine & Associated equipment	
	a) Francis Turbine	60
	b) Kaplan Turbine	60
	c) Pelton Turbine	50
57	Main Inlet Valve & Associated Equipment	60
58	Penstock Protection Valve and Associated Equipment	60
59	Governing system & Accessories	60
60	Generator for Hydro Project & Associated Equipment	60
61	Static Excitation System	60
62	Workshop Equipment	60
63	Cooling Water System	60
64	Compressed Air System	60
65	Drainage/Dewatering System	60
66	Fire Protection System	60
67	Heating, Ventilation & Air Conditioning System (HVAC)	60
68	Oil Handling System	60
69	Mechanical Balance of Plant (BOP) Items	60
(C) Thermal Sector		
Boiler Auxiliaries		
70	Air Pre-Heater	60
71	Steam Coil Air Pre Heater (SCAPH)	60
72	Steam soot blowers (wall blowers & Long Retractable Soot Blower (LRSB))	60
73	Auxiliary Steam Pressure Reducing & Desuperheating (PRDS)	60
74	Fuel oil system	60
75	Seal air Fan	60
76	Ducts and dampers	60
77	Duct expansion joints	60
78	Blowdown tanks	60
79	Coal burners and oil burners	60
80	Coal mills	60
81	Gear Box of Coal Mill	50
82	Coal feeders	60
83	Primary Air Fans	60
84	Forced Draft Fans	60
85	Induced Draft Fans	60
86	Forced Draft (FD)/Induced Draft (ID)/ Primary Air (PA) Fan Servo Motor Assembly	50
87	Tubes (Carbon Steel)	50
88	Steam pipes (Carbon Steel)	50
89	Steam drum	50
90	Separator	50
91	Selective Catalytic Reduction (SCR)	50

Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficient local capacity and competition	Class-I Local Supplier (Minimum Local Content (%))
	Electro-Static Precipitators (ESPs)	
92	Casing	60
93	Electrodes	60
94	Rapping System	60
95	Hopper Heaters	60
96	Transformer Rectifiers	60
97	Insulators	60
	Turbine & Auxiliaries	
98	Turbine (High Pressure/Intermediate Pressure/Low Pressure)	50
99	Condensate Extraction Pumps	60
100	Condenser On line Tube Cleaning System (COLTC)	60
101	Debris filters	60
102	Deaerator	60
103	Drain Cooler and Flash Tank	60
104	ECW Pump	50
105	Plate Heat Exchanger	50
106	Self-cleaning filters	50
107	Condensate Polishing Units (CPUs)	60
108	Chemical Dosing System	60
109	Oil Filter	60
110	Gland Steam Condenser	60
111	Oil Purifying Centrifuge	50
112	Water Cooled Condenser	50
113	Boiler Feed Pumps (BFPs)	50
	Generator and Auxiliaries	
114	Generator (including Seal Oil System, Hydrogen Cooling System, Stator water cooling system)	60
	Electrical Works	
115	Control and metering equipment	60
	Control & Instrumentation System (C&I System)	
116	Thermocouples	50
117	Measuring instruments [Resistance Temperature Detectors (RTDs)], Local gauges	50
118	Actuators (Pneumatic and conventional electric)	50
119	Interplant Communication/ Public Address (PA) system except IP based	50
	Coal Handling Plant	
120	Conveyors	60
121	Wagon Tippler	60
122	Side Arm Charger	60
123	Paddle feeder	60
124	Crushers & Screens	60
125	Dust suppression (dry fog & plain water) system	60
126	Air Compressors	50
127	Magnetic separators & metal detectors	60
128	Coal Sampling System	60
129	Stacker cum reclaimers	60
130	Belt weighing & monitoring system	60
131	Wheel & axle assembly (without bearings) for Bottom Opening Bottom Release (BOBR) Wagons	60
	Ash Handling System	
132	Clinker grinder	60
133	Water jet ejectors	60
134	Scraper chain conveyor	60
135	Dry fly ash vacuum extraction system	60
136	Pressure pneumatic conveying system	60

Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficient local capacity and competition	Class-I Local Supplier (Minimum Local Content (%))
137	Ash water & ash slurry pumps	60
138	Compressors, air dryers & air receivers	50
139	Ash water recovery system	60
Raw Water Intake & Supply System		
140	Travelling water screens	60
141	Raw water supply pumps	60
142	Valves, RE joints etc.	60
Water Treatment System and Effluent Treatment System		
143	Clarification plant	60
144	Filtration plant	60
145	Ultra filtration plant	50
146	Reverse Osmosis (RO) plant and its membrane	55
147	De-Mineralised water plant (DM Plant)	60
148	Chlorination plant	60
149	Chemical dosing system	60
150	Effluent Treatment Plant	60
Circulating Water (CW) & Auxiliary Circulating Water (ACW) System		
151	CW & ACW Pumps	60
152	Butter Fly (BF) valves, Non-return Valves (NRVs) etc.	60
153	Rubber Expansion (RE) joints	60
154	Air release valves	60
Cooling Towers (NDCT/ IDCT)-Natural-Draft and Induced Draft Cooling Tower		
155	Water Distribution System	60
156	Spray nozzles	60
157	Packing	60
158	Drift eliminators	60
159	Cooling Tower (CT) Fans (for Induced Draft Cooling Towers IDCT)	60
160	Gear boxes, shafts & motors (for IDCT)	60
Air Conditioning & Ventilation System		
161	Split & window air conditioners	60
162	Chilling/ condensing unit [upto 500 ton of refrigeration(TR)]	55
163	Air Handling Unit (AHU) and Fresh air unit	60
164	Cooling Towers	60
165	Air Washing Units (AWUs), axial fans, roof extractors	60
166	Ducts, louvers & dampers	60
Flue Gas Desulphurization (FGD)		
167	Spray Nozzles,	50
168	Spray header	50
169	Oxidation Blowers	50
170	Limestone wet Ball Mill	50
171	Slurry Handling Pumps for FGD system	50
172	Booster Fans for FGD system	50
173	Carbon Steel Ducts and Dampers for FGD	60
174	Storage Tanks and Silos	60
175	Process Water Pump for FGD system	50
(D) Other Common Items		
Fire protection and detection system		
176	Motor driven fire water pumps	60
177	Diesel engine driven fire water pumps	60
178	Hydrant system for the power plant.	60
179	High velocity water spray system	60
180	Medium velocity water spray system	60
181	Foam protection system	60
182	Inert gas flooding system	60



Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficient local capacity and competition	Class-I Local Supplier (Minimum Local Content (%))
183	Fire tenders	60
184	Portable fire-extinguishers	60
185	Cranes, EOT cranes, gantry crane & chain pulley blocks etc.	60
186	Elevator	60

(E) Minimum Local Content percentages in Engineering, Procurement & Construction (EPC) / Turnkey project

In case the contract is awarded through the EPC route, the contractor should comply with the requirement of MLC for individual items as listed in Annexure-I and should purchase these items only from Class-I Local supplier. In addition, MLC for complete EPC project may also be prescribed as below:

	(1) Package Based Works	Minimum Local Content (%)
1	Boiler	60
2	TG System (Water Cooled Condenser)	60
3	Ash Handling Plant	60
4	Coal Handling Plant	60
5	Electro-static Precipitator (ESP)	60
6	Circulating Water (CW) System	60
7	Cooling Tower	60
8	Water Treatment System	60
9	Air Conditioning System (below 500TR)	60
10	Flue Gas Desulphurisation (FGD) System	60
11	Station Control & Instrumentation (C&I)	50
12	Hydro Power Projects (Electro-Mechanical Works)	60
	Gas based generation	
	Overall Gas Turbine Package (on finished Product basis)	
13	< 44 MW	60
14	44 –145 MW	60
	Overall Combined Cycle Gas Turbine (CCGT) Package (on finished Product basis)	
15	< 44 MW	60
16	44 – 145 MW	60
17	> 150 MW	60
	(2) Project as a whole	
1	Works and service contracts in Power Sector	60
2	Transmission Line with Conventional conductors (ACSR, AAAC, AL-59 etc.)	60
3	Transmission Line with High temperature Low Sag (HTLS) conductors	60
4	HVAC Substation Air Insulated (AIS)	60
5	HVAC Substation Gas Insulated (GIS)	60
6	HVDC Substation	60
7	Distribution Sector	60



Annexure-II

General guidelines to be adopted selectively in an appropriate manner by the procuring entities in their tender documents.

1. The bidder shall have to be an entity registered in India in accordance with law.
2. The bids shall be in the language as prescribed by the tenderer/procurer.
3. The bids shall be in Indian Rupees (INR) (in respect of local content only).
4. Indian subsidiaries of foreign bidders shall have to meet the qualifying criteria in terms of capability, competency, financial position, past performance etc.
5. The bidder shall follow Indian laws, regulations and standards.
6. To be eligible for participation in the bid, foreign bidders shall compulsorily set up their manufacturing units on a long term basis in India as may be specified by the tenderer/ procurer.
7. Similar or better technology than the technology offered in respect of material, equipment and process involved shall be transferred to India. Along with the transfer of technology, adequate training in the respective field shall also be provided.
8. Country of origin of the equipment/material shall be provided in the bid.
9. For supply of equipment / material from the country of origin other than India, the bidder shall submit performance certificate in support of satisfactory operation in India or a country other than the country of origin having climatic and operational conditions including ambient temperature similar to that of India for more than _____ years (to be specified by the procurer).
10. The technologies/ products offered shall be environmental friendly, consuming less energy, safe, energy efficient, durable and long lasting under the prescribed operational conditions.
11. The supplier shall ensure supply of spares, materials and technological support for the entire life of the project.
12. The manufacturers/ supplier shall list out the products and components producing Toxic E-waste and other waste as may be specified. It shall have an Extended Producers Responsibility (EPR) so that after the completion of the lifecycle, the materials are safely recycled / disposed of by the Manufacturer/ supplier and for this, the Manufacturer/supplier along with procurer has to establish recycling / disposal unit or as may be specified.
13. Minimum Local Content requirement for goods, services or works shall be in accordance with the conditions laid down in respective Order(s) of the sectors on Public Procurement (Preference to Make in India) to provide for purchase preference (linked with local content).

CLAUSE NO.

GENERAL TECHNICAL REQUIREMENTS



14. The equipment/ material sourced from foreign companies may be tested in accredited labs in India before acceptance wherever such facilities are available.
15. The Tender fee and the Bank Guarantee (BG) shall be in Indian Rupees only.
16. The bidder shall have to furnish a certificate regarding cyber security/safety of the equipment/process to be supplied/services to be rendered as safe to connect.
17. Applicable safety requirements shall be met. Regular safety audit shall be carried out by the manufacturer/ supplier.
18. Statutory laws/regulations including the labour and environmental laws shall be strictly complied with during supply, storage, erection, commissioning and operation process. A regular compliance report shall be submitted to the procurer/appropriate Authorities.
19. Formation of new joint venture in India shall be permitted only with the Indian companies.
20. Tendering by the agent shall not be accepted.
21. In case local testing is not considered necessary by the procurer, the original test report in the language prescribed by the procurer may be accepted. The translated test report shall not be accepted unless it is notarised.
22. Certification/compliance as per the Indian Standards/ International Standards/ Indian Regulations/ specified Standards shall be mandatory, where ever applicable.
23. Quality assurance of the product shall be carried out by the procurer or an independent third party agency appointed by the procurer. Manufacturing Quality Plan as approved by the procurer shall be followed by the manufacturer/supplier.
24. Wherever required by the procurer, foreign supplier shall establish fully functional service centers in India and shall keep spares/material locally for future needs of utilities.
25. Arbitration proceedings shall be instituted in India only and all disputes shall be settled as per applicable Indian Laws.


**TALCHER THERMAL POWER PROJECT
STAGE-III (2X660 MW)
EPC PACKAGE**


**TECHNICAL SPECIFICATIONS
SECTION VI, PART-C
BID DOC. NO.:CS-4540-001A-2**

**GENERAL TECHNICAL
REQUIREMENTS**


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CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			एनटीपीसी NTPC
	LIST OF CODES AND STANDARDS			
	Indian Standards	Title	International and Internationally recognised standards	
	IS:277	Galvanised steel sheets (plain or corrugated)		
	IS:655	Specification for metal air duct		
	IS:800	Code of practice for use of structural steel in general building construction	BS 449:1969 BS 5950 ASA A57, 1-1952	
	IS:807	Code of practice for design, manufacture, erection and testing (Structural portion) of cranes and hoists 6588 (Issued by Standards Association of Australia). DIN 120:1936 (Sheet 1) DIN 120:1936 (Sheet 2) 327 part-I, 1951 BS 466 part-II, 1960 BS 644:1960 BS 1757:1951 BS 2573:part-I:1960	Draft Revision of A.S. NO. CS.2 SAA Crane and Hoist code Doc:No. BU/4 Rev	
	IS:875	Code of practice for design loads (other than earthquake) for buildings and structures Leading standards (issued by Canadian Standard) DIN-1055-1955 (Issued by ASA)	National Building code of Canada (1953)-Part-IV Design section 4.1	
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 75 OF 114	


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	IS:1239 Part-I	Mild steel tubes	(ISO/R 65-1957) (ISO/R-64-1958) (ISO/R-65-1958) (BS 1387 : 1957)	
	IS:1239 Part-II	Mild steel tubulars and other wrought steel pipe fittings	BS 1387 : 1967 BS 1387 :1967 BS 1740 :1965	
	IS:2825	Code for unfired vessels		
	IS:1520	Horizontal centrifugal pumps for clear cold and fresh water		
	IS:1600	Code for practice for performance of constant speed IC Engines for general purpose		
	IS:1601	Specification for perform- ance of constant speed IC Engines for general Purpose		
	IS:1893	Criteria for earthquake resistant design of structures		
	IS1978-1971	Line Pipe April 1969.	API Standards 5L	
	IS:2254-1970	Dimensions of vertical shaft motor for pumps	IEC Pub 72-1 part I NEMA Pub MG 1 1954	
	IS:2266	Steel wire ropes for general engineering purposes	BS :302 : 1968	
	IS:2312	Propellant type Ventilation fans		
	IS:2365	Steel wire suspension ropes for lifts and hoists	BS : 1957	
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 76 OF 114	


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		
	<p>IS:3346</p> <p>IS:3354</p> <p>IS:3401</p> <p>IS:3588</p> <p>IS:3589</p> <p>IS:3677</p> <p>IS:3815</p> <p>IS:3895</p> <p>IS:3963</p> <p>IS:3975</p> <p>IS:4503</p>	<p>Method for the determination of thermal conductivity of thermal insulation materials (two slab guarded hot plate method)</p> <p>Outline dimensions for electric lifts.</p> <p>Silica gel</p> <p>Specification for electrical axial flow fans</p> <p>Electrically welded steel pipes for water, gas and sewage (200mm to 2000 mm Nominal Diameter)</p> <p>Unbonded rock and slag wool for thermal insulation</p> <p>Point hook with shank for general engineering purposes</p> <p>Specification for monocrystalline semiconductor rectifier cells and stacks</p> <p>Roof extractor unit</p> <p>Mild steel wires, strips and tapes for armoring cables</p> <p>Shell and tube type heat Exchanger</p>	<p>DIN 52612 (Deutscher Normenausschuss)</p> <p>ASTM C 163-1964 (American Society of Testing and materials)</p> <p>ASTM C 167-1974</p> <p>ASTM C 177-1963</p> <p>BS 482 - 1968 Doc.:67/3 1284 (Revision of BS 2903) (Issued BS)</p>
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p>GENERAL TECHNICAL REQUIREMENTS</p>	<p>PAGE 77 OF 114</p>


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		एनटीपीसी NTPC
	<p>IS:4540</p> <p>IS:4671</p> <p>IS:4736</p> <p>IS:4894</p> <p>IS:5456</p> <p>IS:5749</p> <p>IS:6392</p> <p>IS:6524 Part-I</p> <p>IS:7098</p> <p>IS:7373</p> <p>IS:7938</p> <p>ISO:1217</p> <p>ASHRAE-33 and air heating coils.</p> <p>ASHRAE-52-76 particle matter.</p>	<p>Specification for monory-stallines rectifire assembly equipment</p> <p>Expanded polystyrene for thermal insulation purpose</p> <p>Hot dip zinc coating on steel tubes</p> <p>Centrifugal fans</p> <p>Code of practice for testing of positive displacement type air compressors and exhauster (For Test Tolerance Only)</p> <p>Forged ramshorn hooks</p> <p>Steel pipe flanges</p> <p>Code of practice for design of tower cranes Static and rail mounted</p> <p>Cross linked Polyethylene insulated PVC sheathed cables</p> <p>Specification for wrought aluminium and aluminium sheet and strips</p> <p>Air receivers for compressed air installation</p> <p>Displacement compressor-Acceptance test</p> <p>Methods of testing for rating of forced circulation air cooling</p> <p>Air cleaning device used in general ventilation for removing</p>	<p></p> <p></p> <p></p> <p></p> <p>Entwurf DIN 15402 Blett 1 Entwurf DIN 15402 BS 3017-1958</p> <p>BS 4504 : 1969</p> <p>BS 2799 : 1956</p> <p>Standard No. 1 to IPCEA (USA) Pub. No. 5-66-524</p> <p></p> <p></p> <p></p>
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 78 OF 114

