

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

TECHNICAL ENQUIRY SPECIFICATION FOR WATER / DS PACKAGE FOR

for

2 x 660 MW UDANGUDI STPS

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BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
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CONTENTS

Sl. No.	DESCRIPTION	SHEET No.		
1.0	PROJECT INFORMATION	03	of	28
2.0	BROAD SCOPE OF WORK	04	of	28
3.0	DOCUMENTS/ INFORMATION TO BE FURNISHED ALONG WITH OFFER.	14	of	28
4.0	TECHNICAL REQUIRMENT	16	of	28
5.0	ELECTRICAL AND C&I SCOPE	21	of	28
6.0	EXCLUSIONS	21	of	28
7.0	TERMINAL POINTS	21	of	28
8.0	ERECTION, SUPERVISION AND COMMISSIONING	21	of	28
9.0	DRAWING & DOCUMENTS	22	of	28
10.0	QUALITY ASSURANCE	24	of	28
11.0	INSPECTION & TESTING	26	of	28
12.0	LIST OF ENCLOSURES	27	of	28

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

1.0 PROJECT INFORMATION:

Present proposal is for the establishment of coal based “2x660 MW Udangudi Supercritical Thermal Power Project- Stage-1” at Udangudi, Thoothukudi District, Tamil Nadu. TCE Bangalore is the customer consultant. Mean wind speed is 20.6kmph. Climatological table for the region as enclosed shall be used for reference. For the purpose of design an ambient temperature of 50 deg. C and relative humidity of 85% shall be considered.

POWER SUPPLY SYSTEM :

1.1 HT power supply

- i. Voltage : 6.6 kV AC, 3-Ph, 3 wire
- ii. Voltage variation : $\pm 10\%$
- iii. Frequency variation : +3% to - 5%
- iv. Combined Voltage & Frequency Variation : 10% (absolute sum)
- v. Fault level : 31.5kA for 3 sec
- vi. Earthing : Neutral grounded through resistance

1.2 LT power supply

- i. Voltage : 415V, 3-Ph, 4 wire
- ii. Voltage variation : $\pm 10\%$
- iii. Frequency variation : +3% to - 5%
- iv. Combined Voltage & Frequency Variation : 10% (absolute sum)
- v. Fault level : 65kA/ 50kA for 1 sec
- vi. Earthing : Solidly Grounded

1.3 Control Supply

- i. MCC Feeders : 110V AC, 1-Ph, 2 wire, 50 Hz
- ii. DC Supply : 220 V DC, +10% & -15%, 2 wire, ungrounded

1.4 Uninterrupted power supply output : 230V AC, 1-Ph, $\pm 10\%$, 2 wire, 50Hz

1.5 Construction power: 415V, 3-Ph 3-Wire power supply will be given at one point, on chargeable basis at the prevailing rates. Further distribution including tariff meter installation, shall be carried out by the bidder as per his requirement.

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

2.0 BROAD SCOPE OF WATER PACKAGE BIDDERS:

Scope for this package bidder shall include Design, supply and Erection & Commissioning and PG Tests of Water package for complete Coal Conveying System complete with drives, electrics, C&I system as per enclosed TANGEDCO NIT Specifications

