

THIS IS A PART OF TECHNICAL SPECIFICATION NO. PE-TS-411-673-A001

document to be submitted by him to the Owner/Engineer indicating dates against each document.

The documents shall be divided into two categories : a) for approval and b) for information/further engineering and co-ordination by the Owner.

In preparing this schedule, the Contractor shall allow two (2) weeks from date of receipt for review and comments by the Owner/Engineer for each submission of a document.

This document submission schedule shall require approval by the Owner/Engineer.

7.02.00 All contract documents shall be marked, without fail, with the name of the Owner, the Project, the specification title and number and the unit designation.

All dimensions shall be in metric units.

All notes, markings etc. shall be in English.

7.03.00 Documents/Drawings, submitted during tender stage, shall be revalidated or revised as required and submitted as certified contract document for approval / information of the Owner/Engineer.

7.04.00 Unless specified otherwise, the following categories of documents/drawings would require approval of the Owner/Engineer:

- a) List of sub-vendors (from Owner only)
- b) System scheme and instrumentation diagrams
- c) Design basis justifying selection of equipment & process parameters where not specified in the Contract
- d) Equipment data sheets and general arrangement drawings
- e) Materials of construction
- f) Layout drawings.
- g) Operation logic diagrams.
- h) Typical control circuit.
- i) Drawings of Instrumentation and control.

7.05.00 Unless specified otherwise, the following categories of documents/ drawings would be treated for information/further engineering by the Owner/Engineer. The Contractor shall, however, incorporate all additional information and clarifications in these documents / drawings as and when desired by the Owner/Engineer.

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- a) Equipment foundation drawings.
- b) Equipment cross-section drawings, product literature etc. which are of proprietary nature.
- c) Predicted performance curves of equipment.
- d) Various bills of quantity, schedules etc.
- e) Piping fabrication drawings, isometrics etc.
- f) Panel wiring diagrams.
- g) Instruction/Operation manuals.
- h) Service manuals and trouble shooting guide for C & I system including field instruments.
- i) Cable schedule and interconnection chart.
- j) Drive/feederwise control scheme showing all external interfaces.

In essence, the Contractor is solely responsible for corrections and adequacy of design & engineering for documents under this category.

7.06.00 Upon review, the Owner/Engineer shall put his remarks and one of the following action stamps on the drawing/document:

- a) A - Drawing submitted as approved, proceed with fabrication
- b) B - Drawing approved subject to comments noted, proceed with fabrication, considering our comments. Correct as necessary and resubmit for record.
- c) C - See attached memo.
- d) D - Correct your original drawing incorporating our comments and resubmit for approval.
- e) E - Information furnished is noted.
- f) F - Prints not enclosed

For action stamps in category (c) & (d), documents must be resubmitted for review by the Owner/Engineer. For action stamp in category (b), further review by Owner/Engineer would not be necessary provided the Contractor agrees & incorporates the comments made on the document.

Except for action stamp under category (c) & (d), the Contractor can proceed with manufacturing and other sequential activities for those areas of a drawing/document which do not have any review comment by the Owner/Engineer.

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The Owner/Engineer may accord approval in category (c) or (d) in more than one submission of a document till he is satisfied that the intent of the specification has been fully complied with. The Contractor shall be responsible for delay in such cases and no extension of time shall ordinarily be allowed on such grounds. Approval of contract documents by the Owner/Engineer shall not relieve the Contractor of his responsibility for any errors and fulfillment of contract requirements.

The Contractor's work shall be in strict accordance with the finally approved drawings and no deviation shall be permitted without written approval of the Owner/Engineer.

- 7.07.00 Except key plan/general yard plan, any layout drawing requiring scrutiny shall not be drawn to a scale less than 1:50.
- 7.08.00 For review by the Consulting Engineer, the Contractor shall furnish soft copies of drawings & documents and three (3) prints of each drawing/document. Two (2) prints of such submission shall also be sent to the Owner. After review, comment/approval will be sent to the Contractor. Upon action under category (a) or (e), the Contractor shall directly distribute the documents to the various offices of the Owner and other agencies in number of copies as specified in the contract document. Such distribution copies shall be marked with the reference and date of the letter by which the Owner/Engineer has accorded his final approval. Penal action shall be taken against the Contractor for any unauthorised revision in the drawings so distributed from the drawings approved by the Owner/Engineer. The contractor shall furnish three (3) CDs of all as built/final drawings for Owner/Consultant site.
- 7.09.00 In case of contradiction between the stipulations above and those stated elsewhere in the specification, the stipulations herein shall prevail.

ANNEXURE-1
DISTRIBUTION SCHEDULE

S. No	Description	TSGENCO										Consultant			Equipment Vendor	Remarks
		Director Projects	Director Technical	CE/Civil Thermal Projects Hyd.	CE/ TPC-I, Hyd	CE/ O&M/	SE/ Civil	SE/E&M /	DE Constr.		HYD	BTPS				
A	Letter Of Intent or Contract Documents	1	1	1	S	1	2	2	1	1	1	1	2			
B	Vendor Drawings															
1.	Preliminary	1	1	1	2	1	1	2	2	12	1	-	S			
2.	Return preliminary with comments	-	-	1	2	1	1	1	1	S	1	-	1			
3.	Final and any revision thereof															
	a. Civil	1	1	6+1T	1	1	6+1T	1	-	2+1T	1	1	S			
	b. E&M	1	1	1	6+1T	1	1	6+1T	1	2+1T	1	1	S			
C.	Design Drawings															
1.	Preliminary															
	a. Civil	1	1	2	1	1	2	1	1	4	1	1	S			
	b. E&M	1	1	1	2	1	1	2	1	4	1	1	S			
2.	Released for construction															
	a. Civil	1	1	2	1	1	6	1	1	1	1	2	S			
	b. E&M	1	1	1	1	2	1	6	1	1	1	2	S			
3.	Return marked 'As built'															
	a. Civil	-	-	1	-	-	1	-	-	1	1	S	1			
	b. E&M	-	-	-	1	-	-	1	1	1	1	S	1			
4.	As built drawings															
	a. Civil	-	-	1+1T	-	2+1T	5+1T	-	1	1+1T	-	1	S			
	b. E&M	-	-	1	2+1T	2+1T	-	5+1T	1+1T	1+1T	-	1	S			

S. No	Description	TSGENCO										Consultant		Equipment Vendor	Remarks
		Director Projects	Director Technical	CE/Civil Thermal Projects Hyd.	CE/ TPC-I, Hyd	CE/ O&M/	SE/ Civil	SE/E&M /	DE Constr.		HYD	BTPS			
D	Progress Report Monthly														
1.	Equipment vendor	1	1	1	2	1	1	2	1	1	1	1	S		
2.	Consultant	1	1	2	2	1	1	2	1	S	1	1	Nil		
E	Test & Inspection Reports														
1.	Equipment manufacturer														
s	a. Civil	1	1	1	2	1	1	1	-	11	1	1	S		
	b. E&M	1	1	-	2	1	-	1	1	11	1	1	S		
	Consultant	1	1	-	2	1	-	1	1	S	-	1	-		
F	Instruction Manuals/Data Books														
1.	Equipment manufacturer														
2.	a. Civil	1	1	1+1T	1	1	6+1T	1	1	2+1T	1	1	S		
	b. E&M	1	1	-	3+1T	1	-	6+1T	2	3+1T	1	1	S		
	Consultant	1	1	-	10+1T	1	-	15+1T	-	S	1	1	Nil		
G	Consultant	1	1	1	8+1T	1	1	2	1	1	1	1	S		
H	Design Calculations	1	1	1	8+1T	1	1	2	1	1	1	1	S		
I	Final consulting Engineering Report	1	1	1	10	1	1	2	1	S	1	1	Nil		

S – Source, T – Transparency & Soft Copy on CD,

TSGENCO

: Telangana State Power Generation Corporation Limited

Director, Projects, Hyd

: Director/ Projects, TSGENCO, Vidyut Soudha, Hyderabad – 500 082

QUALITY ASSURANCE REQUIREMENTS

CONTENT

CLAUSE NO.	DESCRIPTION
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2.00.00	GENERAL REQUIREMENTS QUALITY ASSURANCE
3.00.00	QUALITY ASSURANCE DOCUMENTS
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ATTACHMENTS

ANNEXURE-I	FORMAT OF QUALITY ASSURANCE PROGRAMME
ANNEXURE-II	FIELD WELDING SCHEDULE

QUALITY ASSURANCE REQUIREMENTS

1.00.00 QUALITY ASSURANCE PROGRAMME

1.01.00 To ensure that the equipment and services under the scope of Contract whether manufactured or performed within the Contractor's works or at his Sub-contractor's premises or at the Owner's site or at any other place or work are in accordance with the specifications, the Contractor shall adopt suitable quality assurance programme to control such activities at all points, as necessary. Such programmes shall be outlined by the Contractor and shall be finally accepted by the Owner/Authorised representative after discussions before the award of contract. A quality assurance programme of the Contractor shall generally cover the following :

- a) His organisation structure for the management and implementation of the proposed quality assurance programme.
- b) Documentation control system.
- c) Qualification data for Bidder's key personnel.
- d) The procedure for purchase of materials, parts, components and selection of Sub-contractor's services including vendor analysis, source inspection, incoming raw-material inspection, verification of materials purchased etc.
- e) System for shop manufacturing and site erection control including process controls and fabrication and assembly controls.
- f) Control of non-conforming items and system for corrective actions.
- g) Inspection and test procedure both for manufacture and all site related works.
- h) Control of calibration and testing of measuring and testing equipments.
- i) System for quality audit.
- j) System for indication and appraisal of inspection status.
- k) System for authorising release of manufactured product to the Owner.
- l) System for handling storage and delivery.
- m) System for maintenance of records.