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	<p>ASHRAE-22-72</p> <p>ASHRAE 23-67</p> <p>ARI-450-6</p> <p>ARI-550</p> <p>ARI-410</p> <p>ARI-430/435 BS:848 (Part-1,2)</p> <p>BS:400</p> <p>BS:401</p> <p>CTI Code ACT-105</p> <p>ANSI-31.5</p> <p>ASME-PTC- 23-1958</p> <p>AMCA A-21C</p> <p>API:618</p> <p>HYDRAULIC INSTITUTE STANDARDS.</p> <p>HYDRANT SYSTEM MANUALS OF TAC.</p> <p>TAC MANUALS OF SPRAY SYSTEM</p> <p>NFPA USA/ NSC UK/ UL USA/ FM USA STANDARDS.</p> <p>INDIAN EXPLOSIVES ACT.</p> <p>INDIAN FACTORIES ACT.</p> <p>STANDARD OF TUBULAR EXCHANGER MANUFACTURER'S ASSOCIATION.</p>	<p>Method of testing for rating of water cooled refrigerant condensers.</p> <p>Methods of testing for rating of positive displacement refrigerant compressors.</p> <p>Standard for water cooled refrigerant condensers.</p> <p>Standard for centrifugal water chilling packages.</p> <p>Standard for forced circulation air cooling and air heating coils</p> <p>Central station AHU/Application of Central Station AHU Fans</p> <p>Low carbon steel cylinders for the storage & transport of permanent gases.</p> <p>Low carbon steel cylinders for the storage & transport of liquified gases.</p> <p>Acceptance test code for Water Cooling Tower.</p> <p>Refrigerant piping</p> <p>Atmospheric Water Cooling Equipment</p> <p>Test Code for air moving devices</p> <p>Reciprocating Compressor for general refinery services.</p>		
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p>GENERAL TECHNICAL REQUIREMENTS</p>	<p>PAGE 79 OF 114</p>	

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	<p>CODE AND STANDARD FOR CIVIL WORKS</p> <p>Some of the applicable Standards, Codes and references are as follows:</p> <p>Excavation & Filling</p> <p>IS: 2720 (Part-II, IV TO VIII, XIV, XXI, XXIII, XXIV, XXVII TO XXIX, XL) Methods of test for soils-determination for water content etc.</p> <p>IS: 4701 Code of practice for earth work on canals.</p> <p>IS: 9758 Guidelines for Dewatering during construction.</p> <p>IS: 10379 Code of practice for field control of moisture and compaction of soils for embankment and sub-grade.</p> <p>Properties, Storage and Handling of Common Building Materials</p> <p>IS: 269 Specification for ordinary Portland cement, 33 grade.</p> <p>IS: 383 Specification for coarse and fine aggregates from natural sources for concrete.</p> <p>IS: 432 Specification for mild steel and (Parts 1&2) medium tensile steel bars and hard-drawn steel wires for concrete reinforcement.</p> <p>IS: 455 Specification for Portland slag cement.</p> <p>IS: 702 Specification for Industrial bitumen.</p> <p>IS: 712 Specification for building limes.</p> <p>IS: 808 Rolled steel Beam channel and angle sections.</p> <p>IS: 1077 Specification for common burnt clay building bricks.</p> <p>IS: 1161 Specification of steel tubes for structural purposes.</p> <p>IS: 1363 Hexagon head Bolts, Screws and nuts of production grade C.</p> <p>IS: 1364 Hexagon head Bolts, Screws and Nuts of Production grade A & B.</p> <p>IS: 1367 Technical supply conditions for Threaded fasteners.</p>			
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p>GENERAL TECHNICAL REQUIREMENTS</p>	<p>PAGE 80 OF 114</p>	

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		
	<p>IS: 1489 (Part-I) (Part-II)</p> <p>IS: 1542</p> <p>IS: 1566</p> <p>IS: 1786</p> <p>IS: 2062</p> <p>IS: 2116</p> <p>IS: 2386 (Parts-I to VIII)</p> <p>IS: 3150</p> <p>IS: 3495 (Parts-I to IV)</p> <p>IS: 3812</p> <p>IS: 4031</p> <p>IS: 4032</p> <p>IS: 4082</p> <p>IS: 8112</p> <p>IS: 8500</p> <p>IS: 12269</p> <p>IS: 12894</p>	<p>Specification for Portland-pozzolana cement: Fly ash based. Calcined clay based.</p> <p>Specification for sand for plaster.</p> <p>Specification for hard-drawn steel wire fabric for concrete reinforcement.</p> <p>Specification for high strength deformed bars for concrete reinforcement.</p> <p>Specification for steel for general structural purposes.</p> <p>Specification for sand for masonry mortars.</p> <p>Testing of aggregates for concrete.</p> <p>Hexagonal wire netting for general purpose.</p> <p>Methods of tests of burnt clay building bricks.</p> <p>Specification for fly ash, for use as pozzolana and admixture.</p> <p>Methods of physical tests for hydraulic cement.</p> <p>Methods of chemical analysis of hydraulic cement.</p> <p>Recommendations on stacking and storage of construction materials at site.</p> <p>Specification for 43 grade ordinary portland cement.</p> <p>Medium and high strength structural steel.</p> <p>53 grade ordinary portland cement.</p> <p>Specification for Fly ash lime bricks.</p>	
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 81 OF 114


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		
	Cast-In-Situ Concrete and Allied Works		
	IS: 280	Specification for mild steel wire for general engineering purposes.	
	IS: 456	Code of practice for plain and reinforced concrete.	
	IS: 457	Code of practice for general construction of plain & reinforced concrete for dams & other massive structures.	
	IS: 516	Method of test for strength of concrete.	
	IS: 650	Specification for standard sand for testing of cement.	
	IS: 1199	Methods of sampling and analysis of concrete.	
	IS: 1791	General requirements for batch type concrete mixers.	
	IS: 1838 (Part-I)	Specification for preformed fillers for expansion joints in concrete pavements and structures (non-extruding and resilient type).	
	IS: 2204	Code of practice for construction of reinforced concrete shell roof.	
	IS: 2210	Criteria for the design of reinforced concrete shell structures and folded plates.	
	IS: 2438	Specification for roller pan mixer.	
	IS: 2502	Code of practice for bending and fixing of bars for concrete reinforcement.	
	IS: 2505	General requirements for concrete vibrators, immersion type.	
	IS: 2506	General requirements for concrete vibrators, screed board type.	
	IS: 2514	Specification for concrete vibrating tables.	
	IS: 2645	Specification for Integral cement water proofing compounds.	
	IS: 2722	Specification for portable swing weigh batches for concrete. (single and double bucket type)	
	IS: 2750	Specification for Steel scaffolding.	
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 82 OF 114

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		
	<p>IS: 2751</p> <p>IS: 3025</p> <p>IS: 3366</p> <p>IS: 3370 (Part I to IV)</p> <p>IS: 3414</p> <p>IS: 3550</p> <p>IS: 3558 concrete.</p> <p>IS: 4014 (Parts I & II)</p> <p>IS: 4326 of buildings.</p> <p>IS: 4461</p> <p>IS: 4656</p> <p>IS: 4925</p> <p>IS: 4990</p> <p>IS: 4995 (Parts I & II)</p> <p>IS: 5256</p> <p>IS: 5525</p> <p>IS: 5624</p> <p>IS: 6461</p>	<p>Code of practice for welding of mild steel plain and deformed bars for reinforced concrete construction.</p> <p>Methods of sampling and test waste water.</p> <p>Specification for Pan vibrators.</p> <p>Code of practice for concrete structures for the storage of liquids.</p> <p>Code of practice for design and installation of joints in buildings.</p> <p>Methods of test for routine control for water used in industry.</p> <p>Code of practice for use of immersion vibrators for consolidating concrete.</p> <p>Code of practice for steel tubular scaffolding.</p> <p>Code of practice for earthquake resistant design and construction of buildings.</p> <p>Code of practice for joints in surface hydro-electric power stations.</p> <p>Specification for form vibrators for concrete.</p> <p>Specification for batching and mixing plant.</p> <p>Specification for plywood for concrete shuttering work.</p> <p>Criteria for design of reinforced concrete bins for the storage of granular and powdery materials.</p> <p>Code or practice for sealing joints in concrete lining on canals.</p> <p>Recommendations for detailing of reinforcement in reinforced concrete work.</p> <p>Specification for foundation bolts.</p> <p>Glossary of terms relating to cement concrete.</p>	
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 83 OF 114

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		एनटीपीसी NTPC
	IS: 6494 IS: 6509 IS: 7861 IS: 9012 IS: 9103 IS: 9417 IS: 10262 IS: 11384 IS: 11504 IS: 12118 IS: 12200 IS: 13311 Part-1 Part-2 SP:23 SP: 24 SP: 34 Precast Concrete Works SP: 7(PartVI/	Code of practice for water proofing of underground water reservoirs and swimming pools. Code of practice for installation of joints in concrete pavements. Code of practice for extreme weather concreting. (Parts I & II) Recommended practice for shot concreting. Specification for admixtures for concrete. Recommendations for welding cold worked steel bars for reinforced concrete construction. Recommended guidelines for concrete mix design. Code of practice for composite construction in structural steel and concrete. Criteria for structural design of reinforced concrete natural draught cooling towers. Specification for two-parts poly sulphide. Code of practice for provision of water stops at transverse contraction joints in masonry and concrete dams. Method of non-destructive testing of concrete. Ultrasonic pulse velocity. Rebound hammer. Handbook of concrete mixes Explanatory Handbook on IS: 456-1978 Handbook on concrete reinforcement and detailing. National Building Code- Structural design of prefabrication and Sec.7) systems building.	
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 84 OF 114

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		एनटीपीसी NTPC
	IS: 10297	Code of practice for design and construction of floors and roofs using precast reinforced/prestressed concrete ribbed or cored slab units.	
	IS: 10505	Code of practice for construction of floors and roofs using pre-cast reinforced concrete units.	
	Masonry and Allied Works		
	IS: 1905	Code of Practice for Structural Safety of Buildings-Masonry walls.	
	IS: 2212	Code of Practice for Brickwork.	
	IS: 2250	Code of Practice for Preparation and use of Masonry Mortar.	
	SP: 20	Explanatory handbook on masonry code.	
	Sheeting Works		
	IS:277	Galvanised steel sheets (plain or corrugated).	
	IS: 459	Unreinforced corrugated and semi-corrugated asbestos cement sheets.	
	IS: 513	Cold-rolled carbon steel sheets.	
	IS: 730	Specification for fixing accessories for corrugated sheet roofing.	
	IS: 1626	Specification for Asbestos cement building pipes and pipe fittings, gutters and gutter fittings and roofing fittings.	
	IS: 2527	Code of practice for fixing rain water gutters and down pipe for roof drainage.	
	IS: 3007	Code of practice for laying of asbestos cement sheets.	
	IS: 5913	Methods of test for asbestos cement products.	
	IS: 7178	Technical supply conditions for tapping screw.	
	IS: 8183	Bonded mineral wool.	
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CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		एनटीपीसी NTPC
	IS: 8869 IS: 12093 IS: 12866 IS: 14246 Fabrication and Erection of Structural Steel Work IS: 2016 IS: 814 IS: 1852 IS: 3502 IS: 6911 IS: 3757 IS: 6623 IS: 6649 IS: 800 IS: 816 IS: 4000 IS: 9595 IS: 817	Washers for corrugated sheet roofing. Code of practice for laying and fixing of sloped roof covering using plain and corrugated galvanised steel sheets. Plastic translucent sheets made from thermosetting polyester resin (glass fibre reinforced). Specification for continuously pre-painted galvanised steel sheets and coils. Specification for plain washers. Specification for covered Electrodes for Metal Arc Welding for weld steel. Specification for Rolling and Cutting Tolerances for Hot rolled steel products. Specifications for chequered plate. Specification for stainless steel plate, sheet and strip. Specification for high strength structural bolts Specification for high strength structural nuts. High Tensile friction grip washers. Code of practice for use of structural steel in general building construction. Code of practice for use of Metal Arc Welding for General Construction. Code of practice for assembly of structural joints using high tensile friction grip fasteners. Code of procedure of Manual Metal Arc Welding of Mild Steel. Code of practice for Training and Testing of Metal Arc Welders.	
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 86 OF 114

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		
	<p>IS: 1811</p> <p>IS: 9178</p> <p>IS: 9006</p> <p>IS: 7215</p> <p>IS: 12843</p> <p>IS: 4353</p> <p>SP: 6 (Part 1 to 7)</p> <p>IS: 1608</p> <p>IS: 1599</p> <p>IS : 228</p> <p>IS : 2595</p> <p>IS : 1182</p> <p>IS : 3664</p> <p>IS : 3613</p> <p>IS : 3658</p> <p>IS : 5334</p>	<p>Qualifying tests for Metal Arc Welders (engaged in welding structures other than pipes).</p> <p>Criteria for Design of steel bins for storage of Bulk Materials.</p> <p>Recommended Practice for Welding of Clad Steel.</p> <p>Tolerances for fabrication steel structures.</p> <p>Tolerance for erection of structural steel.</p> <p>Recommendations for submerged arc welding of mild steel and low alloy steels.</p> <p>ISI Handbook for structural Engineers.</p> <p>Method of Tensile Testing of Steel products other than sheets, strip, wire and tube.</p> <p>Method of Bend Tests for Steel products other than sheet, strip, wire and tube</p> <p>Methods of chemical Analysis of pig iron, cast iron and plain carbon and low alloy steel.</p> <p>Code of Practice for Radio graphic testing.</p> <p>Recommended practice for Radiographic Examination of fusion welded butt joints in steel plates.</p> <p>Code of practice for Ultra sonic Testing by pulse echo method.</p> <p>Acceptance tests for wire flux combination for submerged Arc Welding.</p> <p>Code of practice for Liquid penetrant Flaw Detection.</p> <p>Code of practice for Magnetic Particle Flaw Detection of Welds.</p>	
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p>GENERAL TECHNICAL REQUIREMENTS</p>	<p>PAGE 87 OF 114</p>