Water package shall include following system of CHP

- a) **Potable water system** (as elaborated in DBR for Water system (IS-4-DB-714-111-M079)
- b) **Service water system**(as elaborated in DBR for Water system (IS-4-DB-714-111-M079)
- c) **Dry fog dust suppression** including compressors (DFDS) and air receiver for all TP's and crusher inlet and outlet (as elaborated in DBR for Water system (IS-4-DB-714-111-M079). Service air branches shall be provided from the compressed air lines on each floor of junction tower wherever drives are placed. Such each floor shall have one tapping point ; Bidder shall provide 1 no potable air compressor of 2 CFM capacity for cleaning of bulldozers in dozer shed
- d) **Plain water dust suppression for Emergency Reclaim Hopper** (as elaborated in DBR for Water system (IS-4-DB-714-111-M079))
- e) **Plain water dust suppression for stockpile** (as elaborated in DBR for Water system (IS-4-DB-714-111-M079))
- f) **Coal run off pit pump** with pipes, isolation valves/gates, sluice gates and accessories(as elaborated in DBR for Water system (IS-4-DB-714-111-M079)). The discharge of coal run off pond pump shall be into ETP (SI No 12 in plot plan)
- g) **Make up water system** for water cooled Package AC {1W+1S with Flow rate=2 CMH (tentative) & Pressure=2.5 kg/cm² (tentative)}
- h) **Sump pumps** with piping and pipe fittings- 2 Nos(1W+1S) of 30CMH capacity for ERH; The piping shall be from ERH to ETP.
- i) **Portable sump pumps**-2 Nos of 10 CMH with piping and pipe fittings for discharging the floor wash water from the sump pits near Junction towers to ETP/Run off pond. Zero liquid discharge scheme with piping shall be provided by the vendor along with his offer. Each Junction tower in CHP shall be provided with 1m³ pit to collect the floor washing waste water. The water from this pit shall be discharged to ETP/Run of ponds using portable floor wash pumps of 10 CMH. Two nos of pumps shall be provided for this purpose. Each pit shall be provided with piping and isolation gate valves (manually operated). As and when the water level in pit is high, the portable pump shall be connected to the pipe and water shall be discharged to ETP/Run off ponds.

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

The capacities mentioned in the DBR for Water system (IS-4-DB-714-111-M079) are tentative and can change to any extent during detailed engineering. The indent of document is to give a brief outline of the scope, specification etc for the bidder's assessment. Any item required to establish the intent of the scope of work- apart from the ones mentioned in DBR- shall be supplied by the successful bidder without any cost implications on BHEL.

The scope of bidder for this package includes design, detailed engineering, submission of engineering & civil assignment drawings/ docs./ datasheets/ QAPs/ FQPs, PG test procedures and obtaining the approval from TANGEDCO/ TCE/ BHEL, Manufacturing/ fabrication, inspection/ shop floor testing, shop floor painting, supply of equipment's including spares, packing & transportation to site including transit insurance, customs clearance/ port clearance, unloading and storage at site, construction of Open & Closed storage, shifting to erection work place and security, erection & commissioning, satisfactory completion of Performance Guarantee tests after successful completion of initial trial operation & final painting after erection along with associated mechanical, electrical, control & Instrumentation and minor associated civil works shall be in bidder scope.

For completing the package, co-ordination with BHEL's other package bidders during detail engineering for preparation of Piping layout, mechanical GA drawings and its civil assignment drawings, trial run, functional testing, Performance guarantee testing till final handing over to end customer TANGEDCO upon satisfactory completion and written confirmation from TANGEDCO for the system shall be in bidder's scope.

Design: Design of water system shall include preparation of drawings/ documents, sizing calculations, data sheets etc. based on the GA drawings, design basis report & NIT specifications furnished by BHEL, preparation of equipment drawings/ datasheets/ quality assurance documents/ field quality plans, commissioning procedures, operation & maintenance manuals, Performance Guarantee test procedures and obtaining approval from TANGEDCO / TCE / BHEL. Providing inputs for preparation of as built drawings and getting it approved from end customer.

Supply: Includes manufacturing/ fabrication, shop floor testing, stage inspections, final inspections, shop floor painting, packing & transportation to site, customs clearance/ port clearance and any other statutory clearances, receipt and unloading at site.

Erection and Commissioning: Includes preparation of storage yard, preparation/ construction of covered shed, storage, security, site handling, shifting to erection location, erection &

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

commissioning, trial operation, preparation of protocols and getting signed from end customer, final painting at site after erection, carrying out Performance Guarantee Tests and handing over to TANGEDCO including free supply items (if any) with associated electricals and C&I (as mentioned in Electrical scope) etc. until satisfactory completion and written confirmation from TANGEDCO.

Performance guarantee requirement: Dust emissions level shall be less than 5mg/nm³ within 5m radius of DS application point for dry fog system.

Operation and maintenance of complete water package system and other equipment till trial operation and final handing over to end customer shall be in bidder's scope.

2.1 Scope of Work - Mechanical:

Scope for this package bidder shall include design, supply and erection & commissioning of complete water system in this specification complete with drives, electrics and C&I system as per enclosed water package DBR, TANGEDCO NIT specifications .