- n) Furnishing of quality plans for manufacturing and field activities detailing out the specific quality control procedure adopted for controlling the quality characteristics relevant to each item of equipment/component as per format enclosed at Annexure-I to this section for Owners approval
- o) Internal standards, if referred in the quality plans shall generally be compatible with National / International standards and shall be mentioned in the quality plans. Alternatively bidder shall furnish extracts of the internal standards detailing out acceptance norm for the product / material.

2.00.00 GENERAL REQUIREMENTS - QUALITY ASSURANCE

2.01.00 All materials, components and equipment covered under this specification shall be procured, manufactured, erected, commissioned and tested at all the stages, as per a comprehensive Quality Assurance Programme. An indicative programme of inspection/tests to be carried out by the Contractor for some of the major items is given in the respective technical specification. This is however, not intended to form a comprehensive programme as it is the Contractor's responsibility to draw up and implement such programme duly approved by the Owner/Consultant. The detailed Quality Plans for manufacturing and field activities should be drawn up by the Bidder, separately in the format attached at Annexure-I and will be submitted to Owner/Authorised representative for approval. Schedule of finalisation of such quality plans will be finalised before award.

Contractor shall furnish list of Manufacturing Quality Plans of major equipments indicating proposed inspection categorisation indicating items that will be offered for Owner's inspection etc and the Field Quality Plans

2.02.00 Manufacturing Quality Plan for all the major equipment will detail out their respective important components, their in-process various tests/inspection & final inspection / tests, to be carried out as per the requirements of this specification and standards mentioned therein and quality practices and procedures followed by Contractor's Quality Control organization. The relevant reference documents and standards, acceptance norms, inspection documents raised etc., during all stages of materials procurement, manufacture, assembly and final testing/performance testing are to be comprehensively documented by Contractor.

Manufacturing Quality Plan for all major equipments/ items will be approved by owner. In these approved quality plans, Owner / Authorised representative shall identify customer hold points (CHP), test / checks which shall be carried out in presence of the Owners Engineer or his authorised representative and beyond which the work shall not proceed without consent of Owner / Authorised representative in writing. Inspection/ Test reports are to be submitted to owner as specified in final approved Manufacturing Quality Plans.

2.03.00 Field Quality Plans / Procedures for all field activities shall be submitted to

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- owner for review / approval. These Quality Plans / procedures will detail out, for all equipment, the quality practices and procedures etc. to be followed by the Contractor's site Quality Control organisation, during various stages of site activities from receipt of materials/ equipment at site.
- 2.04.00 The Bidder shall also furnish copies of the reference documents/plant standards/acceptance norms/tests and inspection procedure etc., as referred in Quality Plans along with Quality Plans. These Quality plans and reference documents/standards etc. will be subject to Owner's approval without which manufacture shall not proceed. These approved documents shall form a part of the contract. In these approved quality plans, Owner/Authorised representative shall identify customer hold points (CHP), test/checks which shall be carried out in presence of the Owners Engineer or his authorised representative and beyond which the work will not proceed without consent of Owner/Authorised representative in writing. All deviations to this specification, approved quality plans and applicable standards must be documented and major deviations in the form of Non Conformity Report shall be referred to Owner/Authorised representative for approval and dispositioning.
- 2.05.00 No material shall be despatched from the manufacturer's works before the same is accepted subsequent to pre-despatch final inspection including verification of records of all previous tests/inspections by Owner's Engineer/ Authorised representative for "CHP" and "W" points marked in quality plans , and duly authorised for despatch by issuance of Material Despatch Clearance Certificate (MDCC). For items which is not under owner's inspection the contractor shall apply for despatch clearance (MDCC) from owner by submitting their internal inspection reports and quality records
- 2.06.00 All materials used or supplied shall be accompanied by valid and approved materials certificates and tests and inspection report. These certificates and reports shall indicate the sheet serial numbers or other such acceptable identification numbers of the material. The material certified shall also have the identification details stamped on it.
- 2.07.00 Castings and forgings used for construction shall be of tested quality. Details of results of chemical analysis, heat treatment record, mechanical property test results shall be furnished.
- 2.08.00 All welding and brazing shall be carried out as per procedure drawn and qualified in accordance with requirements of ASME Section - IX (latest edition) or other International equivalent standard acceptable to the Owner.
- All brazers, welders etc. employed on any part of the contract at Contractor's/ Sub-Contractor's works or at site shall be qualified as per ASME Section-IX (latest edition) or equivalent international standard approved by the Owner. Such qualification tests shall be conducted in presence of Owner / his authorised representative or owner approved Third Party Inspection Agency(TPIA). Previously qualified WPS & PQR shall be acceptable if witnessed by owner's approved TPIA.
- For welding of pressure parts and high pressure piping coming under IBR purview, the requirements of IBR shall also be complied with.

2.09.00	All non-destructive examination (NDT) shall be carried out in accordance with LIST OF STANDARDS FOR REFERENCE as given below in this section. The NDT operator shall be qualified as per SNT-TC-IA (of American Society of non- destructive examination). Results of NDT for the list major equipments / items identified for owner's inspection shall be properly recorded and submitted for review and approval. Other items not covered under owner's inspection, contractor shall review and approve the NDT results and such reports shall be submitted to owner in the final documentation of the items / equipments
2.10.00	All the sub-vendors proposed by the Contractor for procurement of major bought out items including castings, forgings, semi-finished and finished components/equipment list of which shall be drawn up by the Contractor and finalised with the Owner shall be subject to Owner's approval. Quality Plans of the successful vendors shall be discussed, finalised and approved by the Owner/Authorised representative and form part of the Purchase Order between the Contractor and the Vendor.
2.11.00	All the purchase specifications for the major bought-out items, list of which shall be drawn up by the Contractor and finalised with the Owner shall be furnished to the Owner for comments and subsequent approval before orders are placed. Owner reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the Contractor's or their sub-vendor's quality management and control activities. The Contractor shall provide all necessary assistance to enable the Owner carry out such audit and surveillance. Quality audit/approval of the results of tests and inspection will not prejudice the right of the Owner to reject equipment not giving the desired performance after erection and shall not in no way limit the liabilities and responsibilities of the Contractor in earning satisfactory performance of equipment as per specification.
2.12.00	Quality requirements for main equipment shall equally apply for spares and replacement items.
2.13.00	Repair/rectification procedures to be adopted to make any job acceptable shall be subject to the approval of the Owner.
2.14.00	For quality assurance of all civil works refer to the specifications for civil works.
3.00.00	QUALITY ASSURANCE DOCUMENTS
3.01.00	The Contractor shall be required to submit two (2) copies and two (2) sets of microfilms / CDs of the following Quality Assurance documents within three (3) weeks after despatch of the equipment: a) Material mill test reports on components as specified by the specification.

- b) The inspection plan with verification, inspection plan check points, verification sketches, if used and methods used to verify that the inspection and testing points in the inspection plan were performed satisfactorily.
- c) Non-destructive examination results /reports including radiography interpretation reports.
- d) Factory tests results for testing required as per applicable codes and standards referred in the specification.
- e) Welder identification list listing welder's and welding operator's qualification procedure and welding identification symbols.
- f) Sketches and drawings used for indicating the method of traceability of the radiographs to the location on the equipment.
- g) Stress relief time temperature charts.
- h) Inspection reports duly signed by QA personnel of the Owner and Contractor for the agreed inspection hold points. During the course of inspection, the following will also be recorded :
 - i) When some important repair work is involved to make the job acceptable.
 - ii) The repair work remains part of the accepted product quality.
- i) Letter of conformity certifying that the requirement is in compliance with finalised specification requirements.

4.00.00 INSPECTION, TESTING AND INSPECTION CERTIFICATES

4.01.00 The Owner's Engineer, or his duly authorised representative and/or an outside inspection agency acting on behalf of the Owner shall have access inside the workshops, test labs, establishments at all reasonable times to inspect and examine the materials and workmanship of the works during its manufacture or erection and if part of the works is being manufactured or assembled on other premises or works, the Contractor shall obtain for the Owner's Engineer and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Contractor's own premises or works.

4.02.00 The Contractor shall give the Owner's Engineer/ Authorized Inspector twenty one (21) days written notice for "CHP" / "W" points of any material being ready for testing by owner' engineer / Authorized inspector. Such tests shall be to the Contractor's account except for the expenses of the Inspector. The Engineer/ Inspector, unless the witnessing of the tests is virtually waived, will attend such tests within fifteen (15) days of the date on which the equipment is notified as being ready for test/inspection. If owner's Engineer / Authorised Inspector fail to attend the inspection, next mutually convenient date for test shall be agreed with Contractor. Contractor shall, in

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- no case proceed with the test without owner or his authorized inspectors, unless the witnessing is officially waived and advised Contractor to proceed with the test. Contractor shall forthwith forward duly certified completed test report and a product quality certificate in six (6) copies to owner upon completion of such test.
- 4.03.00 The Engineer or Inspector shall within fifteen (15) days from the date of Inspection as defined herein give notice in writing to the Contractor, or any objection to any drawings and all or any equipment and workmanship which is in his opinion not in accordance with the contract / QAP or other approved quality documents. The Contractor shall give due consideration to such objections and shall either make modifications that may be necessary to meet the said objections or shall confirm in writing to the Engineer/Inspector giving reasons therein, that no modifications are necessary to comply with the contract / QAP or other approved quality documents.
- 4.04.00 When the factory tests have been completed at the Contractor's or sub-contractor's works, the Engineer/Inspector shall issue a certificate to this effect fifteen (15) days after completion of tests excluding the test completion date subject to submission of all certified documents related to the test, If the tests are not witnessed by the Engineer/Inspectors, the certificate shall be issued within fifteen (15) days of the receipt of the Contractor's test certificate by the Engineer/Inspector. Failure of the owner's Engineer/Inspector to issue such a certificate shall not prevent the Contractor from proceeding with the works. The completion of these tests, or the issue of the certificates shall not bind the Owner to accept the equipment should it, on further tests after erection be found not to comply with the contract / QAP or other approved quality documents.
- 4.05.00 In all cases where the contract provides for tests whether at the premises or works of the Contractor or any sub-contractor, the Contractor, except where otherwise specified shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the owner's Engineer/Inspector or his authorised representatives to carry out effectively such tests on the equipment in accordance with the Contract / QAP or other approved quality documents. Contractor and shall give facilities to the owner's Engineer/ Inspector or to his authorised representative to accomplish testing.
- 4.06.00 To facilitate advance planning of inspection in addition to giving inspection notice as per Clause 4.02.00, the Contractor shall furnish quarterly inspection programme indicating proposed schedule dates of inspection at customer hold point and final inspection stages. Updated quarterly inspection plans will be made for each three consecutive months and shall be furnished before beginning of each calendar month.