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		एनटीपीसी NTPC
	<p>Plastering and Allied Works</p> <p>IS : 1635 Code of practice for field slaking of Building lime and preparation of putty.</p> <p>IS : 1661 Application of cement and cement lime plaster finishes.</p> <p>IS : 2333 Plaster-of-paris.</p> <p>IS : 2402 Code of practice for external rendered finishes.</p> <p>IS : 2547 Gypsum building plaster.</p> <p>IS : 3150 Hexagonal wire netting for general purpose.</p> <p>Acid and Alkali Resistant Lining</p> <p>IS : 158 Ready mixed paint, brushing, bituminous, black, lead free, acid, alkali & heat resisting.</p> <p>IS : 412 Specification for expanded metal steel sheets for general purpose.</p> <p>IS : 4441 Code of practice for use of silicate type chemical resistant mortars.</p> <p>IS : 4443 Code of practice for use of resin type chemical resistant mortars.</p> <p>IS : 4456 Method of test for chemical resistant tiles. (Part I & II)</p> <p>IS : 4457 Specification for ceramic unglazed vitreous acid resistant tiles.</p> <p>IS : 4832 Specification for chemical resistant mortars.</p> <p style="padding-left: 40px;">Part I Silicate type</p> <p style="padding-left: 40px;">Part II Resin type</p> <p style="padding-left: 40px;">Part III Sulphur type</p> <p>IS : 4860 Specification for acid resistant bricks.</p> <p>IS : 9510 Specification for bitumasitc, Acid resisting grade.</p>		
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CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		एनटीपीसी NTPC
	<p>Water Supply, Drainage and Sanitation</p> <p>IS : 458 Specification for concrete pipes.</p> <p>IS : 554 Dimensions for pipe threads, where pressure tight joints are made on thread.</p> <p>IS : 651 Specification for salt glazed stoneware pipes.</p> <p>IS : 774 Flushing cisterns for water closets and urinals.</p> <p>IS : 775 Cast iron brackets and supports for wash basins and sinks.</p> <p>IS : 778 Copper alloy gate, globe and check valves for water works purposes.</p> <p>IS : 781 Cast copper alloy screw down bib taps and stop valves for water services.</p> <p>IS : 782 Caulking lead.</p> <p>IS : 783 Code of practice for laying of concrete pipes.</p> <p>IS : 1172 Basic requirements for water supply, drainage and sanitation.</p> <p>IS : 1230 Cast iron rain water pipes and fittings.</p> <p>IS : 1239 Mild steel tubes, tubulars and other wrought steel fittings.</p> <p>IS : 1536 Centrifugally cast (Spun) iron pressure pipes for water, gas and sewage.</p> <p>IS : 1537 Vertically cast iron pressure pipes for water, gas and sewage.</p> <p>IS : 1538 Cast iron fittings for pressure pipe for water, gas and sewage.</p> <p>IS : 1703 Ball valves (horizontal plunger type) including float for water supply purposes.</p> <p>IS : 1726 Cast iron manhole covers and frames.</p> <p>IS : 1729 Sand cast iron spigot and socket, soil, water and ventilating pipes, fittings and accessories.</p>		
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CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		एनटीपीसी NTPC
	<p>IS : 1742</p> <p>IS : 1795</p> <p>IS : 1879</p> <p>IS : 2064</p> <p>IS : 2065</p> <p>IS : 2326</p> <p>IS : 2470 (Part-I & II)</p> <p>IS : 2501</p> <p>IS : 2548</p> <p>IS : 2556 (Part 1 to 15)</p> <p>IS : 2963</p> <p>IS : 3114</p> <p>IS : 3311</p> <p>IS : 3438</p> <p>IS : 3486</p> <p>IS : 3589</p> <p>IS : 3989</p> <p>IS : 4111 (Part I to IV)</p> <p>IS : 4127</p>	<p>Code of practice for building drainage.</p> <p>Pillar taps for water supply purposes.</p> <p>Malleable cast iron pipe fittings.</p> <p>Code of practice for selection, installation and maintenance of sanitary appliances.</p> <p>Code of practice for water supply in building.</p> <p>Automatic flushing cisterns for urinals.</p> <p>Code of practice for installation of septic tanks.</p> <p>Copper tubes for general engineering purposes.</p> <p>Plastic seat and cover for water-closets.</p> <p>Vitreous sanitary appliances (vitreous china).</p> <p>Non-ferrous waste fittings for wash basins and sinks.</p> <p>Code of practice for laying of cast iron pipes.</p> <p>Waste plug and its accessories for sinks and wash basins.</p> <p>Silvered glass mirrors for general purposes.</p> <p>Cast iron spigot and socket drain pipes.</p> <p>Electrically welded steel pipes for water, gas and sewage (200mm to 2000mm nominal diameter).</p> <p>Centrifugally cast (Spun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.</p> <p>Code of practice for ancillary structure in sewerage system.</p> <p>Code of practice for laying of glazed stone-ware pipes.</p>	
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CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		
	<p>IS : 4764</p> <p>IS : 4827</p> <p>IS : 5329</p> <p>IS : 5382</p> <p>IS : 5822</p> <p>IS : 5961</p> <p>IS : 7740</p> <p>IS : 8931</p> <p>IS : 8934</p> <p>IS : 9762</p> <p>IS : 10446</p> <p>IS : 10592</p> <p>IS : 12592</p> <p>IS : 12701</p> <p>SP: 35</p> <p>-</p> <p>Doors, Windows and Allied Works</p> <p>IS : 204</p> <p>Part-I</p> <p>Part-II</p>	<p>Tolerance limits for sewage effluents discharged into inland-surface waters.</p> <p>Electro plated coating of nickel and chromium on copper and copper alloys.</p> <p>Code of practice for sanitary pipe work above ground for buildings.</p> <p>Rubber sealing rings for gas mains, water mains and sewers.</p> <p>Code of practice for laying of welded steel pipes for water supply.</p> <p>Cast iron grating for drainage purpose.</p> <p>Code of practice for road gullies.</p> <p>Cast copper alloy fancy bib taps and stop valves for water services.</p> <p>Cast copper alloy fancy pillar taps for water services.</p> <p>Polyethylene floats for ball valves.</p> <p>Glossary of terms for water supply and sanitation.</p> <p>Industrial emergency showers, eye and face fountains and combination units.</p> <p>Specification for precast concrete manhole covers and frames.</p> <p>Rotational moulded polyethylene water storage tanks.</p> <p>Handbook on water supply and drainage.</p> <p>Manual on Sewerage and sewage treatment (Published by CPH & EEO) As updated.</p> <p>Tower Bolts</p> <p>Ferrous metals.</p> <p>Nonferrous metals.</p>	
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CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		एनटीपीसी NTPC
	IS : 208	Door Handles.	
	IS : 281	Mild steel sliding door bolts for use with padlocks.	
	IS : 362	Parliament Hinges.	
	IS : 420	Specification for putty, for use on metal frames.	
	IS : 1003 Part-I door	Specification for timber panelled and glazed shutters- (Part-I) shutters.	
	IS : 1038	Steel doors, windows and ventilators.	
	IS : 1081	Code of practice for fixing and glazing of metal (steel and aluminium) doors, windows and ventilators.	
	IS : 1341	Steel butt hinges.	
	IS : 1361	Steel windows for industrial buildings.	
	IS : 1823	Floor door stoppers.	
	IS : 1868	Anodic coatings on Aluminium and its alloys.	
	IS : 2202 (Part-II)	Specification for wooden flush door shutters (solid core type); particle board face panels and hard board face panels	
	IS:2209	Mortice locks (vertical type).	
	IS:2553	Safety glass	
	IS:2835	Flat transparent sheet glass.	
	IS:3548	Code of practice for glazing in buildings.	
	IS:3564	Door closers (Hydraulically regulated).	
	IS : 3614	Fire check doors; plate, metal covered and rolling type.	
	IS:4351	Steel door frames.	
	IS:5187	Flush bolts.	
	IS:5437	Wired and figured glass	
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 92 OF 114


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		
	IS:6248	Metal rolling shutters and rolling grills.	
	IS:6315	Floor springs (hydraulically regulated) for heavy doors.	
	IS:7196	Hold fasts.	
	IS:7452	Hot rolled steel sections for doors, windows and ventilators.	
	IS:10019	Mild steel stays and fasteners.	
	IS:10451	Steel sliding shutters (top hung type).	
	IS:10521	Collapsible gates.	
	Roof Water Proofing and Allied Works		
	IS:1203	Methods of testing tar and bitumen.	
	IS:1322	Specification for bitumen felts for water proofing and damp proofing.	
	IS:1346	Code of practice for water proofing of roofs with bitumen felts.	
	IS:1580	Specification for bituminous compound for water proofing and caulking purposes.	
	IS:3067	Code of practice for general design details and preparatory work for damp proofing and water proofing of buildings.	
	IS:3384	Specification for bitumen primer for use in water proofing and damp proofing.	
	Floor Finishes and Allied Works		
	IS:1237	Specification for cement concrete flooring tiles.	
	IS:1443	Code of practice for laying and finishing of cement concrete flooring tiles.	
	IS:2114	Code of practice for laying in-situ terrazzo floor finish.	
	IS:2571	Code of practice for laying in-situ cement concrete flooring.	
	IS:3462	Specification for unbacked flexible PVC flooring.	
	IS:4971	Recommendations for selection of industrial floor finishes.	
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 93 OF 114


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		
	IS:5318 IS:8042 IS:13801 Painting and Allied Works IS:162 IS:1477 Part-I Part-II IS:1650 IS:2074 IS:2338 Part-I Part-II IS:2395 Part-I Part-II IS:2524 Part-I Part-II IS:2932 IS:2933 IS:4759 IS:5410	Code of practice for laying of flexible PVC sheet and tile flooring. Specification for white portland cement. Specification for chequered cement concrete flooring tiles. Specification for fire resisting silicate type, brushing, for use on wood, colour as required. Code of practice for painting of ferrous metals in buildings. Pretreatment. Painting. Specification for colours for building and decorative finishes. Specification for red oxide-zinc chrome, priming, ready mixed paint air drying. Code of practice for finishing of wood and wood based materials. Operations and workmanship Schedules Code of practice for painting concrete, masonry and plaster surfaces. Operations and workmanship. Schedule. Code of practice for painting of nonferrous metals in buildings. Pretreatment. Painting. Specification of synthetic enamel paint, exterior, under-coating and finishing. Specification enamel paint, under coating and finishing. Code of practice for hot dip zinc coating on structural steel and other allied products. Specification for cement paint	
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 94 OF 114


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			एनटीपीसी NTPC
	IS:5411 (Part-I)	Specification for plastic emulsion paint-for exterior use		
	IS:6278	Code of practices for white washing and colour washing.		
	IS:10403	Glossary of terms relating to building finishes.		
	Piling and Foundation			
	IS:1080	Code of practice for design and construction of simple spread foundations.		
	IS:1904	Code of practice for design and construction of foundations in Soils; General Requirements.		
	IS:2911	Code of practice for designs and construction of Pile foundations (Relevant Parts).		
	IS:2950	Code of practice for designs and construction of Raft (Part-I) foundation.		
	IS:2974 (Part-I TO V)	Code of practice for design and construction of machine foundations.		
	IS:6403	Code of practice for determination of Allowable Bearing pressure on Shallow foundation.		
	IS:8009	Code of practice for calculation of settlement of foundation subjected to symmetrical vertical loads.		
	Part-I	Shallow foundations.		
	Part-II	Deep foundations.		
	IS:12070	Code of practice for design and construction of shallow foundations on rocks.		
	DIN:4024	Flexible supporting structures for machines with rotating machines.		
	VDI:2056	Criteria for assessing mechanical vibrations of machines.		
	VDI:2060	Criteria for assessing rotating imbalances in machines.		
	Stop Log and Trash Rack			
	IS:4622	Recommendations for fixed - wheel gates structural design.		
	IS:5620	Recommendations for structural design criteria for low head slide gates.		
	IS:11388	Recommendations for design of trash rack for intakes.		
	IS:11855	General requirements for rubber seals for hydraulic gates.		
	Roads			
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 95 OF 114	


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	<p>IRC:5</p> <p>IRC:14</p> <p>IRC:16</p> <p>IRC:19</p> <p>IRC:21</p> <p>IRC:34</p> <p>IRC:36</p> <p>IRC:37</p> <p>IRC:56</p> <p>IRC:73</p> <p>IRC:86</p> <p>IRC:SP:13</p> <p>IRC - Public- ation</p> <p>IS:73</p> <p>Loadings</p> <p>IS:875 (Pt. I to V)</p> <p>IS:1893</p> <p>IS:4091</p> <p>IRC:6</p> <p>M.O.T.</p> <p>Safety</p> <p>IS:3696 (Part I & II)</p>	<p>Standard specifications and Code of practice for road bridges, section-I general Features of Design.</p> <p>Recommended practice of 2cm thick bitumen and tar carpets.</p> <p>Specification for priming of base course with bituminous primers.</p> <p>Standard specifications and code of practice for water bound macadam.</p> <p>Standard specifications and Code of practice for road bridges, section-III - Cement concrete (plain and reinforced).</p> <p>Recommendations for road construction in waterlogged areas.</p> <p>Recommended practice for the construction of earth embankments for road works.</p> <p>Guidelines for the Design of flexible pavements.</p> <p>Recommended practice for treatment of embankment slopes for erosion control.</p> <p>Geometric design standards for rural (non-urban) highways.</p> <p>Geometric Design standards for urban roads in plains.</p> <p>Guidelines for the design of small bridges & culverts.</p> <p>Ministry of Surface Transport (Roads Wing), Specifications for road and bridge works.</p> <p>Specification for paving bitumen</p> <p>Code of practice for design loads other than earthquake) for buildings and structures.</p> <p>Criteria for earthquake resistant design of structures.</p> <p>Code of Practice for design and construction of foundation for transmission line towers & poles.</p> <p>Standard specifications & code of practice for road bridges, Section-II Loads and stresses.</p> <p>Deptt. of railways Bridge Rules.</p> <p>Safety code for scaffolds and ladders.</p>		
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p>GENERAL TECHNICAL REQUIREMENTS</p>	<p>PAGE 96 OF 114</p>	


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		
	IS:3764 IS:4081 IS:4130 IS:5121 IS:5916 IS:7205 IS:7293 IS:7969 IS:11769 - Indian Explosives Act. 1940 as updated. Architectural design of buildings SP:7 SP:41 Miscellaneous IS:802 (Relevant parts) IS:803 IS:10430 IS:11592 IS:12867 CIRIA Publication	Safety code for excavation work. Safety code for blasting and related drilling operations. Safety code for demolition of buildings. Safety code for piling and other deep foundations. Safety code for construction involving use of hot bituminous materials. Safety code for erection on structural steelwork. Safety code for working with construction machinery. Safety code for handling and storage of building materials Guidelines for safe use of products containing asbestos. National Building Code of India Handbook on functional requirements of buildings (other than industrial buildings) Code of practice for use of structural steel in overhead transmission line towers. Code of practice for design, fabrication and erection of vertical mild steel cylindrically welded in storage tanks. Criteria for design of lined canals and liner for selection of type of lining. Code of practice for selection and design of belt conveyors. PVC handrails covers. Design and construction of buried thin-wall pipes.	
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 97 OF 114

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	<p>REFERENCE CODES AND STANDARDS FOR CONTROL AND INSTRUMENTATION</p> <p>The design, manufacture, inspection, testing & installation of all equipment and system covered under this specification shall conform to the latest editions of codes and standards mentioned below and all other applicable VDE, IEEE, ANSI, ASME, NEC, NEMA, ISA AND Indian Standards and their equivalents.</p> <p>Temperature Measurements</p> <ol style="list-style-type: none"> 1. Instrument and apparatus for temperature measurement - ASME PTC 19.3 (1974). 2. Temperature measurement - Thermocouples ANSI MC 96.1 - 1982. 3. Temperature measurement by electrical Resistance thermometers - IS:2806. 4. Thermometer - element - Platinum resistance - IS:2848. <p>Pressure Measurements</p> <ol style="list-style-type: none"> 1. a) Instruments and apparatus for pressure measurement - ASME PTC 19.2 (1964). <li style="padding-left: 2em;">b) Electronic transmitters BS:6447. 2. Bourdon tube pressure and vacuum gauges - IS:3624 - 1966. 3. Process operated switch devices (Pr. Switch) BS-6134. <p>Flow Measurements</p> <p>Instruments and apparatus for flow measurements - ASME PTC 19.5 (1972) Interim supplement, Part-II.</p> <p>Measurement of fluid flow in closed conduits - BS-1042.</p> <p>Electronic Measuring Instrument & Control Hardware/ Software</p> <ol style="list-style-type: none"> 1. Automatic null balancing electrical measuring instruments - ANSI C 39.4 (Rev. 1973): IS:9319. 2. Safety requirements for electrical and electronic measuring and controlling instrument - ANSI C 39.5 - 1974. 3. Compatibility of analog signals for electronic industrial process instruments - ISA - S 50.1 (1982) ANSI MC 12.1 - 1975. 4. Dynamic response testing of process control instrumentation ISA - S 26 (1968). 			
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p>GENERAL TECHNICAL REQUIREMENTS</p>	<p>PAGE 98 OF 114</p>	