The brief scope of work includes the following,

- a) Supply Centrifugal pumps, air compressors, air receivers, gate valves (motorized as well as manual), globe valves (motorized as well as manual), ball valves (motorized as well as manual), butterfly valves, check valves, pressure relief valves, duplex strainers, Y strainers, pressure gauges, compound gauges, pressure switches, DP switches, flow transmitters, Orifice plate, DP transmitters, under belt switches, flow activation station, pressure regulating units, spray nozzle headers, nozzles (both for plain water as well as DFDS), pipes and Pipe fittings, sequential timers, sprinklers, Hose reel with QRC, level gauges, level switches, bib cocks, float valves, puddle flanges etc required for the water system defined in specification
- b) Plain Water Dust Suppression System at Stockpiles & for emergency reclaim hoppers, Dry Fog Dust Suppression System for all TP's, ERH (outgoing conveyor) & crusher house, Service Water System along the conveyor gallery and TP's, crusher houses, tunnels, control rooms, MCCs, toilets, reclaim hopper complex, bunker floors, Loco shed, Bull dozer shed, pump house
- c) Potable Water / Drinking Water System for all CHP area.
- d) Coal pile run off pump, along with C&I, all types of valves & piping system with accessories up to ETP indicated in the Plot plan. Arrangement for Manual digging and removal of excavated coal particles in baskets/containers shall be in bidder's scope.

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

The hoist (manual/electric for handling the coal settling pond pump) shall be in bidder's scope.

- 2) Supply compressed Air system (Compressors, air receiver) along with piping & other accessories for entire CHP area for DFDS. Supply of Compressors (reciprocating type), and air receiver with drives, electrics and control system mentioned elsewhere in the specification for the entire CHP area.
- 3) Supply of Base frames, stools, foundation bolts (For fixing frame and equipment's over the frame), Couplings (Input and output).
- 4) The Stacker cum reclaim machine's shall include a D.F.D.S. system with spray nozzles and machine mounted water tank with the machine (shall be supplied BHEL's other contractor). However, provision of tapping points (for both air line as well as at 25 M interval, and complete with gate valve and quick fix connection should be installed along the side of stockpiles and this shall be in scope of this package bidder.
- 5) Preparation of protocols and getting signed from customer for all equipment/ system in bidder's scope. Bidder to note and confirm that performance guarantee test for the complete system along with bidders supply shall be in the bidder's scope.
- 6) Painting scheme shall be submitted by bidder in line with TANGEDCO NIT and the same shall be subject to approval of TANGEDCO / Consultant. Final approved painting scheme shall be followed by bidder without any price implication to BHEL.
- 7) Submission of commissioning procedures and O&M manuals of all equipment's with related electrics and as built drgs/ doc. Shall be in the bidder's scope.
- 8) Supply of consumables (oil, grease and lubricants) for initial flushing, first fill and initial operation and top up during trial run till successful demonstration of PG test.
- 9) Bidder's scope shall also include supply of mandatory spares, start-up & commissioning spares. Applicable spares for equipment in this package to be considered by the bidder. Mandatory spares shall be as per Annexure – 1.
- 10) Recommended spares list as per the requirement for the entire system mentioned elsewhere in the specification shall be furnished & wherever the list is not furnished by BHEL / TANGEDCO / Consultant, same has to be furnished by bidder.
- 11) Supply of special tools & tackles as per requirement shall be in bidder's scope of supply.
- 12) Quality assurance and inspection of equipment shall be as per TANGEDCO NIT specification.

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

13) Bidder to note that list above is not exhaustive and any work required for completing the system and ensuring its satisfactory running shall also be in the scope of this package bidder.