LIST OF STANDARDS FOR REFERENCE

- a) International Standards Organisation (ISO).
- b) International Electro-technical Commission (IEC).
- c) American Society of Mechanical Engineers(ASME)
- d) American National Standards Institute (ANSI).
- e) American Society for Testing and Materials (ASTM).
- f) American Institute of Steel Construction (AISC).
- g) American Welding Society (AWS).
- h) Architecture Institute of Japan (AIJ).
- i) National Fire Protection Association (NFPA).
- j) National Electrical Manufacturer's Association (NEMA).
- k) Japanese Electro-technical Committee (JEC).
- l) Institute of Electrical and Electronics Engineers (IEEE).
- m) Federal Occupational Safety and Health Regulations (OSHA).
- n) Instrument Society of America (ISA).
- o) National Electric Code (NEC).
- p) Heat Exchanger Institute (HEI).
- q) Tubular Exchanger Manufacturer's Association (TEMA).
- r) Hydraulic Institute (HIS).
- s) International Electro-Technical Commission Publications.
- t) Power Test Code for Steam Turbines (PTC).
- u) Applicable German Standards (DIN).
- v) Applicable British Standards (BS).
- w) Applicable Japanese Standards (JIS).
- x) Electric Power Research Institute (EPRI).
- y) Standards of Manufacturer's Standardization Society (MSS)

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- z) Bureau of Indian Standards Institution (BIS).
 - aa) Indian Electricity Rules.
 - bb) Indian Boiler Regulations (IBR).
 - cc) Indian Explosives Act.
 - dd) Indian Factories Act.
 - ee) Tariff Advisory Committee (TAC) rules.
 - ff) Emission regulation of Central Pollution Control Board (CPCB).
 - gg) Pollution Control regulations of Dept. of Environment, Govt. of India
 - hh) Central Board of Irrigation and Power (CBIP) Publications

ANNEXURE-I

FORMAT OF QUALITY ASSURANCE PROGRAMME

VENDOR'S LOGO , NAME & ADDRESS		MANUFACTURING QUALITY ASSURANCE PLAN		DOC NO: XXXXX-CAL-QAP-M-0001	
ITEM :				REV NO :	0 1 2 3 4
				DATE :	
CLIENT :		LOCATION :			
PROJECT :		REFERENCE PURCHASE ORDER NO. & DT :			
VENDOR :		REFERENCE APPROVED DATA SHEET :			
SUB VENDOR :		REFERENCE APPROVED DRAWING. NO. :			
ABBREVIATIONS :		GENERAL REMARKS			
QAP - QUALITY ASSURANCE PLAN, CR - CRITICAL, MA - MAJOR, MI - MINOR SPEC - SPECIFICATION, TC - TEST CERTIFICATES P - PERFORM W - WITNESS V - VERIFY CHP - CUSTOMER HOLD POINT		AGENCY : 1 - PROJECT AUTHORITY 2 - SUPPLIER 3 - SUB-SUPPLIER 4 - MANUFACTURER 5 - THIRD PARTY INSPECTION AGENCY 1 THE ITEMS WHICH ARE FALLING UNDER ANY STATUTORY AUTHORITY'S (LIKE I.B.R. ETC.) SCOPE SHALL BE SUBJECTED TO THAT STATUTORY AUTHORITY'S INSPECTION CLEARANCE.			
NOTES:					
1. EXACT MATERIAL / PROCESS / INSPECTION / TESTS FOLLOWED BY THE MANUFACTURER SHALL BE SPECIFIED 2. EXACT REFERENCE DOCUMENT/ACCEPTANCE STANDARD SHALL BE SPECIFIED 3. IN CASE SPECIFIED ACCEPTANCE STANDARD / NORMS IS OTHER THAN NATIONAL / INTERNATIONAL STANDARDS . STANDARD / COPY OF THE ACCEPTANCE NORMS FOLLOWED BY THE MANUFACTURER SHALL BE SUBMITTED FOR REVIEW RECORD 4 FINAL INSPECTION DOSSIER SHALL BE PREPARED BY MANUFACTURER & SHALL BE ENDORSED BY INSPECTION AGENCY					
Prepared by		Checked by		Approved By	
Revision	R0	R1	R2	R0	R1
DATE					R2

ANNEXURE-II
FIELD WELDING SCHEDULE

PROJECT : FWS NO :
CONTRACTOR : REV NO. :
PACKAGE : FIELD WELDING CODE :
SYSTEM : PAGE NO. :

Sl No.	Drawing No. for Weld Locations & Identification mark	Description of parts to be welded	Material specification	Dimensions	Process of Welding	Type of Weld	Electrode Filler Specification	WPS No.	Minimum Pre-heat Temperature	Heat Treatment Temperature [Holding Time in secs]	NDT Method	NDT Specification Number	Acceptance Norm Ref.	Remarks
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The Field Welding Schedule should be submitted for :

- ☐ Pressure Parts
- ☐ Tanks/Vessels
- ☐ Piping
- ☐ Heavy/Important Structural Steel
- ☐ Heat Exchangers
- ☐ Bus Ducts

**REQUIREMENTS OF SPARES, TOOLS & TACKLE,
LUBRICANTS/OIL/CONSUMABLES**

CONTENT

CLAUSE NO.	DESCRIPTION
1.00.00	TOOLS AND TACKLE
2.00.00	SPARES
	ATTACHMENT
ANNEXURE-I	MANDATORY SPARE LIST

**REQUIREMENTS OF SPARES, TOOLS & TACKLE,
LUBRICANTS/OIL/CONSUMABLES**

1.00.00 TOOLS & TACKLE

The Contractor shall supply with the equipment one complete set of special tools and tackle as required for the erection, assembly, dismantling & maintenance of the equipment. These special tools will also include special material handling equipment, jigs & fixtures for maintenance and calibration/readjustment, checking & measurement aids etc. A list of such tools & tackle shall be submitted by the Bidder along with the offer. Detailed description of each tools/tackle, its function along with the equipment/part for which it is meant for and the price of each tools/tackle shall also be indicated in the offer. These tools & tackle shall be separately packed and sent to site before the first unit commissioning. The Bidder shall also ensure that these tools are not used for erection purpose.

2.00.00 SPARES

2.01.00 General

The Bidder shall indicate and include in his scope of supply all the necessary start-up, commissioning ~~and recommended spares~~ in addition to mandatory spares as specified elsewhere in the specification. ~~The Owner reserves the right to buy any or all mandatory and recommended spares.~~ The Contractor shall also state for each item of spares both mandatory ~~and recommended~~, the normal expected service life.

2.01.01 All spares supplied under this contract shall be strictly interchangeable with the parts for which they are intended to replace. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site, e.g. small items shall be packed in sealed transparent plastic bags with dessicator packs as necessary.

2.01.02 Each spare part shall be clearly marked or labelled on the outside of the packing with the description. When more than one spare part is packed in a single case, a general description of the contents shall be shown on the outside and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purposes of identification.

2.01.03 All cases, containers or other packages are liable to be opened for examination as may be considered necessary by the Engineer.

2.01.04 All mandatory spares shall be delivered to site within one to three months prior to the scheduled date of the trial operation of the plant. However, they shall not be despatched before the despatch of the associated main equipment.

- 2.01.05 The Bidder shall also guarantee supply of spare parts, which will be made, based on manufacturer's drawings on special order from the Purchaser for 30 years after commissioning of the plant.

2.02.00 **Recommended Spares**

- 2.02.01 The Contractor shall provide a list of recommended spares giving unit prices and total prices for 2 years of normal operation of the plant for spares of indigenous origin, and for 5 years of normal operation for spares of non-indigenous origin. This list shall take into consideration the mandatory spares specified elsewhere in the specification and should be a separate list.

- 2.02.02 The price of recommended spares will not be used for the evaluation of bids. The price of these spares shall remain valid for a period as specified elsewhere in the specification from the date of Award of the Contract. Where the recommended spares are the same as mandatory spares, the prices shall be the same. The prices of any recommended spares, which are not common with mandatory spares, shall be subject to review by the Owner, and shall be finalised after mutual discussion.

2.03.00 **Start-up Commissioning Spares**

- 2.03.01 Start-up commissioning spares are those spares which may be required during the start-up and commissioning of the equipment/system. All spares used until the plant is handed over to the Owner shall come under this category. Said spares, properly marked, shall be supplied together with the main equipment and shall be used by the Contractor, if needed, during erection & commissioning stage. All such spares which remain unused till issuance of Taking Over Certificate by the Owner, along with an equipment-wise quantitative consumption report shall be returned to the Owner during time of handover. The list of commissioning spares to be brought by the Contractor to ensure smooth commissioning of the plant shall be subject to the Engineer's approval.

- 2.03.02 The Contractor shall submit a complete BBU list inclusive of recommended, mandatory, initial start-up and commissioning spares. Costs of the above spares, which are consumed before the handing-over of the plant, shall be deemed to have been included in the lump sum proposal price of the package, and the Contractor shall have no claim on this account to the Owner.