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	<ol style="list-style-type: none"> 5. Surge Withstand Capability (SWC) tests - ANSI C 37.90 a/IEEE-472 or suitable class of IEC-255-4 equivalent to ANSI C37.90a/IEEE-472. 6. Printed circuit boards - IPC TM - 650, IEC 326 C. 7. General requirement and tests for printed wiring boards - IS 7405 (Part-I) 1973. 8. Edge socket connectors - IEC 130-11. 9. Requirements and methods of testing of wire wrap terminations DIN 41611 Part-2. 10. Dimensions of attachment plugs & receptacles - ANSI C 73 - 1973 (Supplement ANSI C 73 a - 1980). 11. Direct acting electrical indicating instrument - IS:1248 - 1968 (R). 12. Standard Digital Interface for Programmable Instrumentation - IEEE-488.2 - 1990. 13. Information Processing Systems - Local Area Networks - Part 2 : Logical Link Control - IEEE-802.2 - 1989. 14. Standard for Local Area Networks : Carrier Sense Multiple Access with Collision Detection - IEEE-802.3 - 1985. 15. Supplements A, B, C and E to Carrier Sense Multiple Access with Collision Detection - IEEE-802.3 - 1988. 16. Standard for Local Area Networks : Token - Passing Bus Access Method - IEEE-802.4 - 1985. 17. Standard for Local Area Networks : Token - Ring Access Method and Physical Layer Specification - IEEE-802.5 - 1985. 18. IEEE Guide to Software Requirements Specifications - IEEE-830 - 1984. 19. Hardware Testing of Digital Process Computers - ISA RP55.1 - 1983. 20. Electromagnetic Susceptibility of Process Control Instrumentation - SAMA PMC 33.1 - 1978. 21. Interface Between the Data Terminal Equipment and Data Circuit - Terminating Equipment Employing Serial Binary Data Interchange - EIA-232-D-1987. 22. Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment, Part 3 : Radiated Electromagnetic Field Requirements - IEC 801-3-1984. 			
<p style="text-align: center;">TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p style="text-align: center;">GENERAL TECHNICAL REQUIREMENTS</p>	<p style="text-align: center;">PAGE 99 OF 114</p>	

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	<p>Instrument Switches and Contact</p> <ol style="list-style-type: none"> 1. Contact rating - AC services NEMA ICS 2 - 1978 (with revision through May 1983), Part - 2-125, A6000. 2. Contact rating - DC services NEMA ICS 2-1978 Part-2 125, N600. <p>Enclosures</p> <ol style="list-style-type: none"> 1. Type of Enclosures - NEMA ICS Part - 6 - 1978 (with Rev. 1 4/80) through 110.22 (Type 4 to 13). 2. Racks, panels and associated equipment - EIA : RS - 310 C- 1983 (ANSI C 83.9 - 1972). 3. Protection class for Enclosures, cabinets, control panels & desks - IS:2147 - 1962. <p>Apparatus, enclosures and installation practices in hazardous area</p> <ol style="list-style-type: none"> 1. Classification of hazardous area - NFPA 70 - 1984, Article 500. 2. Electrical Instruments in hazardous dust location - ISA - 512.11, 1973. 3. Intrinsically safe apparatus - NFPA 493 1978. 4. Purged and pressurised enclosure for electrical equipment in hazardous location - NFPA 496-1982. 5. Enclosures for Industrial Controls and Systems - NEMA IS 1.1 - 1977. <p>Sampling System</p> <ol style="list-style-type: none"> 1. Stainless steel material of tubing and valves for sampling system - ASTM A 296-82, Grade 7 P 316. 2. Submerged helical coil heat exchangers for sample coolers ASTM D11 92-1977. 3. Water and steam in power cycle - ASME PTC 19.11. 4. Standard methods of sampling system - ASTM D 1066-99. <p>Annunciators</p> <ol style="list-style-type: none"> 1. Specifications and guides for the use of general purpose annunciators - ISA S 19.1, 1979. 2. Surge withstand capability tests - ANSI C 37.90a - 1989/IEEE-472 or suitable class of IEC 255-4 equivalent to ANSI C37.90a 1989/IEEE-472 3. Damp heat cycling test - IS:2106 			
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p>GENERAL TECHNICAL REQUIREMENTS</p>	<p>PAGE 100 OF 114</p>	


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	<p>4. Specification for Electromagnetic Susceptibility - SAMA DMC 33, 1/78</p> <p>Protections</p> <ol style="list-style-type: none"> 1. Relays and relay system associated with electric power apparatus. ANSI C 37.90, 1 - 1989. 2. General requirements & tests for switching devices for control and auxiliary circuits including contactor relays - IS:6875 (Part-I) - 1973. 3. Turbine water damage prevention - ASME TDP-1-1980. 4. Boiler safety interlocks - NFPA Section 85 B - 1984, 85 C - 1991. <p>UPS System</p> <ol style="list-style-type: none"> 1. Practices and requirements for semi-conductor power rectifiers - ANSI C 34.2, 1973. 2. Relays and relays system associated with electrical power apparatus - ANSI C 3.90 - 1983. 3. Surge withstand capability test - ANSI C 37.90 1 -1989. 4. Performance testing of UPS - IEC 146. 5. Stationary cells & Batteries Lead Acid type (with tubular positive plates) specification IS-1651-1991. 6. Recommended practice for sizing large lead storage batteries for generating stations & sub-stations - IEEE-485-1985. 7. Printed Circuit Board - IPC TM 650, IEC 326C. 8. General Requirements & tests for printed wiring boards, IS:7405 (Part-I) 1973. <p>Control Valves</p> <ol style="list-style-type: none"> 1. Control valve sizing - Compressible & Incompressible fluids - ISA S 75.01-1985. 2. Face to face dimensions of control valves - ANSI B 16.00 - 1973. 3. ISA Hand Book of Control Valves - (ISBN : B: 1047-087664-234-2). 4. Codes for pressure piping - ANSI B 31.1 5. Control Valve leak class - ISA RP 39.6 			
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p>GENERAL TECHNICAL REQUIREMENTS</p>	<p>PAGE 101 OF 114</p>	

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	<p>Process Connection & Piping</p> <ol style="list-style-type: none"> 1. Codes for pressure piping "power piping" - ANSI B 31.1. 2. Seamless carbon steel pipe ASTM - A - 106. 3. Forged & Rolled Alloy steel pipe flanges, forged fittings and valves and parts - ASTM - A - 182. 4. Material for socket welded fittings - ASTM - A - 105. 5. Seamless ferritic alloy steep pipe - ASTM - A - 335. 6. Pipe fittings of wrought carbon steel and alloy steel - ASTM - A - 234. 7. Composition bronze of ounce metal castings - ASTM - B - 62. 8. Seamless Copper tube, bright annealed - ASTM - B - 168. 9. Seamless copper tube - ASTM - B - 75. 10. Dimension of fittings - ANSI - B - 16.11. 11. Valves flanged and butt welding ends - ANSI - B - 16.34. <p>Instrument Tubing</p> <ol style="list-style-type: none"> 1. Seamless carbon steel pipe - ASTM - A 106. 2. Material of socketweld fittings - ASTM - A105. 3. Dimensions of fittings - ANSI - B - 16.11. 4. Code for pressure piping, welding, hydrostatic testing - ANSI B 31.1. <p>Cables</p> <ol style="list-style-type: none"> 1. Thermocouples extension wires/cables - ANSI MC 96.1 - 1992. 2. Requirements for copper conductor-Wiring cables for telecommunications & information processing system - VDE:0815. 3. Colour coding of single or multi-pair cables - ICEA - S - 61-402 (third edition) NEMA WCS - 1979 with revisions through 2/83. 4. Insulation & Sheathing compounds for cables : VDE 0207 (Part-4, 5 & 6). 5. Guide design and installation of cable systems in power generating stations (insulation, jacket materials) - IEEE Std. 422-1977. 6. Rules for Testing insulated cables and flexible cables : VVDE - 0472 7. Requirements of vertical flame propagation test - IEEE 383 - 1974 (R 1980) 			
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p>GENERAL TECHNICAL REQUIREMENTS</p>	<p>PAGE 102 OF 114</p>	

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		
	<div style="text-align: right; border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;"> एनटीपीसी NTPC </div> <p>8. Standard specification for tinned soft or annealed copper wire for electrical purpose - ASTM B-33-81.</p> <p>9. Oxygen index and temperature index test - ASTM D - 2863.</p> <p>10. Smoke density measurement test - ASTM D - 2843.</p> <p>11. Acid gas generation test - IEC - 754 - 1.</p> <p>12. Swedish Chimney test - SEN - 4241475 (F3).</p> <p>13. Teflon (FEP) insulation & sheath test - ASTM D - 2116.</p> <p>14. Thermocouple compensating cables - Testing requirements & sampling plan IS:8784.</p> <p>15. PVC insulated electric cables for working voltage upto and including 1100 V - IS:1554 (Part-I).</p> <p>Cable Trays, Conduits</p> <p>1. Guide for design and installation of cable systems in power generating station (Cable trays, support systems, conduits) - IEEE Std. 422, 1977, NEMA VE-1 1979, NFPA 70-1984.</p> <p>2. -do- Test Standards. NEMA VE-1-1979.</p> <p>3. Zinc coating "hot dip" on assembled products for galvanising of carbon steel cable trays - ASTM A - 386-78.</p> <p>Public Address System</p> <p>1. Specifications for loud speakers - IS:7741 (Part-I, II and III)</p> <p>2. Code of safety requirement for electric mains operated audio amplifiers - IS:1301</p> <p>3. Specification for Public Address Amplifiers - IS:10426.</p> <p>4. Code of practice for outdoor installation of PA system - IS:1982.</p> <p>5. Code of practice for installation for indoor amplifying and sound distribution system - IS:1881.</p> <p>6. Basic environmental testing procedures for electronic and electrical items - IS:9000.</p> <p>7. Characteristics and methods of measurements for sound system equipment - IS:9302</p> <p>8. Code of practice of electrical wiring installations (System voltage not exceeding 650 volts) - IS:732</p>		
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CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	<p>9. Rigid steel conduits for electric wiring - IS:9537 (Part-I and II)</p> <p>10. Fittings for rigid steel conduits for electrical wiring - IS:2667</p> <p>11. Degree of protection provided by enclosure for low voltage switchgear and control gear - IS:2147.</p> <p>Vibration Monitoring System</p> <p>1. API 670 - 1994</p> <p>2. BS : 4675 Part-2</p>			
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-4540-001A-2</p>	<p>GENERAL TECHNICAL REQUIREMENTS</p>	<p>PAGE 104 OF 114</p>	

ANNEXURE-III

		Project Package Supplier Contractor No. :	Stage ::	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL						DOC. NO.:		
				Item	QP/ Insp. Cat.	QP No.	QP Sub. Schedule	QP approval schedule	Proposed sub-supplier	Place	Sub-suppliers approval status / category	Sub-supplier Details submission schedule
S.												
N.												

LEGENDS

SYSTEM SUPPLIER/SUB-SUPPLIER APPROVAL STATUS CATEGORY (SHALL BE FILLED BY NTPC)

A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter “A” in the list alongwith the condition of approval, if any.

DR – For these items “Detailed required” for NTPC review. To be identified with letter “DR” in the list.

NOTED – For these items vendors are approved by Main Supplier and accepted by NTPC without specific vendor approval from NTPC. To be identified with “NOTED.”

QP/INSPN CATEGORY:

CAT-I : For these items the Quality Plans are approved by NTPC and the final acceptance will be on physical inspection witness by NTPC.

CAT-II : For these items the Quality Plans approved by NTPC. However no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis review of documents as per approved QP.

CAT-III : For these items Main Supplier approves the Quality Plans. The final acceptance by NTPC shall be on the basis certificate of conformance by the main supplier.

UNITS/WORKS : Place of manufacturing Place of Main Supplier of multi units/works.

FORMAT NO.: QS-01-QAI-P-1/F3-R0

1/1

Engg. Div. / QA&I

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ANNEXURE-V

Sl. No.	DRG No. for Weld Location and Identification mark	Description of parts to welded	Matl. Spec.	Dimensions	Process of welding	Type of Weld	Electrode filler spec.	WPS. No.	Min. pre-heat	Heat treatment		NDT method/ Quantum	REF	Spec. No. ACC Norm Ref.	Remarks
										Temp.	Holding time				
<p>Project Contractor No. : _____ Stage : _____</p> <p>Contractor No. : _____</p> <p>System : _____</p> <p>FIELD WELDING SCHEDULE (To be raised by the contractor) Welding Code:</p>															
<p>DOC. NO.:</p> <p>REV. NO.:</p> <p>DATE :</p> <p>PAGE : OF</p>															
NOTES:															
SIGNATURE															
FORMAT															
												1/1			

CLAUSE NO.

GENERAL TECHNICAL REQUIREMENTS (Annexure-VI)



S. No.	Description of Drgs./Docs.	No. of Prints	No. of Portable Hard Disk
1	Drawings, Data sheets, Design calculations, Purchase specifications and other documents		
	First submission and submission with major changes		
	▪ Layout (A0&A1 sizes)	4	-
	▪ Other Drawings/Documents (A0 & A1 sizes)	2	-
	▪ P&ID (All sizes)	4	-
	a) Final drawings/documents (Directly to site)	6	2
	b) "As Built" Drawing/Documents (Directly to site)	6	2
	c) Analysis reports of Equipments / piping / structures components/system employing software packages as detailed in the specifications.	2	2
2	Erection Manual (Directly to site)	4 sets	2
3	i) Operation & Maintenance manual First Submission	1 set	--
	ii) Final Submission (Directly to site)	4 sets	2
4	i) Plant Hand Book First Submission	1	1
	ii) Final Submission (Directly to site)	4 sets	2
5	i) Commissioning and Performance Test Procedure manual First Submission	1 set	--
	ii) Final Submission (Directly to site)	4 sets	2

TALCHER THERMAL POWER PROJECT
STAGE-III (2X660 MW)
EPC PACKAGE

TECHNICAL SPECIFICATIONS
SECTION VI, PART-C
BID DOC. NO.:CS-4540-001A-2

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CLAUSE NO.

GENERAL TECHNICAL REQUIREMENTS (Annexure-VI)



S. No.	Description of Drgs./Docs.	No. of Prints	No. of Portable Hard Disk
6	Performance and Functional Guarantee Test Report		
	i) First Submission	2 sets	—
	ii) Approved Copies (Direct to Site)	4 sets	2
7	Project Completion Report (Directly to site)	6 sets	2

TALCHER THERMAL POWER PROJECT
STAGE-III (2X660 MW)
EPC PACKAGE

TECHNICAL SPECIFICATIONS
SECTION VI, PART-C
BID DOC. NO.:CS-4540-001A-2

GENERAL TECHNICAL
REQUIREMENTS
Annexure-VI

PAGE
109 OF 114

एनटीपीसी NTPC	CORPORATE QUALITY ASSURANCE/ कॉरपोरेट गुणवत्ता आश्वासन MAIN CONTRACTOR'S PROPOSAL CUM EVALUATION REPORT मुख्य संविदाकार प्रस्ताव सह मुल्यांकन रिपोर्ट
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Ref No: संदर्भ सं.:				Date: तिथि:			
i.	Main Contractor मुख्य संविदाकार						
ii.	Project परियोजना						
iii.	Package Name पैकेज का नाम				Package No पैकेज सं.		
iv.	Proposed Item/Scope of Sub-contracting उप-संविदा(अनुबंध) का प्रस्तावित मद/ दायरा						
v.	Item covered under निम्नलिखित के अंतर्गत शामिल मद	Schedule-1 /अनुसूची- 1			As per contract clause No- अनुबंध के अनुसार खंड सं.-- -		
		Schedule-2 अनुसूची- -2					
vi.	<p>If item is Schedule-1 and proposed sub-vendor is indigenous, Main Contractor to explain how the contractual provisions will be fulfilled</p> <p>/यदि मद अनुसूची -1 है और प्रस्तावित उप-विक्रेता स्वदेशी है, तो मुख्य संविदाकार को स्पष्ट करना होगा कि संविदा/अनुबंध के प्रावधान कैसे पूरे किए जाएंगे</p>						
vii.	Name and Address of the proposed Sub-vendor's works /प्रस्तावित सब-वेंडर का नाम तथा पता						
viii.	PO placement date/ Start of manufacturing (if self-manufactured) as per L2 network पीओ नियोजन की तिथि / एल- 2 नेटवर्क के अनुसार विनिर्माण (यदि स्व-निर्मित है) की शुरुआत						
ix.	Item Description (Type/Size/Rating/Scope of Sub-Contracting) मद का विवरण (प्रकार / आकार / रेटिंग / उप-अनुबंध का दायरा)	Total quantity of proposed item envisaged in this package (Nos/ Running Meters/ Kgs/ Tons etc) इस पैकेज में परिकल्पित प्रस्तावित मद की कुल मात्रा (संख्या / क्रियाशील मीटर / किलोग्राम / टन आदि)	Quantity proposed to be procured from proposed sub-vendor (Nos/ Running Meters /Kgs /Tons etc) प्रस्तावित उप-विक्रेता (संख्या / क्रियाशील मीटर / किलोग्राम / टन आदि) से खरीदी जाने वाली मात्रा	Timeline for quantity requirements as per project schedule & whether the proposed Sub-vendor equipped with adequate capacity to supply proposed order quantity in time / परियोजना समय सूची के अनुसार मात्रा आवश्यकताओं के लिए समय-सीमा और क्या प्रस्तावित उप-विक्रेता समय पर प्रस्तावित मांग की मात्रा की आपूर्ति करने में पूरी तरह से सक्षम है			
x.	Supply experience of the proposed sub-vendor (including supplies to Main Contractor, if any) for similar item/scope of sub-contracting, for last 3 years (Note:- Only relevant experience details w.r.t. proposed item/scope of subcontracting to be brought out here) पिछले 3 वर्षों के लिए उप-अनुबंध के समान मद / दायरे के लिए प्रस्तावित सब-वेंडर (मुख्य संविदाकार हेतु						