14) Performance guarantee & procedure for conducting PG test shall be as per TANGEDCO NIT

2.2 GENERAL REQUIREMENTS:

SL NO	ITEM	UNITS	DATA
1	Application points for Dry fog system		Dry fog system – JNT specified in the flow diagram. Dry fog system at Crusher house at the crusher receipt and discharge. Sprinkler type system-Stockpile
2	Stockpile DS system		Sprinkling
3	Control of water supply in DSS		Each water spray header in DSS shall be provided with a solenoid valve to stop the water spray when the concerned plant and equipment of coal handling system do not operate
4	Mode of operation for DSS		Each DSS shall be operated from the local control panels and shall be interlocked with the respective conveyor / equipment.
5	Mode of laying of pipe for stockpile DSS		The pipes for stockpile dust suppression system shall be buried below ground and suitable protection like wrapping and walls shall be provided. The activities like excavation, wrapping and coating of pipes, laying, back filling and levelling shall be in bidder' s scope
6	Design pressure of the receiver		shall be 25% more than the rated pressure. Corrosion allowance of 1.5mm shall be considered for the receiver.
7	Type of nozzles		Swiveling type for stockpile
8			Dry for jet spray type for other areas. Each nozzle for DSS will be provided with inbuilt filter made of brass and shall also be of self cleaning type.
9	Spray nozzle tip and housing		SS 304 and Aluminium alloy
10	Quality of water to be sprayed at each feed and is charge points of conveyor		as per manufacture's standard; Minimum quantity & LPM is defined in DBR for water system

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

11	Method of operation of each DS system		Local panels. Solenoid valves will be provided at each header and interlocked with the respective conveyor operation.
12	Centrifugal pumps		
12.1	Designation		Dust suppression
12.2	Liquid handled		Water
12.3	Type		Back pull out
12.4	Location		As per Requirement
12.5	Shaft		Coupled
12.6	Drive transmission		Direct
12.7	Seal		Gland
12.8	Coupling guard		Made of expandable bolted to the base plate
12.9	Flow per sprinkler	LPM	Flow shall be calculated based on design criteria.
13	Material of construction (DS pumps)		
13.1	Impeller		Bronze
13.2	Casing		Close Grained CI
13.3	Shaft/Shaft sleeve		En-8
13.4	Impeller ring / casing ring		Bronze
14	Material of construction (SW pumps)		
14.1	Casing		CI
14.2	Impeller		SS-304
15	Material of construction (PW pumps)		
15.1	Casing		ASTM A351, SS-CF-8M
15.2	Shaft sleeve		ASTM A-276, SS-316
15.3	Impeller		ASTM A351, SS-CF-8M
15.4	Shaft		ASTM A276 -410
15.5	Rest of components		SS
16	MOC (Coal pile run off)		CF8M/SS316
1	Method of DSS operation in stockpile: The header pipe lines around the stockpile will be buried below ground to avoid obstruction for the movement of dozers in the stock pile area. Only Stand post for sprinklers will be above ground level. The spacing of the sprinklers will be such that it covers the entire stockpile. The spacing of sprinklers will be indicated by contractor.		
2	A duplex strainer will be provided for service water pumps / DS water pumps at pump suction.		
3	The pumps will be of outdoor type. Weather protection hood / cover will be provided for the motor.		

MOC of Pipe:

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

SL NO	SERVICE	SIZE	PIPE	FITTINGS	FLANGES	GASKETS	END JOINT
1)	Service air / service water Dust suppression Water	<= 50 NB	ASTM A53 Gr B ERW/ IS1239 Part I Heavy ERW	ASTM A105/IS1239 Part II	ASTM A105	EPDM/ Teflon	Socket Welded
		> 50 NB & Upto 450 NB	ASTM A53 Gr B ERW/IS1239 ERW Part I up to 150NB.	ASTM A234 WPB/ IS 1239 Part II up to 150NB	ASTM A105	EPDM/ Teflon	Butt welded
		450 NB & Above	ASTM A134-A283 Gr C ERW	ASTM A234 WPB	Plate fabricated from MS IS 2062 Plate	EPDM/ Teflon	Butt welded
2)	Portable water system	<= 50 NB	ASTM A312 TP 316L	ASTM A182 Gr F316L	ASTM A182 Gr F316L	EPDM/ Teflon	Socket Welded
		> 50 NB	ASTM A312 TP 316L	A 403 Gr WP316L	ASTM A182 Gr F316L	EPDM/ Teflon	Butt welded

MOC of valve:

SL. NO.	1		2		3	
SERVICE	Potable water		Service water		DS system water	
SIZE	>65NB	<50NB	>65NB	< 50 NB	>65NB	< 50 NB
BODY/ BONNET			A216 Gr. WCB	A105.	A216 Gr. WCB	A105.
DISC	ASTM A 351 CF3M	ASTM A 182 F316L	ASTM A216 Gr WCB	ASTM A 182 Gr. F6a	ASTM A216 Gr WCB	ASTM A 182 Gr. F6a
STEM	ASTM A479 Type 410-2	ASTM A479 Type 410-2	ASTM A479 Type 410-2	ASTM A479 Type 410-2	ASTM A479 Type 410-2	ASTM A479 Type 410-2
HAND WHEL	ASTM A47 Gr 32510	ASTM A47 Gr 32510	ASTM A47 GR. 32510	ASTM A47 GR. 32510	ASTM A47 GR. 32510	ASTM A47 GR. 32510
VALVE ENDS	FLANGED RAISED FACE	SOCKET WELDED	FLANGED RAISED FACE	SOCKET WELDED	FLANGED RAISED FACE	SOCKET WELDED
REFERENCE	As per Page 24 of 31 of Vol-II, Section-2.0,2.20 Piping, Valves and Fitting					

The design requirements of Strainers are:

- The pressure drop of the strainer at design flow and clean condition shall not exceed 0.1 Kg/cm². Pressure drop at design flow and 50% clogged condition shall not exceed 0.15 Kg/cm²

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

- The clear area of strainer shall be five times the inlet cross sectional area of the connection piping.

SL NO	DESCRIPTION	REQUIREMENT
1	Type	Duplex
2	MOC	
3	Body	IS-2062; For sump pumps CI
4	Plates	SS
5	Filters	SS-304

Bidders to consider following in their scope apart from referred bid documents and broad scope/ scope of work mentioned above and Annexure's.

- 1) The design, manufacture, inspection and testing of the equipments shall comply with all the currently applicable statutes, regulations and safety codes in the locality where the equipment to be installed and shall also conform to the latest edition of Indian and other international standards and codes. Nothing in this specification shall be construed to relieve the contractor of the required statutory responsibility.
- 2) The Contractor shall be responsible for providing all materials, equipment and services specified or otherwise (unless specifically excluded) which are required to fulfill the intent of ensuring operability and the reliability of the complete system covered under this specification.
- 3) E&C of all free issued items (if any) shall be in bidder's scope.
- 4) In case of any ambiguity, conflict in the standard & specification & /or interpretation of clauses in this enquiry spec. and its enclosures the decision of BHEL/ TANGEDCO shall be final and binding and any change due to this shall have no price implication on BHEL and shall have to be absorbed by successful bidder.
- 5) Bidder shall strictly follow and adhere to the guidelines laid down in the enclosed BHEL's Health, Safety and Environment (HSE) manual.
- 6) Bidder shall visit the site to familiarize with the Coal Handling system and site constraints before submitting the complete offer to BHEL in all respects. No issues arising out of site condition or layout constraints shall be entertained later on during detail engineering and any modification required due to site condition or layout constraints shall be done by successful bidder without any cost implication to BHEL.
- 7) Bidder shall ensure the correctness of civil assignment drgs which shall be an input for BHEL's civil design agency & structural design package bidder. Any issues like cutting /

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

chipping of floors, beams shall not be permitted. Any additional civil works arising if missed out things in civil assignment drg prepared by the bidder like pedestal, foundation etc. shall have to be taken care by this package bidders without any cost implication to BHEL and engaging its own resources.