2.04.00 **Mandatory Spare Parts**

- 2.04.01 The Owner considers some of the spares are essential for running the equipment irrespective of whether they are included in the list of recommended spares by the Bidder as mentioned above.

Since the components involved can not be foreseen at the bidding stage, only

broad requirements of the Owner in this respect are outlined hereinafter. The bidder shall include his proposal, on the basis of this guideline, an item-wise list of all components and the quantity, unit prices & total price thereof, offered as mandatory spares for each and every equipment. This list shall be separate from the list of recommended spares and shall be used for bid evaluation purposes. Any clarification in this respect may be obtained by the Bidder at the pre-bidding stage.

- 2.04.02 The mandatory spares should be supplied to the Owner at least one month before the trial run. The despatch programme is subject to approval of the Owner/Consultant after award of contract.

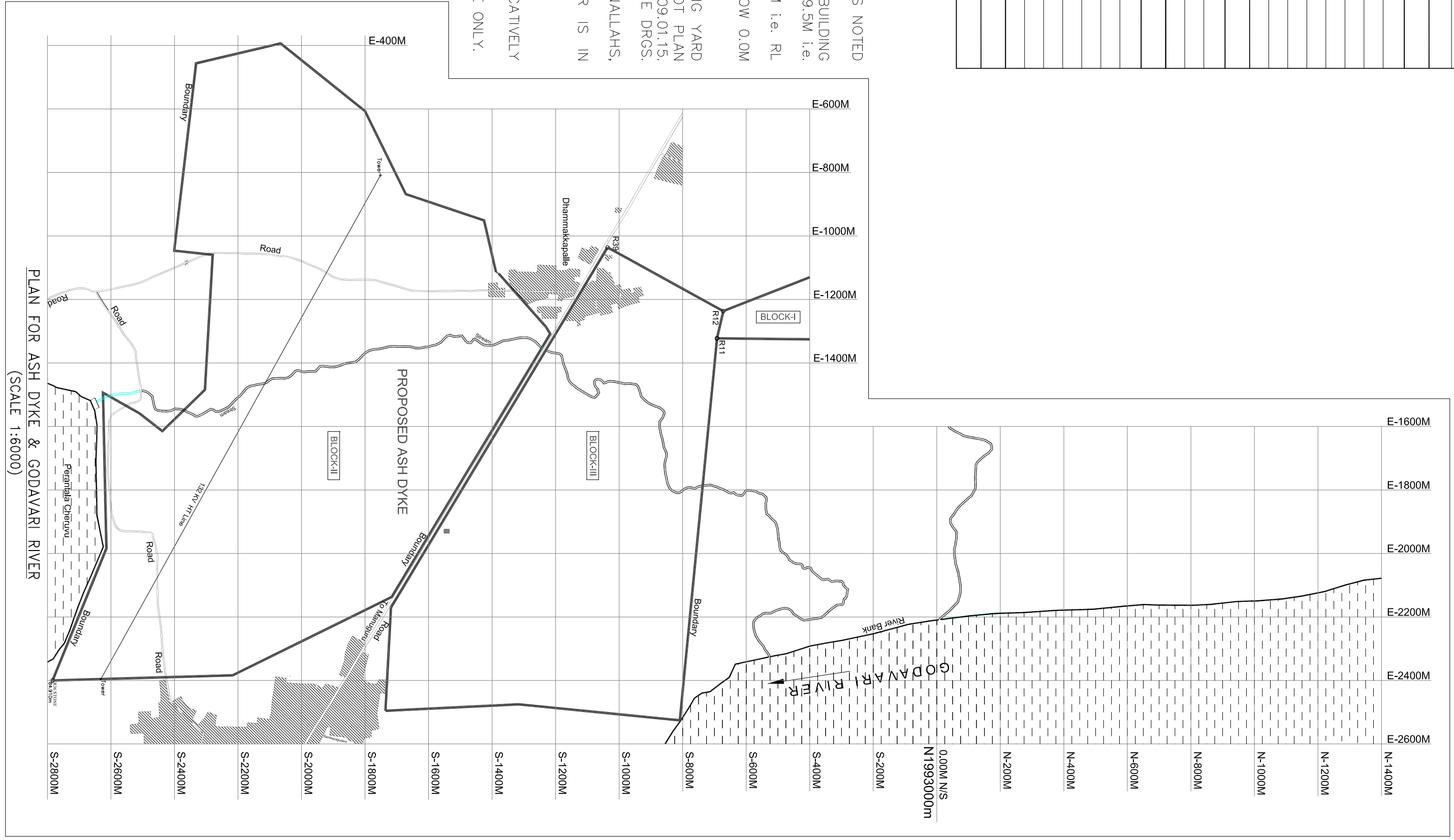
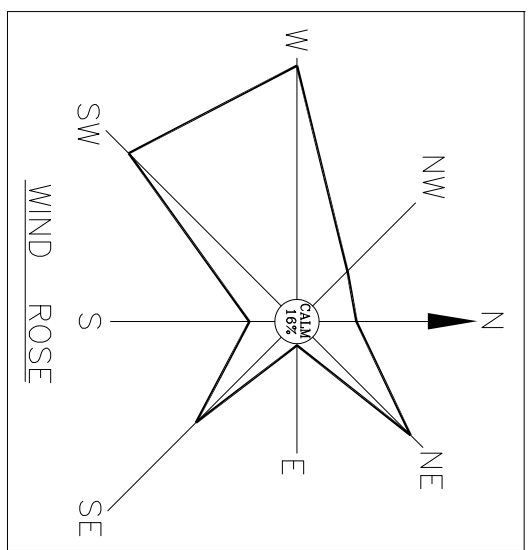
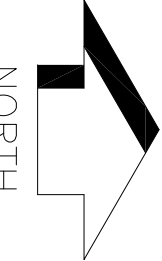


TITLE: 4 X 270 MW BHADRADRI TPS	SPECIFICATION NO. PE-TS-411-673-A001	
	TECHNICAL SPECIFICATION FOR SEWAGE TREATMENT PLANT	REV. NO. 00 DATE : 29/05/2017

ANNEXURE XII

INPUT DRAWINGS

SL. NO.	DRAWING TITLE	DRAWING NO.
1.	P& I DIAGRAM FOR SEWAGE TREATMENT PLANT	PE-DG-411-673-A001
2.	PLOT PLAN	PE-DG-411-100-M001



FACILITIES IN WHICH ADDITIONS /CHANGES HAVE BEEN DONE AS PER NEW ENVIRONMENT NORMS AND TSD & SCR, ARE MARKED WITH CLOUD CO

LEGENDS:

- AREA BOUNDARY
- RIVER, STREAM
- DRAIN POINTS WITH ASH LEVEL
- VILLAGE
- PPE/CABLE RACK
- GREEN BELT

1. ALL DIMENSIONS AND CO-ORDINATES ARE IN METRE UNLESS NOTED OTHERWISE.
2. THE FINISHED FLOOR LEVEL (F.F.) OF POWER HOUSE BUILDING IS 0.5M ABOVE F.O.L.
3. BOLLER AREA FINISHED FLOOR LEVEL IS 200MM BELOW 0.0M I.e. RL.
4. TRANSPORTER YARD FINISHED FLOOR LEVEL IS 100MM BELOW 0.0M
5. THE SPILLAGE SHOW IS INDICATIVE ONLY.
6. ASH DYKE LOCATION IN BLOCK-II & RAJAWA MARSHALLING YARD (CUSTOMER SCOPE) ARE CONSIDERED AS PER DESIGN FLOOR PLAN (CUSTOMER SCOPE) AND WILL BE UPDATED AS PER THE DRESS.
7. BOUNDARY BALUSTION DIVERSION OF EXISTING ROADS, VIALARS, WATER STREAMS & CANALS ARE IN CUSTOMER SCOPE.
8. CUSTOMER SCOPE TAKE UP TO IN-PLANT WATER RESERVOIR IS IN GREEN BELT (CUSTOMER SCOPE) IS SHOWN INDICATIVELY.
9. THE FFG & SCR FACILITIES SUGGESTIVE LOCATIONS SHOWN INDICATIVELY (NOT IN PRESENT SCOPE OF WORK).
11. LAYOUT/ARRANGEMENT FROM ESP TO CHIMNEY IS INDICATIVE ONLY.

NOTES:-

1. ALL DIMENSIONS AND CO-ORDINATES ARE IN METRE UNLESS NOTED OTHERWISE.
2. THE FINISHED FLOOR LEVEL (F.F.) OF POWER HOUSE BUILDING IS 0.5M ABOVE F.O.L.
3. BOLLER AREA FINISHED FLOOR LEVEL IS 200MM BELOW 0.0M I.e. RL.
4. TRANSPORTER YARD FINISHED FLOOR LEVEL IS 100MM BELOW 0.0M
5. THE SPILLAGE SHOW IS INDICATIVE ONLY.
6. ASH DYKE LOCATION IN BLOCK-II & RAJAWA MARSHALLING YARD (CUSTOMER SCOPE) ARE CONSIDERED AS PER DESIGN FLOOR PLAN (CUSTOMER SCOPE) AND WILL BE UPDATED AS PER THE DRESS.
7. BOUNDARY BALUSTION DIVERSION OF EXISTING ROADS, VIALARS, WATER STREAMS & CANALS ARE IN CUSTOMER SCOPE.
8. CUSTOMER SCOPE TAKE UP TO IN-PLANT WATER RESERVOIR IS IN GREEN BELT (CUSTOMER SCOPE) IS SHOWN INDICATIVELY.
9. THE FFG & SCR FACILITIES SUGGESTIVE LOCATIONS SHOWN INDICATIVELY (NOT IN PRESENT SCOPE OF WORK).
11. LAYOUT/ARRANGEMENT FROM ESP TO CHIMNEY IS INDICATIVE ONLY.