CORPORATE QUALITY ASSURANCE/ कॉर्पोरेट गुणवत्ता आश्वासन
MAIN CONTRACTOR'S PROPOSAL CUM EVALUATION REPORT
मुख्य संविदाकार प्रस्ताव सह मुल्यांकन रिपोर्ट

आपूर्ति, यदि कोई हो, सहित) का आपूर्ति अनुभव (नोट: - उप-अनुबंध के प्रस्तावित मद / दायरे के संबंध में केवल प्रासंगिक अनुभव के विवरण का उल्लेख हो									
Project/Package परियोजना/पैकेज	Customer Name ग्राहक का नाम	Supplied Item (Type/Rating/Model /Capacity/Size etc) आपूर्ति मद (प्रकार/रेटिंग /माडल /क्षमता/आकार आदि)	PO ref no/date पीओ संदर्भ सं. /तिथि	Supplied Quantity आपूर्ति की मात्रा	Date of Supply आपूर्ति की तिथि				
We confirm that as per our assessment, the proposed sub-vendor has requisite capabilities & supply experience and is suitable for supplying the proposed item/scope of sub-contracting/हम अपने आकलन के अनुसार इस बात की पुष्टि करते हैं कि, प्रस्तावित उप-विक्रेता के पास अपेक्षित क्षमता और आपूर्ति करने का अनुभव है और उप-अनुबंध के दायरे /प्रस्तावित मद की आपूर्ति के लिए उपयुक्त है।									
Name: नाम:		Desig: पद:		Contact No: दूरभाष सं.:		Sign: हस्ताक्षर:		Date: तिथि:	

Company's Seal/Stamp:- कंपनी का मुहर:-

i.	Item/Scope of Sub-contracting उप-संविदा(अनुबंध) का मद/ दायरा	
ii.	Address of the registered office पंजीकृत कार्यालय का पता 	Details of Contact Person संपर्क व्यक्ति का विवरण (Name, Designation, Mobile, Email) (नाम, पदनाम, मोबाइल, ईमेल)
iii.	Name and Address of the proposed Sub-vendor's works where item is being manufactured प्रस्तावित उप-विक्रेता के कार्यों का नाम और पता, जहां मद का निर्माण किया जा रहा है 	Details of Contact Person: संपर्क व्यक्ति का विवरण (Name, Designation, Mobile, Email) (नाम, पदनाम, मोबाइल, ईमेल)
iv.	Annual Production Capacity for proposed item/scope of sub-contracting उप-संविदा(अनुबंध) के प्रस्तावित मद / दायरे के लिए वार्षिक उत्पादन क्षमता	
v.	Annual production for last 3 years for proposed item/scope of sub-contracting उप-संविदा(अनुबंध) के प्रस्तावित मद / दायरे के लिए पिछले 3 वर्षों का वार्षिक उत्पादन	
vi.	Details of proposed works प्रस्तावित कार्यों का विवरण	
1.	Year of establishment of present works वर्तमान फैक्टरी की स्थापना का वर्ष	
2.	Year of commencement of manufacturing at above works उपरोक्त फैक्टरी में निर्माण कार्य शुरू होने का वर्ष	
3.	Details of change in Works address in past (if any) पूर्व में फैक्टरी स्थल में परिवर्तन का विवरण (यदि कोई हो)	
4.	Total Area कुल क्षेत्र	
	Covered Area शामिल क्षेत्र	
5.	Factory Registration Certificate फैक्टरी पंजीकरण प्रमाण पत्र	Details attached at Annexure – F2.1 विवरण अनुलग्नक- एफ 2.1 पर संलग्न है
6.	Design/ Research & development set-up डिजाइन / अनुसंधान और विकास सेटअप (No. of manpower, their qualification, machines & tools employed etc.) (श्रमिकों की संख्या, उनकी योग्यता, मशीन और उपलब्ध उपकरण आदि)	Applicable / Not applicable if manufacturing is as per Main Contractor/purchaser design Details attached at Annexure – F2.2 (if applicable) लागू / लागू नहीं, अगर विनिर्माण मुख्य संविदाकार / खरीददार के डिजाइन के अनुसार है। विवरण अनुलग्नक –एफ 2.2 पर संलग्न है। (यदि लागू हो)
7.	Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc) मैनपावर विवरण के साथ समग्र संगठन का चार्ट (डिजाइन / विनिर्माण / गुणवत्ता आदि)	Details attached at Annexure – F2.3 विवरण अनुलग्नक – F2.3 में संलग्न है।
8.	After sales service set up in India, in case of foreign sub-vendor(Location, Contact Person, Contact details etc.) भारत	Applicable / Not applicable लागू / लागू नहीं

	में विक्री सेवा की स्थापना के बाद, विदेशी उप-विक्रेता के मामले में(स्थल , संपर्क व्यक्ति, संपर्क विवरण आदि)	<i>Details attached at Annexure – F2.4</i> विवरण अनुलग्नक -2.4 पर संलग्न है।			
9.	<i>Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any</i> फ्लोचार्ट सहित विनिर्माण प्रक्रिया निष्पादन योजना , जिसमें आउटसोर्स प्रक्रिया, यदि कोई हो, सहित कच्चे माल से तैयार उत्पाद तक विनिर्माण के विभिन्न चरणों को दर्शाया गया हो,	<i>Details attached at Annexure – F2.5</i> विवरण अनुलग्नक - F2.5में संलग्न है।			
10.	<i>Sources of Raw Material/Major Bought Out Item</i> कच्चे माल के स्रोत / खरीदे हुए मुख्य मद	<i>Details attached at Annexure – F2.6</i> विवरण अनुलग्नक - F2.6में संलग्न है।			
11.	<i>Quality Control exercised during receipt of raw material/BOI, in-process , Final Testing, packing</i> कच्चे माल / खरीदे हुए मद, प्रक्रियाबद्ध, अंतिम परीक्षण, पैकिंग करते समय गुणवत्ता नियंत्रण	<i>Details attached at Annexure – F2.7</i> विवरण अनुलग्नक - F2.7 पर संलग्न है			
12.	<i>Manufacturing facilities (List of machines, special process facilities, material handling etc.)</i> विनिर्माण सुविधा(मशीनों की सूची , विशेष प्रक्रिया सुविधाएं, सामग्री रख-रखाव आदि)	<i>Details attached at Annexure – F2.8</i> विवरण अनुलग्नक - F2.8में संलग्न है।			
13.	<i>Testing facilities (List of testing equipment)</i> परीक्षण सुविधाएं(परीक्षण उपकरण की सूची)	<i>Details attached at Annexure – F2.9</i> विवरण अनुलग्नक – F2. 9 में संलग्न है।			
14.	<i>If manufacturing process involves fabrication then-</i> यदि निर्माण प्रक्रिया में फेब्रिकेशन की गई है तो- <i>List of qualified Welders</i> पात्र वेल्डर की सूची <i>List of qualified NDT personnel with area of specialization</i> विशेषज्ञता के क्षेत्र सहित पात्र एनडीटी कार्मिकों की सूची	<i>Applicable / Not applicable</i> लागू / लागू नहीं <i>Details attached at Annexure – F2.10</i> विवरण अनुलग्नक - F2.10में संलग्न है। <i>(if applicable)</i> लागू / लागू नहीं			
15.	<i>List of out-sourced manufacturing processes with Sub-Vendors’ names & addresses</i> सब-वेंडर द्वारा बाह्य स्रोतों (उनके नाम और पते सहित)से करवाएं गए निर्माण प्रक्रियाओं की सूची	<i>Applicable / Not applicable</i> लागू / लागू नहीं <i>Details attached at Annexure. –F2.11</i> विवरण अनुलग्नक - F2.10में संलग्न है। <i>(if applicable)</i> (यदि लागू हो)			
16.	<i>Supply reference list including recent supplies</i> नवीनतम आपूर्ति सहित आपूर्ति संदर्भ सूची	<i>Details attached at Annexure – F2.12</i> विवरण अनुलग्नक - F2.12 में संलग्न है। <i>(as per format given below)</i> (नीचे दिए गए प्रारूप के अनुसार)			
<i>Project/ package परियोजना /पैकेज</i>	<i>Customer Name</i> ग्राहक का नाम	<i>Supplied Item (Type/Rating/Model /Capacity/Size etc)</i> आपूर्ति की गई वस्तु (प्रकार / रेटिंग / मॉडल / क्षमता / आकार आदि)	<i>PO ref no/date</i> पीओ संदर्भ सं. / तिथि	<i>Supplied Quantity</i> आपूर्ति की मात्रा	<i>Date of Supply</i> आपूर्ति की तारीख
17.	<i>Product satisfactory performance feedback letter/certificates/End User Feedback</i> उत्पाद के संतोषजनक प्रदर्शन संबंधी फीडबैक पत्र / प्रमाण पत्र / अंतिम उपयोगकर्ता फीडबैक			<i>Attached at annexure - F2.13</i> अनुलग्नक F2. 3पर संलग्न है	
18.	<i>Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product</i>			<i>Applicable / Not applicable</i> लागू / लागू नहीं	

**CORPORATE QUALITY ASSURANCE/ कॉर्पोरेट गुणवत्ता आश्वासन****SUB-VENDOR QUESTIONNAIRE/ सब-वेंडर प्रश्नावली**

	<i>(similar or higher rating)</i> प्रस्तावित उत्पाद (एक समान या उच्च रेटिंग वाले) के लिए टाइप टेस्ट रिपोर्ट (टाइप टेस्ट विवरण, रिपोर्ट संख्या, एजेंसी, जांच की तारीख) का सारांश नोट: - रिपोर्ट प्रस्तुत करने की आवश्यकता नहीं है Note:- Reports need not to be submitted	Details attached at Annexure – F2.14 विवरण अनुलग्नक - F2.1 4में संलग्न है (if applicable) (यदि लागू हो)
19.	Statutory / mandatory certification for the proposed product प्रस्तावित उत्पाद के लिए वैधानिक / अनिवार्य प्रमाणीकरण	Applicable / Not applicable लागू / लागू नहीं Details attached at Annexure – F2.15 (if applicable) (यदि लागू हो)
20.	Copy of ISO 9001 certificate आईएसओ 9001 प्रमाण पत्र की प्रति (if available) (यदि उपलब्ध हो)	Attached at Annexure – F2.16 अनुलग्नक में संलग्न - F2.1 6 है
21.	Product technical catalogues for proposed item (if available) प्रस्तावित मद के लिए उत्पाद तकनीकी कैटलॉग (यदि उपलब्ध हो)	Details attached at Annexure – F2.17 विवरण अनुलग्नक - F2.1 7 में संलग्न है

Name:		Desig:		Sign:		Date:	
नाम:		पद:		हस्ता		तिथि:	
				क्षर:			

Company's Seal/Stamp:- कंपनी की मुहर / मोहर: -

**TITLE****2 X 660 MW TALCHAR TPP STAGE-III
MILL REJECT SYSTEM (CONVEYOR TYPE)****SPECIFIC TECHNICAL REQUIREMENTS**

SPECIFICATION NO. PE-TS-497-160-A101

SECTION - I

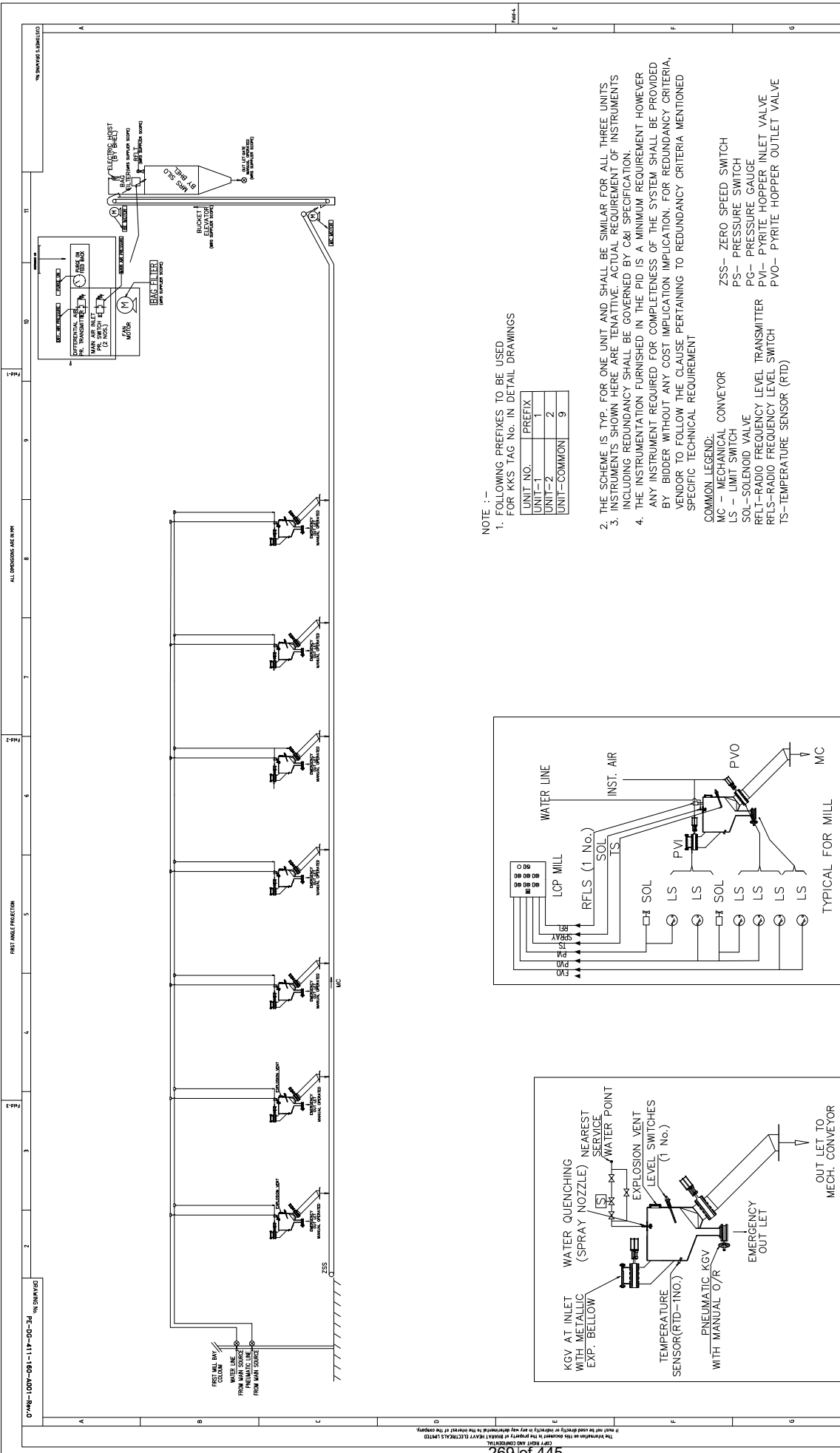
REV 01

Sub Section -IA

Date APR 2023

Page 1 of 1

ANNEXURE – X
INPUT DRAWINGS

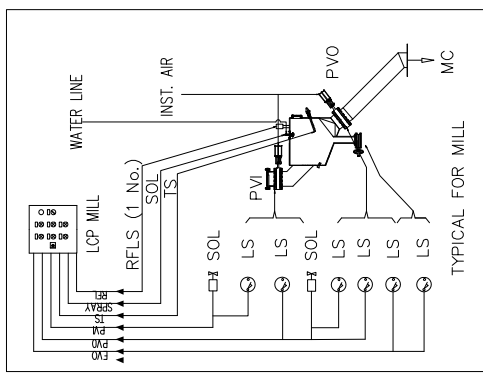


NOTE :-
 1. FOLLOWING PREFIXES TO BE USED FOR KKS TAG No. IN DETAIL DRAWINGS

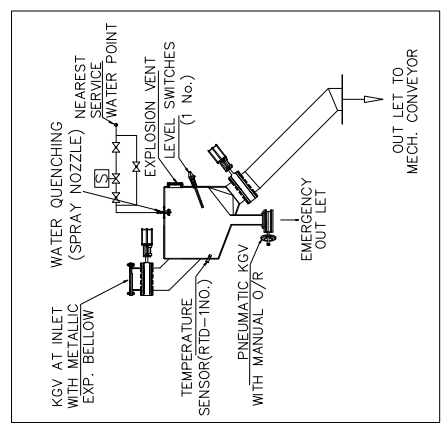
UNIT NO.	PREFIX
1	1
2	2
COMMON	9

- THE SCHEME IS TYP. FOR ONE UNIT AND SHALL BE SIMILAR FOR ALL THREE UNITS INCLUDING REDUNDANCY. ACTUAL REQUIREMENT OF INSTRUMENTS SHALL BE GOVERNED BY C&I SPECIFICATION.
- ANY INSTRUMENTATION FURNISHED IN THE PID IS A MINIMUM REQUIREMENT HOWEVER BY BIDDER WITHOUT ANY COST IMPLICATION. FOR REDUNDANCY CRITERIA, VENDOR TO FOLLOW THE CLAUSE PERTAINING TO REDUNDANCY CRITERIA MENTIONED SPECIFIC TECHNICAL REQUIREMENT