- 8) Supply of grouting cement and grouting of all mechanical equipment/items and its drives base shall be in bidder's scope. BHEL/ BHEL's civil contractors shall provide only the foundation pockets for pedestals (wherever necessary) as per mechanical GA.
- 9) Supply of all stools, foundation bolts and other embedment in concrete. Bidder to mention the requirement of the same clearly in their respective GA drgs. and it will be erected by BHEL/ BHEL's civil & structural contractor. However, supervision of erection shall be done by bidder.
- 10) Rust preventive after inspection at shop floor before dispatch shall be in bidder's scope. Rust preventive and Paint at site after erection.
- 11) Necessary provisions shall be considered in the equipment / items / systems which are in other bidder's scope for integrating with other equipments / systems / items which are part of other contractor's scope.
- 12) Material of construction for all equipment / items shall be as per NIT & subject to BHEL / TANGEDCO / Consultant approval during detail engineering. If any issue arises out of this, bidder to consider the same without any price implication BHEL.
- 13) Bidder's scope shall also include system integration & control requirements and control philosophy.
- 14) Bidder shall be responsible for commissioning, demonstration of performance guarantee parameters of complete system as laid down elsewhere in the specification and support to BHEL's other vendor for integration with Main CHP system like conveyors system, other auxiliary system and commissioning of the complete CHP after integration. Equipments / systems offered by the bidder shall not be accepted for final handover till the demonstration of performance guarantee parameters of the equipments / systems and in case any changes required in machines to match the overall CHP system PG test parameters without affecting other associated system shall have to be done by the bidder without any cost implication to BHEL / TANGEDCO.
- 15) Bidder shall submit the Bi- weekly engineering progress reports in BHEL's/ TANGEDCO format and depute full project team for attending all project review meetings called by BHEL and TANGEDCO (or their consultant) without fail.

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

- 16) Bidder shall strictly adhere and follow the supply, erection & commissioning terms and conditions as mentioned in the annexure elsewhere.
- 17) Bidder to ensure sufficient manpower throughout the project for during detail engineering. Bidder to strictly adhere to BHEL / TANGEDCO drg. formats, document numbering, quality plan & FQP formats.
- 18) Bidder to extend all help and documentary support for compliance and addressing any statutory issues raised at site which pertains to the area / work under bidder's scope.
- 19) The conveyor profile, GA of conveyors, TP's, ERH, Crusher house etc., coal flow diagram and Plot plan attached with enclosed TANGEDCO NIT Specification is indicative only and doesn't show comprehensive scope of work and it may vary during detail engineering. However, bidder to make all efforts to optimize and restrict the size of Pump houses (i.e. L x B x H). Bidder shall furnish auxiliary power consumption in KW for all the equipments / machines at rated capacity. It is the sole responsibility of the bidder to demonstrate the same during PG test & handing over to customer successfully. However, if any issue arises during that stage, same shall be taken care by bidder without any price implication to BHEL.
- 20) Bidder shall comply with the furnished ratings and performance figures of the equipment as desired by BHEL / TANGEDCO.
- 21) Bidders to note minor chipping up to 50mm thk. micro leveling and providing shim plates, provision of temporary platforms / supports, base frame and fixing / foundation bolts for all pumps & compressors & its motor and coupling required during E&C of Mechanical equipments shall be in bidders scope.
- 22) Bidder has to arrange office and its amenities on his own, only space shall be provided by TANGEDCO /BHEL as per approval.
- 23) Leveling & Construction of open storage yard and closed storage shall be in bidder's scope.
- 24) Supply of all pipe sleeves, puddle flanges (as per system requirement) for this package shall be in bidder's scope.
- 25) Bidder shall furnish the complete GA of pump house along with the civil assignment drgs within 25 days of LOI.
- 26) Bidder shall prepare piping layout drgs. for all the buildings (over and underground) and conveyors (over and underground) incorporating DS system nozzles (at conveyor discharge and receipt points), PRU, FAS, piping, valves, tappings, pipe supports and

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

- other accessories etc., in the drgs which shall be provided by BHEL.
- 27) Apart from nozzles, all mounting arrangement for nozzles shall also be in bidder's scope.
- 28) Interconnection activities like pipe fixing (taking support from stringer post or gallery) by taking suitable support using nut & bolt or by welding shall be in bidder's scope of work. The pipes supports shall be in bidder's scope.
- 29) Supply, E&C of all pipe supporting members and its fixing, required for Pipes/Equipment/ items/ systems during erection (in buildings both over and underground, in conveyor galleries and underground tunnels) shall be in bidder's scope and this shall be done in coordination with BHEL's civil & structural contractor.
- 30) For laying of underground/ burying of pipes (if applicable) including hume pipe, excavation, laying & routing of pipes and back filling of soil any excavation done shall be in bidder's scope. The piping from run off pond to ETP shall be completely buried. The entire activities for this like excavation, laying of pipes, joining, back filling and levelling shall be in bidder's scope.
- 31) For all the underground pipes, wrapping & coating shall be done by the bidder at site, prior to erection.
- 32) During the entire storage period, pipes must be stored on wooden sleepers to avoid burying in soil and wound with necessary cover to avoid rusting.