* REFER NOTE NO. 10

TABLE	
FACILITY / DESCRIPTION OF FACILITIES	
1.0	MAIN PLANT AREA
1.1	SWITCH YARD
1.2	TRANSFORMER YARD
1.3	TURBINE BUILDING
1.4	BOLLER
1.5	ESP CONTROL ROOM
1.6	SPACE FOR FGD - BUILT
1.7	CONDENSATE STORAGE TANKS
1.8	SPACE FOR FGD - BUILT
1.9	1A & 5A COMPRESSOR HOUSE
1.10	500 SET
2.0	WATER SYSTEM
2.1	RAW WATER RESERVOIR
2.2	1A & 5A WATER TOWER
2.3	FF PLANT
2.4	DM PLANT
2.5	WATER HOUSE
2.6	1A & 5A WATER TOWER
2.7	DM INFORMATION PLANT FOR CM SYSTEM
2.8	DM TREATMENT PLANT FOR CM SYSTEM
2.9	CLARIFIED WATER STORAGE TANK & PUMP HOUSE
2.10	EFFLUENT TREATMENT PLANT
2.11	1A & 5A WATER TOWER
2.12	STORAGE TREATMENT PLANT
2.13	DM TANKS & DM TRANSFER PUMPS
2.14	CONDENSATE STORAGE TANKS AND CONDENSER MAKE UP & BOLLER FILL PUMPS
2.15	500 SET
3.0	FUEL OIL SYSTEM
3.1	FUEL OIL STORAGE TANK AREA
3.2	FUEL OIL UNLOADING AND PRESSURISING PUMP HOUSE
3.3	FUEL OIL STORAGE TANK AREA
3.4	FUEL OIL UNLOADING AND PRESSURISING PUMP HOUSE
4.0	COAL HANDLING PLANT
4.1	MAISON TOWER
4.2	1A & 5A COAL STORAGE
4.3	COAL CONTROL ROOM/CHP MCC ROOM
4.4	STACKER RECLAIMER
4.5	STACKER RECLAIMER (T)
4.6	COAL BELT CONVEYOR
4.7	COAL BELT CONVEYOR
4.8	COAL BELT CONVEYOR
4.9	COAL BELT CONVEYOR
4.10	DM RAIL RAIL OFF ROAD
5.0	ASH HANDLING PLANT
5.1	FLY ASH SLATS
5.2	ASH WATER TANK
5.3	ASH WATER TANK
5.4	ASH WATER TANK
5.5	ASH WATER TANK
5.6	ASH WATER TANK
5.7	ASH WATER TANK
5.8	ASH WATER TANK
5.9	ASH WATER TANK
6.0	ASH WATER TANK
6.1	ASH WATER TANK
6.2	ASH WATER TANK
6.3	ASH WATER TANK
6.4	ASH WATER TANK
6.5	ASH WATER TANK
6.6	ASH WATER TANK
6.7	ASH WATER TANK
6.8	ASH WATER TANK
6.9	ASH WATER TANK
7.0	FIRE FIGHTING SYSTEM
7.1	FIRE FIGHTING SYSTEM
7.2	FIRE FIGHTING SYSTEM
7.3	FIRE FIGHTING SYSTEM
8.0	FGD SYSTEM *
8.1	FGD (GOL ASSIGNED)
8.2	FGD (GOL ASSIGNED)
8.3	FGD (GOL ASSIGNED)
8.4	FGD (GOL ASSIGNED)
8.5	FGD (GOL ASSIGNED)
8.6	FGD (GOL ASSIGNED)
8.7	FGD (GOL ASSIGNED)
8.8	FGD (GOL ASSIGNED)
8.9	FGD (GOL ASSIGNED)
9.0	SCR SYSTEM *
9.1	SCR SYSTEM *



TITLE: 4 X 270 MW BHADRADRI TPS	SPECIFICATION NO. PE-TS-411-673-A001	
	TECHNICAL SPECIFICATION FOR SEWAGE TREATMENT PLANT	REV. NO. 00 DATE : 29/05/2017

DATASHEET A FOR STP

SL. NO.	DESCRIPTION	
1.	Capacity of STP	60 m3/day with an average flow of 6 m3/hr
2.	SEWAGE PUMPS	
2.1	Type	Submersible grinder type
2.2	Quantity per sump	2 X 100 %
2.3	Capacity	As per P & ID of Sewage Treatment plant
2.4	MOC casing	Cast Iron to IS 210 FG 260
2.5	MOC impeller	Stainless Steel AISI 304
2.6	MOC shaft	SS 410
3.	AERATION TANK	
3.1	Quantity	One (1)
3.2	MOC	RCC
3.3	Type	Extended type aeration tank above ground
3.4	Size	As per 16 hour retention time (Minimum 12 m3) with an average flow of 6 m3/hr
4.	HOPPER BOTTOM SECONDARY CLARIFIER	
4.1	Quantity / Capacity	One (1) / 60 m3/day
4.2	MOC	RCC
4.3	Type	Hopper bottom (Above ground) with tube settlers
4.4	Size	To suit the sewage inflow of 60 m3/day with an average flow of 6 m3/hr
4.5	Rise rate	Less than 0.5 m3/hr/m2
5.	FILTER PRESS	
5.1	Capacity / Type	6 m3/hr / Plate type
5.2	MOC	
5.2.1	Feed head, moving plate and roller	CI
5.2.2	Plates	PP
5.2.3	Inlet Nozzle	SS
5.2.4	Filtrate cock	PP
6.	CLEAR WATER TRANSFER PUMP	
6.1	Type	Horizontal centrifugal
6.2	Quantity	Two (2) Nos. (1W+1S)
6.3	Capacity	Suitable to empty the clear water sump in one hour or 25 m3/hr (min.) whichever is higher
6.4	MOC Casing	CI to IS 210 Gr. FG 260



TITLE: 4 X 270 MW BHADRADRI TPS	SPECIFICATION NO. PE-TS-411-673-A001	
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6.5	MOC Casing Impeller / shaft / shaft sleeve	SS316 / SS410
6.6	Other fasteners	CS
6.7	Base plate / mounting plate	MS as per IS 2062
7.	SEWAGE RECYCLE PUMP	
7.1	Type	Horizontal centrifugal
7.2	Quantity	Two (2) Nos. (1W+1S)
7.3	Capacity	To suit system requirement or minimum 6 m3/hr whichever is higher
7.4	MOC Casing	CI to IS 210 Gr. FG 260
7.5	MOC Casing Impeller / shaft / shaft sleeve	SS316 / SS410
7.6	Other fasteners	CS
7.7	Base plate / mounting plate	MS as per IS 2062
8.	AIR BLOWER (Common for aeration tank, Common sewage collection sump & Sludge holding tank)	
8.1	Type	Twin lobe rotary
8.2	Quantity	Two(2) Nos.(1W+1S)
8.3	Capacity	To suit system requirement
8.4	MOC casing	CI to IS 210 Gr. FG 260
8.5	Side plates / gear cover	CI to IS 210 Gr. FG 260
8.6	Impeller	SS 304
8.7	Diffuser	EPDM
9.	SODIUM HYPOCHLORITE DOSING TANK	
9.1	Type	Vertical cylindrical
9.2	Quantity	One (1)
9.3	Capacity	Minimum One day requirement
9.4	Material of construction	HDPE
10.	SODIUM HYPOCHLORITE DOSING PUMP	
10.1	Quantity	2X100 %
10.2	Capacity and head	As per requirement
10.3	Material of construction	PP
11.	FLOCCULATION TANK	
11.1	Quantity	One (1)
11.2	MOC	RCC
11.3	Capacity	As per system requirement or 1 m3 whichever is higher
11.4	Agitator	One (1), MOC SS 316



TITLE: 4 X 270 MW BHADRADRI TPS	SPECIFICATION NO. PE-TS-411-673-A001	
	TECHNICAL SPECIFICATION FOR SEWAGE TREATMENT PLANT	REV. NO. 00 DATE : 29/05/2017

12.	PIPING	
12.1	Sewage transfer piping	CI
12.2	Air	CS
12.3	Hypochlorite piping	PVC (Sch. 20 min.)
13.	CLEAR WATER TANK	
13.1	Quantity	One (1)
13.2	MOC	RCC
13.3	Capacity	As per system requirement or 25 m3 whichever is higher
14.	VALVES	
14.1	Butterfly Valve	Type : Wafer / double flanged Body : CI to IS 210 GF 260 + Epoxy Disc : SGI Bonnet Seat : EPDM
14.2	Diaphragm Valve	Body : CI to IS 210 GF 260 Bonnet : CI to IS 210 GF 260 (sealed Type) Compressor : SS 304 Stem : AISI 410 Diaphragm : Neoprene rubber 65+/-5 Shore A / Back butyl 65+/-5 Shore A Lining: EBONITE LINED TO 3.0mm THK.(UP TO 80NB) & 4.0mm THK.(HDNB & ABOVE) HARDNESS: 90 TO 100 SHORE A Hand wheel MOC : SG IRON
14.3	Gate valve	Body: CI 210 Gr FG 260. Type :Outside screw and rising stem type Stem, seat ring and wedge facing ring: SS, Rating: PN 10 (min). Other parts of the valve: As per IS: 14846.
14.4	Ball valve/plug valve	Type :Full bore Rating: PN 10 (min). Body: cast Iron/carbon steel Ball: stainless steel Seat ring: PTFE Stem: Stainless steel Seat: Nitrile rubber,PTFE
14.5	Non return valve	These valves shall be swing check type or dual plate type Swing check type (non corrosive application) Body and disc: Cast iron. Hinge pin and door/disc pin: Cast steel ASTM A216 Gr.WCB Disc facing ring: stainless steel Body Seat ring: Stainless steel
15.	SEWAGE SUMPS (OUTSIDE STP AREA)	
15.1	Sewage sump S1, S2, S3, S4, S5, S6, S7, S8, S9 and S10	Minimum effective dimensions as per P & ID of sewage treatment plant.
15.2	MOC	RCC
15.3	Type	Covered at top, below ground