COMMON LEGEND:
 MC - MECHANICAL CONVEYOR
 LS - LIMIT SWITCH
 SOL - SOLENOID VALVE
 RFL - RADIO FREQUENCY LEVEL TRANSMITTER
 RFLS - RADIO FREQUENCY LEVEL SWITCH
 TS - TEMPERATURE SENSOR (RTD)



ALL SOLENOIDS SHALL BE DOUBLE COILED



CUSTOMER: NTPC LIMITED.	
CUSTOMER'S CONSULTANT:	STATUS: CONTRACT
JOB No. 487	
DISTRIBUTION	
TO:	DATE:
BY:	DATE:
REV. DATE	REV. DATE
BY: S.K.S.	PKC
APPD:	RN
CHKD:	VV/GB
PROJECT: TALCHAR TPP STAGE-III (2X860 MW).	
DRAWING No. PE-TS-487-160-A001	
PROJECT: BHARAT HEAVY ELECTRICALS LTD POWER SECTOR MANAGEMENT NEW DELHI	
TITLE: FLOW DIAGRAM FOR MILL REJECTS HANDLING SYSTEM	
SCALE:	
SHEET 1 OF 1	

**TITLE****2 X 660 MW TALCHAR TPP PAHSE-III
MILL REJECT SYSTEM (CONVEYOR TYPE)****SPECIFIC TECHNICAL REQUIREMENTS**

SPECIFICATION NO. PE-TS-497-160-A101

SECTION - I

REV 0

Sub Section

Date APR 2023

Page 1 of 1

SUB-SECTION IB – Specific Technical Requirement (Electrical)




**ELECTRICAL EQUIPMENT SPECIFICATION
FOR
MILL REJECT SYSTEM**

2X660 MW TALCHER THERMAL POWER PROJECT

SPECIFICATION NO.
VOLUME NO. : II-B
SECTION : C
REV NO.: 00 DATE: 27.03.23
SHEET : 1 OF 2

**TECHNICAL SPECIFICATION
FOR
MILL REJECT SYSTEM
(ELECTRICAL PORTION)**

	ELECTRICAL EQUIPMENT SPECIFICATION FOR MILL REJECT SYSTEM 2X660 MW TALCHER THERMAL POWER PROJECT	SPECIFICATION NO.
		VOLUME NO. : II-B
		SECTION : C
		REV NO.: 00 DATE: 27.03.23
		SHEET : 2 OF 2

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 ***MILL REJECT 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 enclosures:

- a) Electrical scope between BHEL & vendor.
- b) Technical specification, datasheets & quality plans for motors.
- c) Technical Specification, datasheets & quality plans for cabling.
- d) Electrical Load data format.
- e) Cable schedule format.
- f) Typical cable tray details.

ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR (FOR EPC PROJECTS)

PACKAGES : MILL REJECT SYSTEM
 SCOPE OF VENDOR: SUPPLY, ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT
 PROJECT: 2 X 660 MW TALCHER TPP STAGE-III (EPC)

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	415V MCC	BHEL	BHEL	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	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	BHEL	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	BHEL	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 BHEL	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	BHEL	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	BHEL	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

ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR(FOR EPC PROJECTS)

PACKAGES : MILL REJECT SYSTEM
SCOPE OF VENDOR: SUPPLY, ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT
PROJECT: 2 X 660 MW TALCHER TPP STAGE-III (EPC)

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	BHEL	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	BHEL	
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	-	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.

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 – 02

MOTORS

CLAUSE NO.	TECHNICAL REQUIREMENTS																						
	MOTORS																						
1.00.00	GENERAL REQUIREMENTS																						
1.01.00	<p>This chapter has to be read in conjunction with sub-section B-0 "General electrical specification" of Technical specification Section- VI, Part-B and Sub-Section-IIB Electrical system/Equipment of Technical Specifications Section-VI, Part-A"</p> <p>Degree of Protection</p> <p>Degree of protection for various enclosures as per IEC60034-05 shall be as follows :-</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 5%;">i)</td> <td style="width: 45%;">Indoor motors</td> <td style="width: 10%;">-</td> <td style="width: 40%;">IP 55</td> </tr> <tr> <td>ii)</td> <td>Outdoor motors</td> <td>-</td> <td>IP 55 (Additional Canopy to be provided)</td> </tr> <tr> <td>iii)</td> <td>Cable box-indoor area</td> <td>-</td> <td>IP 55</td> </tr> <tr> <td>iv)</td> <td>Cable box-Outdoor area</td> <td>-</td> <td>IP 55</td> </tr> </table>			i)	Indoor motors	-	IP 55	ii)	Outdoor motors	-	IP 55 (Additional Canopy to be provided)	iii)	Cable box-indoor area	-	IP 55	iv)	Cable box-Outdoor area	-	IP 55				
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2.00.00	CODES AND STANDARDS																						
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3.02.00	DC Motors: Shunt wound.																						
4.00.00	RATING																						
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5.00.00	TEMPERATURE RISE																						
	<p>Air cooled motors</p> <p>70 deg. C by resistance method for both thermal class 130(B) & 155(F) insulation.</p> <p>Water cooled</p> <p>80 deg. C over inlet cooling water temperature mentioned elsewhere, by resistance method for both thermal class 130(B) & 155(F) insulation.</p>																						
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-4540-001A-2 279 of 445	SUB SECTION-II-B-02 MOTORS	PAGE 1 OF 4																				

CLAUSE NO.	TECHNICAL REQUIREMENTS		
<p>6.00.00</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>OPERATIONAL REQUIREMENTS</p> <p>Starting Time</p> <p>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.</p> <p>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.</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>Torque Requirements</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>NOT USED.</p>		
<p>7.00.00</p> <p>7.01.00</p> <p>7.02.00</p> <p>7.03.00</p>	<p>DESIGN AND CONSTRUCTIONAL FEATURES</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 & RTDs shall be provided. However for flame proof 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 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>Type : Electrolytic grade Copper conductor, Non-hygroscopic, oil resistant, flame resistant Insulation.</p> <p>Starting duty : Two hot starts in succession, with motor initially at normal running temperature.</p> <p>However, conveyor motors shall be suitable for 3 consecutive hot starts</p> <p>11kV, 6.6 KV & 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 & interturn insulation surge withstand level shall be as per IEC-60034 part-15.</p>		
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-4540-001A-2 280 of 445</p>	<p>SUB SECTION-II-B-02 MOTORS</p>	<p>PAGE 2 OF 4</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS		
	<p>240VAC, : Thermal Class (F) or better 415V AC & 220V DC motors</p> <p>7.04.00 Motors rated above 1000KW shall have insulated bearings/housing to prevent flow of shaft currents.</p> <p>7.05.00 Motors with heat exchangers shall have dial type thermometer with adjustable alarm contacts to indicate inlet and outlet primary air temperature.</p> <p>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 vibration pads.</p> <p>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 three numbers duplex RTDs connected to three numbers dual input transmitters with display. However for air compressor, being high speed drive, each motor bearing shall be provided with minimum two numbers of duplex RTDs connected to two numbers dual input transmitters with display unit.7.08.00 Motor body shall have two earthing points on diagonally opposite sides.</p> <p>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.</p> <p>7.10.00 3.3/6.6 KV motors shall be offered with dust tight phase segregated 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 (non magnetic material for single core cables) shall be provided.</p> <p>7.11.00 The spacing between gland plate & centre of bottom terminal stud shall be as per Table-I.</p> <p>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.</p> <p>7.13.00 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> <p>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.</p> <p>7.15.00 NOT USED</p> <p>8.00.00 NOT USED</p> <p>10.00.00 TYPE TEST</p> <p>10.01.00 HT MOTORS</p> <p>LIST OF TYPE TESTS TO BE CONDUCTED</p> <p>The following type tests shall be conducted on each type and rating of HT motor</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>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-4540-001A-2 281 of 445</p>	<p>SUB SECTION-II-B-02 MOTORS</p>	<p>PAGE 3 OF 4</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS		
10.02.00	<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>LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED</p> <p>The following type test reports shall be submitted for each type and rating of HT motor</p> <p>(a) Degree of protection test for the enclosure followed by IR, HV and no load run test.</p> <p>(b) Terminal box-fault level withstand test for each type of terminal box of HT motors only.</p> <p>(c) Lightning Impulse withstand test on the sample coil shall be as per clause no. 4.3 IEC-60034, part-15</p> <p>(d) Surge-withstand test on inter-turn insulation shall be as per clause no. 4.2 of IEC 60034, part-15</p> <p>LT Motors</p> <p>LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED</p> <p>The following type test reports shall be submitted for each type and rating of LT motor of above 100 KW only</p> <ol style="list-style-type: none"> 1. Measurement of resistance of windings of stator and wound rotor. 2. No load test at rated voltage to determine input current power and speed 3. Open circuit voltage ratio of wound rotor motors (in case of Slip ring motors) 4. Full load test to determine efficiency power factor and slip 5. Temperature rise test 6. Momentary excess torque test. 7. High voltage test 8. Test for vibration severity of motor. 9. Test for noise levels of motor(Shall be limited as per clause no 7.06.00 of this section) 10. Test for degree of protection and 11. Overspeed test. 12. Type test reports for motors located in fuel oil area having flame proof enclosures as per IS 2148 / IEC 60079-1 		
10.03.00	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.		
10.04.00	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.		
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-4540-001A-2 282 of 445	SUB SECTION-II-B-02 MOTORS	PAGE 4 OF 4

SUB-SECTION-B – 10

CABLING EARTHING

CLAUSE NO.	TECHNICAL REQUIREMENTS			
<p>1.00.00</p> <p>1.01.00</p> <p>1.02.00</p>	<p>CODES AND STANDARDS</p> <p>All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions as on date of opening of bid. In case of conflict between this specification and those (IS codes, standards, etc.) referred to herein, the former shall prevail. All work shall be carried out as per the following standards/ codes as applicable .</p> <p>IS:513 Cold rolled low carbon steel sheets and strips. IS:802 Code of practice for the use of Structural Steel in Overhead Transmission Line Towers. IS:1079 Hot Rolled carbon steel sheet & strips IS:1239 Mild steel tubes, tubulars and other wrought steel fittings IS:1255 Code of practice for installation and maintenance of power cables upto and including 33 KV rating IS:1367 Part-13 Technical supply conditions for threaded Steel fasteners. (Hot dip galvanized coatings on threaded fasteners). IS:2147 Degree of protection provided by enclosures for low voltage switchgear and control gear IS:2309 Code of Practice for the protection of building and allied structures against lightning. IS:2629 Recommended practice for hot dip galvanising of iron & steel IS:2633 Method for testing uniformity of coating on zinc coated articles. IS:3043 Code of practice for Earthing IS:3063 Fasteners single coil rectangular section spring washers. IS:6745 Methods for determination of mass of zinc coating on zinc coated iron & steel articles. IS:8308 Compression type tubular in- line connectors for aluminium conductors of insulated cables IS:8309 Compression type tubular terminal ends for aluminium conductors of insulated cables. IS:9537 Conduits for electrical installation. IS:9595 Metal - arc welding of carbon and carbon manganese steels - recommendations. IS:13573 Joints and terminations for polymeric cables. BS:476 Fire tests on building materials and structures IEEE:80 IEEE guide for safety in AC substation grounding IEEE:142 Grounding of Industrial & commercial power systems DIN 46267 (Part-II) Non tension proof compression joints for Aluminium conductors. DIN 46329 Cable lugs for compression connections, ring type ,for Aluminium conductors BS:6121 Specification for mechanical Cable glands for elastomers and plastic insulated cables. Indian Electricity Act. Indian Electricity Rules.</p> <p>Equipment complying with other internationally accepted standards such as IEC, BS, DIN, USA, VDE, NEMA etc. will also be considered if they ensure performance and constructional features equivalent or superior to standards listed above. In such a case, the Bidder shall clearly indicate the standard(s) adopted, furnish a copy in English of the latest revision of the standards alongwith copies of all official amendments and revisions in force as on date of opening of bid and shall clearly bring out the salient features for comparison.</p>			
<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-4540-001A-2</p>	<p>SUB SECTION-B-10 CABLING, EARTHING & LIGHTNING PROTECTION</p>	<p>Page 1 of 21</p>	

CLAUSE NO.	TECHNICAL REQUIREMENTS			
2.01.11	Conscious exceptions to the above guidelines may be accepted under special conditions but suitable measures should be taken at such location to: <ul style="list-style-type: none"> • Meet all safety requirements • Safeguard against fire hazards, mechanical damage, flooding of water, oil accumulation, electrical faults/interferences, etc 			
3.00.00	EQUIPMENT DESCRIPTION			
3.01.00	Cable trays, Fittings & Accessories			
3.01.01	Cable trays shall be ladder/perforated type as specified complete with matching fittings (like brackets, elbows, bends, reducers, tees, crosses, etc.) accessories (like side coupler plates, etc. and hardware (like bolts, nuts, washers, G.I. strap, hook etc.) as required. Cable tray shall be ladder type for power & control cables and perforated for instrumentation cables.			
3.01.02	Cable trays, fittings and accessories shall be fabricated out of rolled mild steel sheets free from flaws such as laminations, rolling marks, pitting etc. These (including hardware) shall be hot dip galvanized as per Clause No. 3.13.00 of this chapter.			
3.01.03	Cable trays shall have standard width of 150 mm, 300 mm & 600 mm and standard lengths of 2.5 metre. Thickness of mild steel sheets used for fabrication of cable trays and fittings shall be 2 mm. The thickness of side coupler plates shall be 3 mm.			
3.01.04	Cable troughs shall be required for branching out few cables from main cable route. These shall be U-shaped, fabricated of mild steel sheets of thickness 2 mm and shall be hot dip galvanized as per Clause No. 3.13.00 of this chapter. Troughs shall be standard width of 50 mm & 75 mm with depth of 25 mm.			
3.01.05	The tolerance for cable tray and accessories shall be as per IS 2102 (Part-1). Tolerance Class: - Coarse			
3.02.00	Support System for Cable Trays			
3.02.01	Cable tray support system shall be pre-fabricated out of single sheet as per enclosed tender drawings.			
3.02.02	Support system for cable trays shall essentially comprise of the two components i.e. main support channel and cantilever arms. The main support channel shall be of two types : (i) C1:- having provision of supporting cable trays on one side and (ii) C2:-having provision of supporting cable trays on both sides. The support system shall be the type described hereunder <ol style="list-style-type: none"> a. Cable supporting steel work for cable racks/cables shall comprise of various channel sections, cantilever arms, various brackets, clamps, floor plates, all hardwares such as lock washers, hexagon nuts, hexagon head bolt, support hooks, stud nuts, hexagon head screw, channel nut, channel nut with springs, fixing studs, etc. b. The system shall be designed such that it allows easy assembly at site by using bolting. All cable supporting steel work, hardwares fittings and accessories shall be prefabricated factory galvanized. c. The main support and cantilever arms shall be fixed at site using necessary brackets, clamps, fittings, bolts, nuts and other hardware etc. to form various arrangements required to support the cable trays. Welding of the components shall not be allowed. However, welding of the bracket (to which the main support channel is bolted) to the overhead beams, structural steel, insert plates or reinforcement bars will be permitted. Any cutting or welding of the galvansied surface shall be brushed and red lead primer, oil primer & aluminium paint shall be applied 			
TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-4540-001A-2	SUB SECTION-B-10 CABLING, EARTHING & LIGHTNING PROTECTION	Page 3 of 21	