TITLE: 4 X 270 MW BHADRADRI TPS	SPECIFICATION NO. PE-TS-411-673-A001	
	TECHNICAL SPECIFICATION FOR SEWAGE TREATMENT PLANT	REV. NO. 00 DATE : 29/05/2017

15.4	Accessories	Coarse bar screen (MOC : MSEP) at each sump location
15.5	Handrail	To be provided by bidder
15.6	No. of chain pulley block and capacity	One no. at each sump location, capacity as per specification requirement
16.	COMMON SEWAGE COLLECTION SUMP (INSIDE STP AREA)	Minimum effective dimensions as per P & ID of sewage treatment plant.
16.1	Capacity	
16.2	MOC	RCC
16.3	Type	Covered at top, below ground
16.4	Handrail	To be provided by bidder
16.5	No. of chain pulley block and capacity	One no., capacity as per specification requirement.
17.	Sludge Holding tank	
17.1	Quantity	One no. no. two compartments
17.2	Capacity	24 m3 (effective) each compartment
17.3	MOC	RCC
18.	Filter Press Feed Pump	
18.1	Type	Horizontal Screw
18.2	Quantity	Two (2) Nos. (1W+1S)
18.3	Capacity	To suit system requirement or minimum 6 m3/hr whichever is higher
18.4	MOC Casing	CI to IS 210 Gr. FG 260
18.5	MOC shaft / Rotor	Stainless Steel AISI 316
18.6	MOC stator	Stainless Steel AISI 316
18.7	Other fasteners	CS
18.8	Base plate / mounting plate	MS as per IS 2062

ELECTRIC HOIST

Sl.no	DESCRIPTION	TECHNICAL PARTICULARS
1.0	Type	Steel wire electric hoist with electrically operated trolley
2.0	Scope (Qty., Capacity, Lift, Travel Length)	As per specification and layout requirement
3.0	Type of service	Indoor
4.0	Overload test	125% of SWL
5.0	Design Ambient temperature	50° C
6.0	General Design	As per IS: 3938 / 1983 or latest, Class-II duty
7.0	Operating speed	
7.1	Hoisting speed	3 MPM.
7.2	Trolley speed	15 MPM



TITLE: 4 X 270 MW BHADRADRI TPS	SPECIFICATION NO. PE-TS-411-673-A001	
	TECHNICAL SPECIFICATION FOR SEWAGE TREATMENT PLANT	REV. NO. 00 DATE : 29/05/2017

8.0	Type of transmission	Through Electric motor and gear box.
9.0	Wire Rope	
9.1	Construction / core	6 x36/ 6X37 (Steel core)
9.2	Code	IS:2266
9.3	Number of falls	Min. 4
9.4	Factor of safety	Not less than 5
10.0	Load Hook and block	NORMALISED HOOK ONLY
10.1	Type of load hook	Plain shank trapezoidal section with safety latch.
10.2	Load hook Code	IS: 15560
10.3	Load hook Material	As per IS:15560
10.4	Hook suspension	Thrust bearing
10.5	Material of block suspension	Fabricated from steel plate, Material: IS: 2062
11.0	Gearing	
11.1	Type	Spur / Helical
11.2	Gear/ pinion material	as per IS 3938
11.3	Lubrication	Oil splash/ grease lubricated
11.4	Bearing type	Antifriction Ball / Roller
12.0	Trolley drive	
12.1	Wheel	Single flange taper thread
12.2	Wheel conform to (Std. / code)	IS: 3938
12.3	Wheel material	As per IS:3938
12.4	Bearing type	Antifriction Ball / Roller
12.5	Trolley type	Rolled structural steel with side plates extended beyond wheel flanges to protect wheels.
12.6	Hardness	Max hardness 200 BHN
13.0	SHEAVE	
13.1	Material	Fabricated from steel plate. IS: 2062 Gr. A or Gr. B / as per IS: 3938
13.2	Bearing type	Antifriction Ball / Roller.
14.0	BRAKE (HOIST and TROLLEY)	
14.1	Type	DC EM brakes disc type (fail to safe).
14.2	Capacity	As per IS 3938.
14.3	Number	One number for each motor.
15.0	ROPE DRUM	
15.1	Material	Cast iron, cast steel or mild steel.
15.2	Flange / Flangeless	Flanged
15.3	Type of groove	As per manufacturers standard to suit the layout requirement.(Shall be decided during detail



TITLE: 4 X 270 MW BHADRADRI TPS	SPECIFICATION NO. PE-TS-411-673-A001	
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		engineering)
17.0	TYPE OF DSL	
17.1	CT travel	PVC Shrouded bus bar conductor type DSL
18.0	MOTORS	
18.1	Type	Sq. Cage induction, TEFC, S4 duty, 40% CDF.
18.2	Number of start	150 starts / hr
18.3	Voltage, Phase and Frequency	415V $\pm 10\%$, 3 phase, 4 wire, 50 Hz
18.4	Class of insulation	Class "F" and temperature rise limited to class B.
18.5	Type of enclosure	TEFC
18.6	Degree of protection provided for enclosure	IP-54/IP-55 depending upon Indoor / Outdoor application
18.7	Margin	Motor rating will be calculated keeping margin of at least 15% over the maximum power requirement in the duty condition specified.
19.0	LIMIT SWITCHES	Hoisting Trolley
19.1	Type	Snap action, self actuating type Lever type
20.0	Control panel	* Fabricated from Cold rolled sheet steel not less than 2.5mm for front & rear & 2mm for side, top & bottom portion with gland plate of 3mm thick. * Degree of protection shall be IP 54. * Power on indicating lamps shall be provided * Panel illumination lamps operated by door switch. * 2 nos earthing terminals on panel. * 20 % spares terminals (clip on type) shall be provided. * Power and control terminals (clip on type) shall be on separate channels. * Gland plate shall be double brass compression type.
20.1	Qty	1 No.
21.0	Pendent Push buttons	Up /down / forward / Reverse push buttons. Indicative marking for easy operation shall be provided.
22.0	Power cables	FRLS / EPR flexible Cu cable / Aluminum cable
23.0	Control cable	FRLS / EPR flexible Cu cable
24.0	Control Voltage	110 V
25.0	Painting	A) Structural Surface preparation : De greasing and Mechanical cleaning with wire brush or hand tool. (SA 1/ ST 2 / ST 3 as applicable) Primer : Red oxide Zinc phosphate



TITLE: 4 X 270 MW BHADRADRI TPS	SPECIFICATION NO. PE-TS-411-673-A001	
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		(Alkyd medium)- 2 coat , DFT 35 μ per coat. Finish Coat : Synthetic enamel (Alkyd medium) as per IS: 2932- 2 coats, DFT 35 μ per coat. Total DFT : 140μ B) Electrical /Control Panel Surface preparation: Seven tank process Primer : Red Oxide Zinc phosphate (Alkyd medium)- 2 coat , Minimum DFT 35 μ per coat. Finish Coat : Synthetic enamel (Alkyd medium) as per IS: 2932- 2 coats, Minimum DFT 35 μ per coat. Total DFT : 140 μ
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MANUAL HOIST (CHAIN PULLEY BLOCK)

1	Type	Chain pulley block with/without travelling trolley
2	General Design	IS: 3832
3	Duty Class as per IS:3832	Class –II
4	Hoisting Mechanism	
a)	Type	Hand operated gear transmission
b)	Type of gear	Spur / Helical
c)	Load Chain	
i)	Type	Link type
ii)	Material	T (8) as per IS: 6216
iii)	Conforms to (Std./Code)	IS: 6216
d)	Hand Chain	
i)	Type	Link type
ii)	Material	Mild steel Grade 30
iii)	Conform to Std.	IS:2429 (Part I)
e)	Load Hook & Hook Block	
i)	Type of load hook	Plain shank- Trapezoidal section
ii)	Load hooks conforms to	IS: 15560
iii)	Type of hook suspension	Swivelling type with lock
iv)	Type of make of bearing	Thrust ball bearing of hook suspension
v)	Type & Material of hook	Carbon steel/forged steel As per IS 15560
f)	Gears/ Pinion	
i)	Type	Spur
ii)	Material	Alloy steel / carbon steel
iii)	Type of Bearing	Antifriction ball bearing / Roller
h)	Sprockets:	
	Type of bearings used	Antifriction ball bearing / Roller
i)	Method of lubrication	
	Bearings	Grease
	Gearing & Pinions	Grease
	Sprockets	Grease
j)	Brakes	



TITLE: 4 X 270 MW BHADRADRI TPS	SPECIFICATION NO. PE-TS-411-673-A001	
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	Type	Screw and friction disc type
5	Trolley and Bridge drive	
a)	Trolley	
i)	Type	Geared (Manually operated)
ii)	Material of frame	Mild steel (IS:2062 Grade A or B)
b)	Drive Chain	
i)	Type	Link type
ii)	Material	Steel Gr.30 as per IS 2429 (part 1)
c)	Wheel	
i)	Number of pairs of wheel	Two in each trolley/bridge
ii)	Flange	Single flanged
iii)	Wheel material	Cast Iron Gr. FG 200 as per IS:210
iv)	Type of bearings need	Antifriction
d)	Gears	
i)	Type	Spur / helical
ii)	Material	EN8
iii)	Type of bearings used	Antifriction
e)	Method of lubrication for	
i)	Bearings	Grease
ii)	General	Grease
iii)	Sprockets	Grease
6	Painting	As per manufacturer standard



TITLE: 4 X 270 MW BHADRADRI TPS	SPECIFICATION NO. PE-TS-411-673-A001	
	TECHNICAL SPECIFICATION FOR SEWAGE TREATMENT PLANT	REV. NO. 00 DATE : 29/05/2017

SUB-SECTION IB
SPECIFIC TECHNICAL REQUIREMENTS (ELECTRICAL)



**ELECTRICAL EQUIPMENT SPECIFICATION
FOR WATER SYSTEM MAUX PACAKGES
SEWAGE TREATMENT PLANT
4X270 MW BHADRADRI TPS**

SPECIFICATION NO.

VOLUME NO. : **II-B**

SECTION :

REV NO. : **00** DATE : 30/03/17

SHEET : 2 OF 3

1.0 EQUIPMENT & SERVICES TO BE PROVIDED BY BIDDER:

- a) Services and equipment as per “Electrical Scope between BHEL and Vendor”.
- b) Any item/work either supply of equipm ent or erection m aterial 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 sam e shall be provided by the bidder without any extra charge.
- c) Supply of m andatory spares as specified in the specifications of m echanical equipments.
- d) Electrical load requirement for SEWAGE TREATMENT PLANT
- 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 m akes for each equipment at contract stage, which shall be subject to custom er/BHEL approval without any com mercial 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 docum ents shall be subject to customer/BHEL approval without any commercial implication to BHEL.
- h) Motor shall meet the general technical requirements for motor.
- i) Vendor to clearly indicate equipm ent 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 equipm ent 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”.



**ELECTRICAL EQUIPMENT SPECIFICATION
FOR WATER SYSTEM MAUX PACAKGES
SEWAGE TREATMENT PLANT
4X270 MW BHADRADRI TPS**

SPECIFICATION NO.

VOLUME NO. : **II-B**

SECTION :

REV NO. : **00** DATE : 30/03/17

SHEET : 3 OF 3

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 (Annexure –I)
- b) General technical requirements for LV motors.
- c) Datasheet A & C.
- d) Quality plan for motors.
- e) Electrical Load data format (Annexure –II)
- f) BHEL cable listing format (Annexure –III)

ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR(FOR EPC PROJECTS)**PACKAGES : SEWAGE TREATMENT PLANT****SCOPE OF VENDOR: SUPPLY, ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT****PROJECT:**

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

ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR(FOR EPC PROJECTS)**PACKAGES : SEWAGE TREATMENT PLANT****SCOPE OF VENDOR: SUPPLY, ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT****PROJECT:**

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
	lightning protection			
11	Below grade grounding	BHEL	BHEL	
12	LT Motors with base plate and foundation hardware	Vendor	Vendor	Makes shall be subject to customer/ BHEL approval at contract stage.
13	Mandatory spares	Vendor	-	Vendor to quote as per specification.
14	Recommended O & M spares	Vendor	-	As specified elsewhere in specification
15	Any other equipment/ material/ service required for completeness of system based on system offered by the vendor (to ensure trouble free and efficient operation of the system).	Vendor	Vendor	
16	a) Input cable schedules (Control & Screened Control Cables) b) Cable interconnection details for above c) Cable block diagram	Vendor Vendor Vendor	- - -	Cable listing for Control and Instrumentation Cable and electronic earthing cable in enclosed excel format shall be submitted by vendor during detailed engineering stage.
17	Electrical Equipment & cable tray layout drawings	Vendor	-	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.

ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR(FOR EPC PROJECTS)

PACKAGES : SEWAGE TREATMENT PLANT

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

PROJECT:

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.

STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR (FOR EPC PROJECTS)**PACKAGE:** EOT FOR SEWAGE TREATMENT PLANT**PROJECT :** 4 X 270 MW BHADRADRI TPS**SCOPE OF VENDOR:** SUPPLY , ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT

<u>S. NO</u>	<u>DETAILS</u>	<u>SCOPE SUPPLY</u>	<u>SCOPE E&C</u>	<u>REMARKS</u>
1	Isolating Switch	Vendor	Vendor	BHEL will provide one number 415 V(3ph, 4W) supply feeder only up to isolating switches for cranes. Any other voltage level (AC/DC) required will be derived by the vendor. Motor starter shall be part of crane control panel.
2	Power cables, control cables, screened control cables and any special cables (if required) between equipment supplied by vendor.	Vendor	Vendor	Cable from supply feeder to isolating switch shall be in BHEL scope.
3	Cabling material (cable trays, accessories, cable tray supporting system, conduits etc).	Vendor	Vendor	
4	Equipment Earthing	Vendor	Vendor	All equipment metallic enclosures / frames, metal structure etc. shall be grounded at two points each to the nearest grounding points / risers provided by BHEL.
5	Motors	Vendor	Vendor	
6	Cable glands and lugs for equipment supplied by vendor	Vendor	Vendor	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type heavy duty tinned copper lugs for power & control cables.
7	a) Input cable schedules (C & I) b) Cable interconnection details for above c) Cable block diagram	Vendor Vendor Vendor	- - -	Cable listing for Control and Instrumentation Cable in enclosed excel format shall be submitted by vendor during detailed engineering stage.
8	Equipment layout drawings	Vendor	-	
9	Electrical Equipment GA drawing	Vendor	-	For necessary interface review.

DATA SHEET A

SL.NO.	PARAMETERS	4X270MW BHADRADRI
1	Design ambient temperature	50 °C
2	Maximum acceptable kW rating of LV motor	160KW *
3	Installation (Indoors/ Outdoors)	As required
4	Degree Of protection for motor/ terminal box	IP 54/ IP 55
5	Type of Cooling	TEFC/CACA/TETV
6	Details of supply system	
a)	Rated voltage (with variation)	415V $\pm$ 10%
b)	Rated frequency (with variation)	50 Hz + 3 % to - 5%
c)	Combined voltage & freq. variation	10% (sum of absolute values)
d)	System fault level at rated voltage	50 kA for 1 sec
e)	Short time rating for terminal boxes	
i)	110 kW and above (Breaker Controlled)	50 KA for 0.25 sec..
ii)	Below 110 Kw (Contactor Controlled)	50 KA protected by HRC fuse
f)	LV System grounding	Solidly
7	Class of insulation	Class 'F', with temp rise limited to class B.
8	Minimum voltage for starting (As percentage of rated voltage)	(a) 85% below 110KW (b) 80% from 110KW to 160KW (c) 85% above 160KW to 1000KW (d) 80% from 1001 KW to 4000KW (e) 75% > 4000KW
9	Power cables data	Shall be given during detailed engg.
10	Earth Conductor Size & Material	415 V motors : Above 90 kW - 50 x 6 Galvanised MS Flat 415 V motors : Above 30 upto 90 kW - 35 x 6 Galvanised MS Flat 415 V motors : Above 2.2 upto 90 kW - 25 x 3 Galvanised MS Flat 415 V motors : Upto 2.2 kW - 8SWG GI/GS Wire
11	Space heater supply	240 V, 1 ϕ , 50 Hz (for motors above 30 Kw)
12	Rating up to which Single phase motor	Acceptable below 0.20 kW
13	Locked rotor current Limit as percentage of FLC	As per IS 12615*
14	Flame-proof motor	
a)	Enclosure suitable (As per IS: 2148)	As per requirement
b)	Classification of Hazardous area (As per IS: 5572 part-I)	As per requirement
15	Makes	BHEL/ Customer approval
16	Paint shade	Shall be given during detailed engg
17	TESTING	All motors shall be subjected to Type tests & routine tests as per IS: 325 and approved quality plan.
18	Energy efficient motors	* Continuous duty LT motors up to 160 KW Output rating (at 50 deg.C ambient temperature), shall be premium efficiency (IE3) as per IEC: 60034-30/ IS:12615.

	TITLE	MOTOR DATA SHEET – C 4 X 270 MW BHADRADRI TPS	SPECIFICATION NO.	
			VOLUME	II B
			SECTION D	
			REV NO. 00	DATE
			SHEET	1 OF 2

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

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE	MOTOR DATA SHEET – C 4 X 270 MW BHADRADRI TPS	SPECIFICATION NO.	
			VOLUME	II B
			SECTION D	
			REV NO. 00	DATE
			SHEET 2	OF 2

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

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

[illegible]

ANNEXURE III

[illegible]

		QUALITY PLAN		CUSTOMER :			PROJECT TITLE		SPECIFICATION : NUMBER :			
				BIDDER/ : VENDOR			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03		SPECIFICATION : TITLE			
		SHEET 1 OF 9		SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)		SECTION		VOLUME III	
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	P	W	V	11
1.0	RAW MATERIAL & BOUGHT OUT CONTROL											
1.1	SHEET STEEL, PLATES, SECTION, EYEBOLTS	1.SURFACE CONDITION	MA	VISUAL	100%	-	FREE FROM BLINKS, CRACKS, WAVINESS ETC	LOG BOOK	3	-	-	
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	MANFR'S DRG./SPEC	MANFR'S DRG./SPEC	-DO-	3	-	-	
		3.PROOF LOAD TEST (EYE BOLT)	MA	MECH. TEST	-DO-	-DO-	-DO-	INSPEC. REPORT	3	-	2	
1.2	HARDWARES	1.SURFACE CONDITION	MA	VISUAL	100%		FREE FROM CRACKS, UN-EVENNESS ETC.	-DO-	3	-	-	
		2.PROPERTY CLASS	MA	VISUAL	SAMPLES	MANFR'S DRG./SPEC BOOK	RELEVANT IS/SPEC.	SUPPLIERS TC & LOG	3	-	2	PROPERTY CLASS MARKING SHALL BE CHECKED BY THE VENDOR
1.3	CASTING	1.SURFACE CONDITION	MA	VISUAL	100%		FREE FROM CRACKS, BLOW HOLES ETC.	LOG BOOK	3	-	2	
		2.CHEM. & PHY. PROP.	MA	CHEM & MECH TEST	1/HEAT NO.	MANFR'S DRG./SPEC	RELEVANT IS/	SUPPLIER'S TC	3	-	2	HEAT NO. SHALL BE VERIFIED
		3.DIMENSIONS	MA	MEASUREMENT	100%	MANUFR'S DRG.	MANUFR'S DRG.	LOG BOOK	3	-	2	
1.4	PAINT & VARNISH	1.MAKE, SHADE, SHELF LIFE & TYPE	MA	VISUAL	100% CONTINUOUS	MANFR'S DRG./SPEC	MANFR'S DRG./SPEC	LOG BOOK	3	-	2	
BHEL			PARTICULARS			BIDDER/VENDOR						
			NAME									
			SIGNATURE									
			DATE						BIDDER'S/VENDORS COMPANY SEAL			