CLAUSE NO.	TECHNICAL REQUIREMENTS	
	<p>d. All steel components, accessories, fittings and hardware shall be hot dip galvanised after completing welding, cutting, drilling and other machining operation.</p> <p>e. The typical arrangement of flexible support system is shown in the enclosed drawings and described briefly below: The main support channel and cantilever arms shall be fabricated out of 2.5 thick rolled steel sheet conforming to IS 1079.</p> <p>f. Cantilever arms of 320 mm, 620mm and 750 mm in length are required, and shall be as shown in the enclosed drawing. The arm portion shall be suitable for assembling the complete arm assembly on to component constructed of standard channel section. The back plate shall allow sufficient clearance for fixing bolt to be tightened with tray in position.</p> <p>g. Support system shall be able to withstand</p> <ul style="list-style-type: none"> • weight of the cable trays • weight of the cables (75 Kg/Metre run of each cable tray) • Concentrated load of 75 Kg between every support span. • Factor of safety of minimum 1.5 shall be considered. 	
3.02.03	The size of structural steel members or thickness of sheet steel of main support channel and cantilever arms and other accessories as indicated above or in the enclosed drawings are indicative only. Nevertheless, the support system shall be designed by the bidder to fully meet the requirements of type tests as specified. In case the system fails in the tests, the components design modification shall be done by the Bidder without any additional cost to the Employer. The bidder shall submit the detailed drawings of the system offered by him alongwith the bid.	
3.02.04	Four legged structure shall be provided wherever there is change in elevation and change in direction	

3.03.00	Pipes, Fittings & Accessories	
3.03.01	Pipes offered shall be complete with fittings and accessories (like tees, elbows, bends, check nuts, bushings, reducers, enlargers, coupling caps, nipples etc.) The size of the pipe shall be selected on the basis of maximum 40% fill criteria	
<p style="text-align: center;">TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-4540-001A-2</p>	<p style="text-align: center;">SUB SECTION-B-10 CABLING, EARTHING & LIGHTNING PROTECTION</p> <p style="text-align: right;">Page 4 of 21</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS	
3.03.02	GI Pipes shall be of medium duty as per IS: 1239	
3.03.03	Duct banks shall be High Density PE pipes encased in PCC (10% spare of each size, subject to minimum one) with suitable water-proof manholes.	
3.03.04	Hume pipes shall be NP3 type as per IS 458.	
3.03.05	TERNE Coated Flexible Steel Conduits shall be water proof and rust proof made of heat resistant lead coated steel. Conduit diameter shall be uniform throughout its length. Internal surface of the conduit shall be free from burrs and sharp edges. Conduits shall be complete with necessary accessories for proper termination of the conduit with junction boxes and lighting fixtures	
3.03.06	HDPE pipes and conduits shall be PE-80, PN-10 type as per IS 4984/IS 8008 part-I.	
3.04.00	Junction Boxes	
3.04.01	<p>Junction box shall be made of Fire retardant material. Material of JB shall be Thermoplastic or thermosetting or FRP type. The box shall be provided with the terminal blocks, mounting bracket and screws etc. The cable entry shall be through galvanized steel conduits of suitable diameter. The JB shall have suitable for installing glands of suitable size on the bottom of the box. The JB shall be suitable for surface mounting on ceiling/structures. The JB shall be of grey color RAL 7035. All the metal parts shall be corrosion protected. Junction box surface should be such that it is free from crazings, blisterings, wrinkling, colour blots/striations. There should not be any mending or repair of surface. JB's will be provided with captive screws so that screws don't fall off when cover is opened. JB's mounting brackets should be of powder coated MS. Type test reports for the following tests shall be furnished:-</p> <p>(a) Impact resistance for impact energy of 2 Joules (IK07) as per BS EN50102</p> <p>(b) Thermal ageing at 70deg C for 96 hours as per IEC60068-2-2Bb.</p> <p>(c) Class of protection shall be IP 55.</p> <p>(d) HV test.</p>	

CLAUSE NO.	TECHNICAL REQUIREMENTS	
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3.06.00 3.06.01		Cable glands	Cable shall be terminated using double compression type cable glands. Testing requirements of Cable glands shall conform to BS:6121 and gland shall be of robust construction capable of clamping cable and cable armour (for armoured cables) firmly without injury to insulation. Cable glands shall be made of heavy duty brass machine finished and nickel chrome plated. Thickness of plating shall not be less than 10 micron. All washers and hardware shall also be made of brass with nickel chrome plating Rubber components shall be of neoprene or better synthetic material and of tested quality. Cable glands shall be suitable for the sizes of cable supplied/erected.
3.07.00 3.07.01		Cable lugs/ferrules	<p>Cable lugs/ferrules shall be solderless crimping type suitable for power and control cables as per the DIN 46239. Aluminium solderless crimping lugs/ ferrules shall be used for Aluminium cables and Copper lugs/ferrules shall be used for Copper cables. Bimetallic washers or bimetallic type lugs shall be used for bimetallic connections.</p> <p>Crimping tool for crimping (from 1.5sqmm cable to 630sqmm cables) above mentioned lugs shall be of Hexagonal Type crimp profile, with suitable die of crimp match code. Characteristics of crimping tool:</p> <ol style="list-style-type: none"> 1) To should generate enough pressure to pass pull out test as per IEC 61238-1. Relevant type test to be produced for the sizes specified in the tender. 2) Tool die shall be replaceable for assorted sizes and crimp code to be mentioned on both part the die. 3) Tool should be compliant of testing according to IEC, UL and GS standards. <p>Tool shall have features such as:</p> <ul style="list-style-type: none"> • Auto retraction system • Manual retraction stop. • Feedback signals for improper pressure • Better battery capacity and with status display • Flexible and rotating head for easy crimping.
3.08.00 3.08.01		Trefoil clamps	Trefoil clamps for single core cables shall be pressure die cast aluminum or fibre glass or nylon and shall include necessary fixing accessories like G.I. nuts, bolts, washers, etc. Trefoil clamps shall have adequate mechanical strength, when installed at 1 mtr intervals, to withstand the forces generated by the peak value of maximum system short circuit current.
3.09.00 3.09.01		Cable Clamps & Ties	The cable clamps/ties required to clamp multicore cables shall be of SS-316 material, 12mm wide, polyester coated ladder lock type. The clamps/ties shall have self locking arrangement

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CLAUSE NO.	TECHNICAL REQUIREMENTS			
	<p>& shall have sufficient strength. The cable clamps/ties shall be supplied in finished individual pieces of suitable length to meet the site requirements.</p>			
3.10.00	<p>Receptacles</p>			
3.10.01	<p>Receptacles boxes shall be fabricated out of MS sheet of 2mm thickness and hot dipped gavanised or of die-cast aluminium alloy of thickness not less than 2.5 mm. The boxes shall be provided with two nos. earthing terminals, gasket to achieve IP55 degree of protection, terminal blocks for loop-in loop-out for cable of specified sizes, mounting brackets suitable for surface mounting on wall/column/structure, gland plate etc. The ON-OFF switch shall be rotary type heavy duty, double break,AC23 category, suitable for AC supply. Plug and Socket shall be shrouded Die-cast aluminium. Socket shall be provided with lid safety cover. Robust mechanical interlock shall be provided such that the switch can be put ON only when the plug is fully engaged and plug can be withdrawn only when the switch is in OFF position. Also cover can be opened only when the switch is in OFF position. Wiring shall be carried out with 1100 V grade PVC insulated stranded aluminium/copper wire of adequate size. The Terminal blocks shall be of 1100 V grade. The Terminal blocks shall be of 1100 V grade made up of unbreakable polymide 6.6 grade with adequate current rating and size. The welding receptacles shall be provided with RCCB/RCD of 30mA sensitivity having facility for manual testing/checking of operation of RCCB/RCD. Location and Minimum no of RC type receptacle TG and SG area shall be provided as per Annex-I attached.</p>			
3.11.00	<p>Cable Drum Lifting Jack</p> <p>The jack for cable drum lifting shall be of screw type with 10 ton capacity. The cable drum jacks shall be manufactured from fabricated steel. The spindles supplied with the cable drum jack shall be manufactured using BSEN-24 grade steel bar with locking collars. Jack nests shall be of SG cast steel. Cable drum jack supplied shall have undergone load testing and reports for the same shall be submitted. At least Two Nos. of jacks shall be supplied for NTPC use. Contractor has to make arrangements for his own jacks for cable reeling/unreeling under his scope of installation.</p>			
3.12.00	<p>Galvanising</p>			
3.12.01	<p>Galvanising of steel components and accessories shall conform to IS:2629 , IS4759 & IS:2633. Additionally galvanising shall be uniform, clean smooth, continuous and free from acid spots.</p>			
3.12.02	<p>The amount of zinc deposit over threaded portion of bolts, nuts, screws and washers shall be as per IS:1367 . The removal of extra zinc on threaded portion of components shall be carefully done to ensure that the threads shall have the required zinc coating on them as specified</p>			
3.13.00	<p>Welding</p>			
3.13.01	<p>The welding shall be carried out in accordance with IS:9595. All welding procedures and welders qualification shall also be followed strictly in line with IS:9595</p>			
4.00.00	<p>INSTALLATION</p>			
4.01.00	<p>Cable tray and Support System Installation</p>			
4.01.01	<p>Cables shall run in cable trays mounted horizontally or vertically on cable tray support system which in turn shall be supported from floor, ceiling, overhead structures, trestles, pipe racks, trenches or other building structures.</p>			
4.01.02	<p>Horizontally running cable trays shall be clamped by bolting to cantilever arms and vertically running cable trays shall be bolted to main support channel by suitable bracket/clamps on both top and bottom side rails at an interval of 2000 mm in general. For vertical cable risers/shafts cable trays shall be supported at an interval of 1000mm in general. Fixing of cable trays to cantilever arms or main support channel by welding shall not be accepted.</p>			
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CLAUSE NO.	TECHNICAL REQUIREMENTS													
	<p>Cable tray installation shall generally be carried out as per the approved guidelines/ drawings. Vendor shall design the support system along with tray, spacing etc in line with tray loadings/drawings.</p> <p>4.01.03 The cantilever arms shall be positioned on the main support channel with a minimum vertical spacing of 300 mm unless otherwise indicated.</p> <p>4.01.04 The contractor shall fix the brackets/ clamps/ insert plates using anchor fasteners. Minimum size of anchor fasteners shall be M 8 X 50 and material shall be stainless steel grade 316 or better. Anchor fastener shall be fixed as recommended by manufacturer and as approved by site engineer. For brick wall suitable anchor fasteners shall be used as per the recommendations of manufacturer. Make of anchor fasteners subject to QA approval and the same shall be finalized at pre-award stage.</p> <p>4.01.05 All cable way sections shall have identification, designations as per cable way layout drawings and painted/stenciled at each end of cable way and where there is a branch connection to another cable way. Minimum height of letter shall be not less than 75 mm. For long lengths of trays, the identification shall be painted at every 10 meter. Risers shall additionally be painted/stenciled with identification numbers at every floor.</p> <p>4.01.06 In certain cases it may be necessary to site fabricate portions of trays, supports and other non standard bends where the normal prefabricated trays, supports and accessories may not be suitable. Fabricated sections of trays, supports and accessories to make the installation complete at site shall be neat in appearance and shall match with the prefabricated sections in the dimensions. They shall be applied with one coat of red lead primer, one coat of oil primer followed by two finishing coats of aluminium paint.</p> <p>4.01.07 In fire prone areas, like Boiler, TG, fuel oil area and any other strategic location etc, fire retardant paint to be applied after installation cables.</p> <p>4.02.00 Conduits/Pipes/Ducts Installation</p> <p>4.02.01 The Contractor shall ensure for properly embedding conduit pipe sleeves wherever necessary for cabling work. All openings in the floor/roof/wall / cable tunnel/cable trenches made for conduit installation shall be sealed and made water proof by the Contractor.</p> <p>4.02.02 GI pull wire of adequate size shall be laid in all conduits before installation. Metallic conduit runs at termination shall have two lock nuts wherever required for junction boxes etc.</p> <p>4.02.03 Conduit runs/sleeves shall be provided with PVC bushings having round edge at each end. All conduits/pipes shall have their ends closed by caps until cables are pulled. After cables are pulled, the ends of conduits/pipes shall be sealed with Glass wool/Cement Mortar/Putty to prevent entrance of moisture and foreign material</p> <p>4.02.04 Exposed conduit/pipe shall be adequately supported by racks, clamps, straps or by other approved means. Conduits /pipe support shall be installed square and true to line and grade with an average spacing between the supports as given below, unless specified otherwise</p> <table border="0" data-bbox="402 1539 950 1682"> <thead> <tr> <th>Conduit /pipe size (dia).</th> <th>Spacing</th> </tr> </thead> <tbody> <tr> <td>Upto 40 mm</td> <td>1 M</td> </tr> <tr> <td>50 mm</td> <td>2.0 M</td> </tr> <tr> <td>65-85 mm</td> <td>2.5 M</td> </tr> <tr> <td>100 mm and above</td> <td>3.0 M</td> </tr> </tbody> </table> <p>4.02.05 For bending of conduits, bending machine shall be arranged at site by the contractor to facilitate cold bending. The bends formed shall be smooth.</p>				Conduit /pipe size (dia).	Spacing	Upto 40 mm	1 M	50 mm	2.0 M	65-85 mm	2.5 M	100 mm and above	3.0 M
Conduit /pipe size (dia).	Spacing													
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<p>TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-4540-001A-2</p>	<p>SUB SECTION-B-10 CABLING, EARTHING & LIGHTNING PROTECTION</p>	<p>Page 8 of 21</p>											