		QUALITY PLAN	CUSTOMER :			PROJECT TITLE			SPECIFICATION :				
			BIDDER/ : VENDOR			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE				
		SHEET 2 OF 9			SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION		VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS	
									P	W	V		
1	2	3	4	5	6	7	8	9	10			11	
1.5	SHAFT (FORGED OR ROLLED)	1. SURFACE COND.	MA	VISUAL	100%	-	FREE FROM VISUAL DEFECTS	-DO-	3	-	-	VENDOR'S APPROVAL IDENTIFICATION SHALL BE MAINTAINED	
		2. CHEM. & PHYSICAL PROPERTIES	MA	CHEM. & PHYSICAL TESTS	1/HEAT NO. OR HEAT TREATMENT BATCH NO	MFG. DRG. SPEC.	RELEVANT IS	SUPPLIER'S TC	3	-	2		
		3. DIMENSIONS	MA	MEASUREMENT	100%	-DO-	MANUFR'S DRG.	LOG BOOK	3	-	2		
		4.INTERNAL FLAWS	CR	UT	-DO-	ASTM-A388	MANUFR'S SPEC. BHEL SPEC.	-DO-	3	2	1		
1.6	SPACE HEATERS, CONNECTORS, TERMINAL BLOCKS, CABLES, CABLE LUGS, CARBON BRUSH TEMP. DETECTORS, RTD, BTD'S	1. MAKE & RATING	MA	VISUAL	-DO-	MANUFR'S DRG. SPEC.	MANUFR'S DRG. SPEC.	-DO-	3	-	2	FOR DIA OF 55 MM & ABOVE	
		2. PHYSICAL COND.	MA	-DO-	-DO-	-	NO PHYS. DAMAGE, NO ELECTRICAL DISCONTINUITY	-DO-	3	-	2		
		3.DIMENSIONS (WHEREVER APPLICABLE)	MA	MEASUREMENT	SAMPLE	MANUFR'S DRG./ SPEC.	MANUFR'S DRG. / SPEC.	-DO-	3	-	2		
		4.PERFORMANCE/ CALIBRATION	MA	TEST	100%	-DO-	-DO-	INSP. REPORT	3	-	2		
BHEL			PARTICULARS			BIDDER/VENDOR							
			NAME										
			SIGNATURE										
			DATE										
												BIDDER'S/VENDORS COMPANY SEAL	

		QUALITY PLAN SHEET 3 OF 9		CUSTOMER :		PROJECT			SPECIFICATION :			
				BIDDER/		TITLE			NUMBER :			
				VENDOR		QUALITY PLAN			SPECIFICATION :			
		SYSTEM		NUMBER PED-506-00-Q-007, REV-03			TITLE			SECTION		
				ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			VOLUME III					
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	P	W	V	11
1.7	OTHER INSULATING MATERIALS LIKE SLEEVES, BINDINGS CORDS, PAPERS, PRESS BOARDS ETC.	1. SURFACE COND. ETC. 2. OTHER CHARACTERISTICS	MA MA	VISUAL TEST	100% SAMPLE	- MANUF'S SPEC.	NO VISUAL DEFECTS MANUF'S SPEC.	INSPT. REPORT LOG BOOK AND OR SUPPLIER'S TC	3 3	- -	2 2	FOR MV MOTOR INSULATION/VARNISH THICKNESS SHALL BE MORE THAN THE BURS HEIGHT
1.8	SHEET STAMPING (PUNCHED)	1. SURFACE COND. 2.DIMENSIONS INCLUDING BURS HEIGHT 3. ACCEPTANCE TESTS	MA MA MA	VISUAL MEASUREMENT ELECT. & MECH TESTS	100% SAMPLE -DO-	- MANUFR'S DRG. . MANUF'S SPEC./ RELEVANT IS	NO VISUAL DEFECTS (FREE FROM BURS) MANUFR'S DRG. RELEVANT IS	LOG BOOK -DO- SUPPLIER'S TC	3 3 3	- - -	2 2 2	
1.9	CONDUCTORS	1. SURFACE FINISH 2.ELECT. PROP. & MECH. PROP	MA MA	VISUAL ELECT. & MECH.TEST	100% SAMPLES	- RELEVANT IS/ BS OR OTHER STANDARDS	FREE FROM VISUAL DEFECTS RELEVANT IS/ BS OR OTHER STANDARDS	LOG BOOK SUPPLIERS TC & VENDOR'S INSPN. REPORTS	3* 3	- -	2* 2	
BHEL			PARTICULARS			BIDDER/VENDOR						
			NAME									
			SIGNATURE									
			DATE						BIDDER'S/VENDORS COMPANY SEAL			

		QUALITY PLAN SHEET 4 OF 9		CUSTOMER :		PROJECT			SPECIFICATION :			
				BIDDER/ :		TITLE			NUMBER :			
				VENDOR		QUALITY PLAN			SPECIFICATION :			
				SYSTEM		NUMBER PED-506-00-Q-007, REV-03			TITLE			
				ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)		SECTION			VOLUME III			
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
1.10	BEARINGS	3.DIMENSIONS	MA	MEASUREMENT	-DO-	-DO-	-DO-	Log Book	3	-	2	
		1.MAKE & TYPE	MA	VISUAL	100%	MANFR'S DRG./ APPROVED DATASHEET	MANFR'S DRG./ APPROVED DATASHEET	-DO-	3	-	2	
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	BHEL DATA SHEET	BHEL DATA SHEET BEARING MANUF'S CATALOGUES	-DO-	3	-	2	
		3.SURFACE FINISH	MA	VISUAL	100%	-	FREE FROM VISUAL DEFECTS	-DO-	3	-	2	
1.11	SLIP RING (WHEREVER APPLICABLE)	1.SURFACE COND.	MA	VISUAL	100%	-	-DO-	-DO-	3	-	-	
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	MANUF'S DRG	MANUF'S DRG	-DO-	3	-	-	
		3.TEMP.WITH-STAND CAPACITY	MA	ELECT.TEST	-DO-	MANUF'S SPEC./ BHEL SPEC.	MANUF'S SPEC./ BHEL SPEC.	-DO-	3	-	2	
		4.HV/IR	MA	-DO-	100%	-DO-	-DO-	-DO-	3	-	2	
1.12	OIL SEALS & GASKETS	1.MATERIAL OF GASKET	MA	VISUAL	100%	MANUF'S DRG/SPECS	MANUF'S DRG./ SPECS.	-DO-	3	-	-	
		2.SURFACE COND.	MA	VISUAL	100%	-	FREE FROM VISUAL DEFECTS	-DO-	3	-	-	
		3.DIMENSIONS	MA	MEASUREMENT	SAMPLE	MANUF'S DRG	MANUF'S DRG	-DO-	3	-	-	
BHEL			PARTICULARS			BIDDER/VENDOR						
			NAME									
			SIGNATURE									
			DATE									
									BIDDER'S/VENDORS COMPANY SEAL			

		QUALITY PLAN		CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :		
				BIDDER/ : VENDOR			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE		
		SHEET 5 OF 9		SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION		VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	P	W	V	11
2.0	IN PROCESS											
2.1	STATOR FRAME WELDING (IN CASE OF FABRICATED STATOR)	1.WORKMANSHIP & CLEANNES	MA	VISUAL	100%	-DO-	GOOD FINISH	LOG BOOK	3/2	2	-	
		2.DIMENSIONS	MA	MEASUREMENT	-DO-	MANUF'S DRG	MANUF'S DRG	-DO-	2	-	-	
2.2	MACHINING	1.FINISH	MA	VISUAL	100%	-DO-	GOOD FINISH	LOG BOOK	2	-	-	
		2.DIMENSIONS	MA	MEASUREMENT	-DO-	MANUF'S DRG	MANUF'S DRG	-DO-	2	-	-	
		3.SHAFT SURFACE FLOWS	MA	PT	-DO-	RELEVENT SPEC./ ASTM-E165	MANUFR'S SPEC./ BHEL SPEC./	-DO-	2	-	1	
2.3	PAINTING	1.SURFACE PREPARATION	MA	VISUAL	100%	MANFR'S SPEC./BHEL SPEC./ RELEVANT STAND	BHEL SPEC. SAME AS COL.7	LOG BOOK	2	-	-	
		2.PAINT THICKNESS (BOTH PRIMER & FINISH COAT)	MA	MEASUREMENT BY ELCOMETER	SAMPLE	-DO-	-DO-	-DO-	2	-	-	
		3.SHADE	MA	VISUAL	-DO-	-DO-	-DO-	Log Book	2	-	-	
		4.ADHESION	MA	CROSS CUTTING & TAPE TEST	-DO-	-DO-	-DO-	Log Book	2	-	-	
BHEL			PARTICULARS			BIDDER/VENDOR						
			NAME									
			SIGNATURE									
			DATE						BIDDER'S/VENDORS COMPANY SEAL			