CLAUSE NO.	TECHNICAL REQUIREMENTS			
4.03.00	Junction Boxes Installation			
4.03.01	Junction boxes shall be mounted at a height of 1200mm above floor level or as specified in the drawings and shall be adequately supported/mounted on masonry wall by means of anchor fasteners/ expandable bolts or shall be mounted on an angle, plate or other structural supports fixed to floor, wall, ceiling or equipment foundations.			
4.04.00	Cable Installation			
4.04.01	Cable installation shall be carried out as per IS:1255 and other applicable standards.			
4.04.02	For Cable unloading, pulling etc following guidelines shall be followed in general:			
	<p>a) Cable drums shall be unloaded, handled and stored in an approved manner on hard and well drained surface so that they may not sink. In no case shall be drum be stored flat i.e. with flange horizontal. Rolling of drums shall be avoided as far as possible. For short distances, the drums may be rolled provided they are rolled slowly and in proper direction as marked on the drum. In absence of any indication, the drums may be rolled in the same direction as it was rolled during taking up the cables. For unreeling the cable, the drum shall be mounted on suitable jacks or on cable wheels and shall be rolled slowly so that cable comes out over the drum and not from below. All possible care shall be taken during unreeling and laying to avoid damage due to twist, kink or sharp bends. Cable ends shall be provided with sealed plastic caps to prevent damage and ingress of moisture.</p> <p>b) While laying cable, ground rollers shall be used at every 2 meter interval to avoid cable touching ground. The cables shall be pushed over the rollers by a gang of people positioned in between the rollers. Cables shall not be pulled from the end without having intermediate pushing arrangements. Pulling tension shall not exceed the values recommended by cable manufacturer. Selection of cable drums for each run shall be so planned so as to avoid using straight through joints. Care should be taken while laying the cables so as to avoid damage to cables. If any particular cable is damaged, the same shall be repaired or changed to the satisfaction of Project Manager.</p>			
4.04.03	Cables shall be laid on cable trays strictly in line with cable schedule			
4.04.04	Power and control cables shall be laid on separate tiers inline with the approved guidelines/drawings. The laying of different voltage grade cables shall be on different tiers according to the voltage grade of the cables. In horizontal tray stacks, H.T. cables shall be laid on top most tier and cables of subsequent lower voltage grades on lower tiers of trays. Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every one metre. All multicore cables shall be laid in touching formation. Power and control cables shall be secured fixed to trays/support with cable clamps/ties with self locking arrangement. For horizontal trays arrangements, multicore power cables and control cables shall be secured at every five meter interval. For vertical tray arrangement, individual multicore power cables and control cables shall be secured at every one meter. After completion of cable laying work in the particular vertical tray, all the control cables shall be binded to trays/supports by cable clamps/ties with self locking arrangement at every five meter interval and at every bend. Fibre Optical cable shall be laid in trenches/trays or as decided by Employer.			
4.04.05	Bending radii for cables shall be as per manufacturer's recommendations and IS:1255.			
4.04.06	Where cables cross roads/rail tracks, the cables shall be laid in hume pipe/ HDPE pipe.			
4.04.07	No joints shall be allowed in trip circuits, protection circuits and CT/PT circuits. Also joints in critical equipment in main plant area shall not be permitted. Vendor shall identify and accordingly procure the cable drum length.			
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4.04.08	In each cable run some extra length shall be kept at suitable point to enable one LT/two HT straight through joints to be made, should the cable develop fault at a later stage. Control cable termination inside equipment enclosure shall have sufficient lengths so that shifting of termination in terminal blocks can be done without requiring any splicing.										
4.04.09	Wherever few cables are branching out from main trunk route troughs shall be used.										
4.04.10	Wind loading shall be considered for designing support as well Cable trays wherever required.										
4.04.11	Where there is a considerable risk of steam, hot oil or mechanical damage cable routes shall be protected by barriers or enclosures.										
4.04.12	The installation work shall be carried out in a neat workman like manner & areas of work shall be cleaned of all scraps, water, etc. after the completion of work in each area every day. Contractor shall replace RCC/Steel trench covers after the Installation work in that particular area is completed or when further work is not likely to be taken up for some time.										
4.04.13	<p>Separation</p> <p>At least 300mm clearance shall be provided between:</p> <ul style="list-style-type: none"> - HT power & LT power cables, - LT power & LT control/instrumentation cables, 										
4.04.14	<p>Segregation</p> <ol style="list-style-type: none"> 1) Segregation means physical isolation to prevent fire jumping. 2) All cables associated with the unit shall be segregated from cables of other units. 3) Interplant cables of station auxiliaries and unit critical drives shall be segregated in such a way that not more than half of the drives are lost in case of single incident of fire. Power and control cables for AC drives and corresponding emergency AC or DC drives shall be laid in segregated routes. Cable routes for one set of auxiliaries of same unit shall be segregated from the other set. 4) In switchyard, control cables of each bay shall be laid on separate racks/trays. 										
4.04.15	<p>Minimum number of spare cores required to be left for interconnection in control cables shall be as follows:</p> <table style="margin-left: 40px;"> <thead> <tr> <th style="text-align: center;">No. of cores in cable</th> <th style="text-align: center;">No. of spare cores</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">2C,3C</td> <td style="text-align: center;">NIL</td> </tr> <tr> <td style="text-align: center;">5C</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">7C-10C</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: center;">14C and above</td> <td style="text-align: center;">3</td> </tr> </tbody> </table>	No. of cores in cable	No. of spare cores	2C,3C	NIL	5C	1	7C-10C	2	14C and above	3
No. of cores in cable	No. of spare cores										
2C,3C	NIL										
5C	1										
7C-10C	2										
14C and above	3										

CLAUSE NO.	TECHNICAL REQUIREMENTS			
4.04.17	<p>Cable tags shall be provided on all cables at each end (just before entering the equipment enclosure), on both sides of a wall or floor crossing, on each duct/conduit entry, and at every 20 meters in cable tray/trench runs. Cable tags shall also be provided inside the switchgear, motor control centers, control and relay panels etc. where a number of cables enter together through a gland plate. Cable tag shall be of rectangular shape for power cables and control cables. Cable tag shall be of 2 mm thick aluminum with number punched on it and securely attached to the cable by not less than two turns of 20 SWG GI wire conforming to IS:280. Alternatively, the Contractor may also provide cable tags made of nylon, cable marking ties with cable number heat stamped on the cable tags. The cable tag requirements mentioned above shall prevail over Tag requirements mentioned elsewhere in this document for HT power, LT power & control cables.</p>			
4.04.18	<p>While crossing the floors, unarmoured cables shall be protected in conduits upto a height of 500 mm from floor level if not laid in tray.</p>			
4.05.00	<p>Cable Terminations & Connections</p>			
4.05.01	<p>The termination and connection of cables shall be done strictly in accordance with cable termination kit manufacturer" instructions, drawings and/or as directed by Project Manager. Cable jointer shall be qualified to carryout satisfactory cable jointing/termination. Contractor shall furnish for review documentary evidence/experience reports of the jointers to be deployed at site.</p>			
4.05.02	<p>Work shall include all clamps, fittings etc. and clamping, fitting, fixing, plumbing, soldering, drilling, cutting, taping, preparation of cable end, crimping of lug, insulated sleeving over control cable lugs, heat shrinking (where applicable), connecting to cable terminal, shorting and grounding as required to complete the job to the satisfaction of the Project Manager.</p>			
4.05.03	<p>The equipment will be generally provided with undrilled gland plates for cables/conduit entry. The Contractor shall be responsible for punching of gland plates, painting and touching up. Holes shall not be made by gas cutting. The holes shall be true in shape. All cable entry points shall be sealed and made vermin and dust proof. Unused openings shall be effectively sealed by 2mm thick aluminium sheets.</p>			
4.05.04	<p>Control cable cores entering control panel/switchgear/MCC/miscellaneous panels shall be neatly bunched, clamped and tied with self locking type nylon cable ties with de interlocking facility to keep them in position.</p>			
4.05.05	<p>All the cores of the control cable to be terminated shall have identification by providing ferrules at either end of the core, each ferrule shall be indelible, printed single tube ferrule and shall include the complete wire number and TB number as per the drawings. The ferrule shall fit tightly on the core. Spare cores shall have similar ferrules with suffix sp1, sp2, ---etc along with cable numbers and coiled up after end sealing.</p>			
4.05.06	<p>All cable terminations shall be appropriately tightened to ensure secure and reliable connections.</p>			
5.00.00	<p>EARTHING SYSTEM</p>			
5.01.00	<p>Earthing system shall be in strict accordance with IS:3043 and Indian Electricity Rules/Acts</p>			
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	<p>The earthing system shall be designed for a life expectancy of at least forty (40) years, for a system fault current of 63 kA for 1.0 sec. The minimum rate of corrosion of steel for selection of earthing conductor shall be 0.12mm per year.</p> <p>Earthing system network/earthmat shall be interconnected mesh of mild steel rods buried in ground in the plant. All areas under contractor scope of supply shall be interconnected together by minimum two parallel conductors. The Contractor shall furnish the detailed design and calculations for Employer's approval. Contractor shall obtain all necessary statutory approvals for the system. All the columns shall be earthed by nearby risers and earthmat grid spacing shall be maximum 10 mts. Minimum two nos of risers shall be provided for each equipment in SG area. Separate dedicated riser shall be provided for C&I earthing purpose and also for Lightning down conductor connection purpose. Sufficient nos of risers near the equipment shall be provided as per the system requirement. Ring type earthing around the offsite building shall be provided with interconnection of with main grid at minimum two points.</p>
5.02.00	The earth conductors shall be free from pitting, laminations, rust, scale and other electrical, mechanical defects

5.04.00	The sizes of earthing conductors for various electrical equipments shall be as below:		
	Equipment	Earth conductor buried in earth	Earth conductor above ground level & in built-up trenches
	a) Main earth grid	Min 40 mm dia. MS rod or as per actual calculation whichever is more	65 x 8mm GS flat
	b) 33kV/11kV/6.6kV/3.3 kV/ switchgear equipment and 415V switchgear	---	65 x 8mm GS flat
	c) 415 V MCC/ Distribution boards / Transformers	---	50 x 6mm GS flat
	d) LT Motors above 125 KW	---	50 x 6mm GS flat
	25 KW to 125 KW	---	25 x 6mm GS flat
	1KW to 25 KW	---	25 x 3mm GS flat
	Fractional House power motor	---	8 SWG GS wire
	e) Control panel & control desk	---	25 x 3 mm GS flat
	f) Push button station / Junction Box	---	8 SWG GI wire
	g) Columns, structures, cable trays and bus ducts enclosures	---	50 x 6mm GS flat
	h) Crane, rails, rail tracks & other non-current carrying metal parts	---	25 x 6mm GS flat
5.05.00	Metallic frame of all electrical equipment shall be earthed by two separate and distinct connections to earthing system, each of 100% capacity, Crane rails, tracks, metal pipes and conduits shall also be effectively earthed at two points. Steel RCC columns, metallic stairs,		


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5.06.00	<p>and rails etc. of the building housing electrical equipment shall be connected to the nearby earthing grid conductor by one earthing ensured by bonding the different sections of hand rails and metallic stairs. Metallic sheaths/screens, and armour of multi-core cables shall be earthed at both ends. Metallic Sheaths and armour of single core cables shall be earthed at switchgear end only unless otherwise approved. Every alternate post of the switchyard fence shall be connected to earthing grid by one GS flat and gates by flexible lead to the earthed post. Railway tracks within the plant area shall be bonded across fish plates and connected to earthing grid at several locations. Portable tools, appliances and welding equipment shall be earthed by flexible insulated cable.</p> <p>Each continuous laid lengths of cable tray shall be earthed at minimum two places by G.S. flats to earthing system, the distance between earthing points shall not exceed 30 meter. Wherever earth mat is not available, necessary connections shall be done by driving an earth electrode in the ground</p>
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5.09.00	Connections between earth leads and equipment shall normally be of bolted type. Contact surfaces shall be thoroughly cleaned before connections. Equipment bolted connections after being tested and checked shall be painted with anti corrosive paint/compound.
5.10.00	Suitable earth risers as approved shall be provided above finished floor/ground level, if the equipment is not available at the time of laying of main earth conductor.
5.11.00	Connections between equipment earthing leads and between main earthing conductors shall be of welded type. For rust protection the welds should be treated with red lead compound and afterwards thickly coated with bitumen compound. All welded connections shall be made by electric arc welding.
5.12.00	Resistance of the joint shall not be more than the resistance of the equivalent length of conductors.
5.13.00	Earthing conductors buried in ground shall be laid minimum 600 mm below grade level unless otherwise indicated in the drawing. Back filling material to be placed over buried conductors shall be free from stones and harmful mixtures. Back filling shall be placed in layers of 150 mm.
5.14.00	Earthing conductors embedded in the concrete floor of the building shall have approximately 50 mm concrete cover.
5.15.00	A minimum earth coverage of 300 mm shall be provided between earth conductor and the bottom of trench/foundation/underground pipes at crossings. Earthing conductors crossings the road can be installed in pipes. Wherever earthing conductor crosses or runs at less than 300 mm distance along metallic structures such as gas, water, steam pipe lines, steel reinforcement in concrete, it shall be bonded to the same.
5.16.00	Earthing conductors along their run on columns, walls, etc. shall be supported by suitable welding / cleating at interval of 1000mm and 750mm respectively.


TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-4540-001A-2	SUB SECTION-B-10 CABLING, EARTHING & LIGHTNING PROTECTION	Page 13 of 21
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CLAUSE NO.	Bidder's Name		
	DE-1B	LT MOTORS	
	A.	GENERAL	
	5.	Manufacturer & Country of origin. (Shall be as per approved QA make)	
	6.	Equipment driven by motor	
	7.	Motor type	
	8.	Quantity	
	B.	DESIGN AND PERFORMANCE DATA	
	18.	Frame size	
	19.	Type of duty	
	20.	Type of enclosure /Method of cooling/ Degree of	
	21.	Applicable standard to which motor generally	
	22.	Efficiency class as per IS 12615	
	23.	(a)Whether motor is flame proof	Yes/No
		(b)If yes, the gas group to which it conforms as per IS:2148	
	24.	Type of mounting	
	25.	Direction of rotation as viewed from DE END	
	26.	Standard continuous rating at 40 deg.C. ambient temp. as per Indian Standard (KW)	
	27.	Derated rating for specified normal condition i.e. 50 deg. C ambient temperature (KW)	
	28.	Maximum continuous load demand of driven	
	29.	Rated Voltage (volts)	
	30.	Permissible variation of :	
		a. Voltage (Volts)	
		b. Frequency (Hz)	
		c. Combined voltage and frequency	
	31.	Rated speed at rated voltage and	
	32.	At rated Voltage and frequency:	
		a. Full load current	

CLAUSE NO.	Bidder's Name		
		b. No load current	
	33.	Power Factor at	
		a. 100% load	
		b. NO load	
		c. Starting.	
	34.	Efficiency at rated voltage and frequency,	
		a. 100% load	
		b. 75% load	
		c. 50% load	
	35.	Starting current (amps) at	
		a. 100 % voltage	
		b. 85% voltage	
		c. 80% voltage	
	36.	Minimum permissible starting Voltage (Volts)	
	37.	Starting time with minimum permissible voltage	
		a. Without driven equipment coupled	
		b. With driven equipment coupled	
	38.	Safe stall time with 100% and 110% of rated	
		a. From hot condition	
		b. From cold condition	
	39.	Torques :	
		a. Starting torque at min. permissible voltage(kg-	
		b. Pull up torque at rated voltage.	
		c. Pull out torque	
		d. Min accelerating torque (kg.m) available	
		e. Rated torque (kg.m)	
	40.	Stator winding resistance per phase (ohms at 20	
	41.	GD2 value of motors	

CLAUSE NO.	Bidder's Name		
	42.	No of permissible successive starts when motor is in hot condition	
	43.	Locked Rotor KVA Input	
	44.	Locked Rotor KVA/KW	
	45.	Vibration limit :Velocity (mm/s)	
	46.	Noise level limit (dBA)	
	C.	CONSTRUCTIONAL FEATURES	
	1.	Stator winding insulation	
		a. Class & Type	
		b. Winding Insulation Process	
		c. Tropicalised (Yes/No)	
		d. Temperature rise over specified maximum ambient temperature of 50 deg C	
		e. Method of temperature measurement	
		f. Stator winding connection	
	2.	Main Terminal Box	
		a. Type	
		b. Location(viewed from NDE side)	
		c. Entry of cables(bottom/side)	
		d. Recommended cable size(To be matched with cable size envisaged by owner)	
		e. Fault level (MVA),Fault level duration(sec)	
		f. Cable glands & lugs details (shall be suitable for	
	3.	Type of DE/NDE Bearing	
	4.	Motor Paint shade	
	5.	Weight of	
		a. Motor stator (KG)	
		b. Motor Rotor (KG)	
		c. Total weight (KG)	

CLAUSE NO.	Bidder's Name		
	D.	List of accessories.	
	1.	3 Space Heaters (Applicable for 30 KW & above motor) (Nos./Power in watts/supply voltage)	
	2.	Terminal Box for Space Heater (Yes/No)	
	3.	Speed switch (Yes/No)	
	4.	Insulation of bearing (Yes/No)	
	5.	Noise reducer(Yes/No)	
	6.	Grounding pads	
		i) No and size on motor body	
		ii) Nos on terminal Box	
	7.	Vibration pads	
		i) Nos and size	
		ii) Location	
	8.	Any other fitments	
	E.	List of curves.	
	1.	Torque speed characteristic of the motor	
	2.	Thermal withstand characteristic	
	3.	Starting. current Vs. Time	
	4.	Starting. current Vs speed	
	5.	P.F. and Effi. Vs Load	
	F.	Additional Data to be filled for each rating of DC Motor	
	1.	Rated armature voltage (Volt)	
	2.	Rated field excitation (Amp)	
	3.	Permissible % variation in voltage	
	4.	Minimum Permissible Starting voltage (volt)	
	5.	At rated voltage	
		i)Full load Armature current.(Amp)	

CLAUSE NO.	Bidder's Name		
		ii) Full load Field current (Amp)	
		iii) No load Armature current (Amp)	
6.		Full load Field current (Amp)	
7.		No load Armature current (Amp)	
8.		Minimum permissible field current (Amp) to avoid	
	i)	Maximum permissible voltage	
	ii)	Rated voltage	
	iii)	Minimum Permissible Voltage	
9.		Resistance (indicative Values) in ohm	
	i)	Armature winding (Arm + IP + Series) at 25	
	ii)	Field Winding at 25 deg. C	
10..		Inductance (indicative values)	
	i)	Armature winding	
	ii)	Field winding	
11		Value of trimmer resistance (ohm) to be connected in series with the shunt field to	
	i)	220 V DC	
	ii)	250 V DC	
	iii)	187 V DC	
12		Value of the external resistance (ohm) required to be connected in series with armature during starting only	
13		Technical data sheet for external resistance box	
14		GA drawing of motor	
15		Starting time calculation	
16		Starter resistance design calculation	
17		Electrical connection diagram of motor	