Note:

- a) Bidder to note no deviation shall be acceptable to BHEL (pre-bid, bid and post bid) from TANGEDCO NIT specification & BHEL enquiry specification amendments and clarifications, unless and until written approval from BHEL has been accorded except for points mutually agreed upon in pre-bid MOM.
- b) Bidder shall submit the signed and stamped copy of all the pages (of all annexures – digital signatures also acceptable) which constitutes this technical enquiry specification signed by authorized signatory and clearly mentioning each clause under following two categories to avoid any ambiguity in scope understanding & the scope division as a technical offer during bidding.
 - i. "accepted without deviation and considered in scope of work"
 - ii. "Not considered in scope of work"
- c) Complete detail engineering drawings, load data details, pump and pipe sizing calculations, compressor sizing calculations, all other calculations, selection of

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

components for pumps, valves, compressors, dryers, receivers, piping's, etc. shall be reviewed & subject to approval of BHEL / TANGEDCO / TCE during detail engineering.

- d) Successful bidder shall take prior approval from BHEL while placing the E&C contract order for this package to a sub-contractor. BHEL reserves the right to disapprove/reject any such E&C contractor which BHEL deems not fit/not having the adequate experience for executing E&C of this contract.
- e) Bidder to quote for this offer considering the enclosed drawings in the annexure-06 / drawings.
- f) In case of any ambiguity, conflict in the standard &/or interpretation of clauses in this enquiry spec. and its enclosures the decision of TANGEDCO / TCE/ BHEL shall be final and binding and any change due to this shall have no price implication on BHEL and shall have to be absorbed by successful bidder
- g) The quantity & capacity indicated by bidder during bidding stage is tentative only & same shall be finalized during detailed engineering (DDE). Bidder to take care of the same during detailed engineering without any price implication to BHEL.
- h) Bidder to note & confirm that all data sheets, specification, schedules, vendor list, MOC etc furnished in their offer are complying with the BHEL's enquiry spec. and TANGEDCO's NIT document and scope & exclusions mentioned there in. If any deviation is there same shall not be acceptable to BHEL and in the event bidder becomes a successful bidder and LOA is placed on the bidder then all such data sheets, specification, schedules etc submitted with the offer having technical deviation shall stand null and void and shall not be considered during detail engineering. And detail engineering shall be done as per the spec. as per BHEL/ TANGEDCO approval and these changes shall not have any kind of cost implication on BHEL.

3.0 DOCUMENTS/ INFORMATION TO BE FURNISHED ALONGWITH OFFER.

- 1) List of Commissioning spares and start-up spares.
- 2) List of special tools and tackles.
- 3) List of recommended spare parts list for 3 years trouble free operation.
- 4) Reference list of your Customers for the similar items / system supplied & executed already.
- 5) Optional price of items in Annexure-D.
- 6) Latest performance certificates, completion certificates etc obtained from end customer.

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

- 7) Bidder to also submit tentative list of complete drive schedule (Type, Rating, Type of coupling, constant / Variable speed, duty, Power supply requirement, Load curves). However, shall be finalized during detailed engineering.
- 8) **Bidder to furnish the signed & stamped copy of complete NIT documents, without which bidders offer is liable for rejection.**
- 9) Bidder to also submit complete drive schedule including pumps, compressors, driers, air receivers etc along with the offer without which bidders offer is liable for rejection.
- 10) Motor margins to be considered for LT & HT motor is 15% & 10% respectively.
- 11) Duly signed along with seal a copy of complete Electrical scope (Annexure-2) along with all of its annexures.

1) Data to be filled in by the bidder and furnished along with technical bid:

Sl. No	Item	Capacity (m ³ / hr)	Discharge Pressure/ Head (MWC)	Reqd BKW (kW)	Motor with over (kW)	rating margin BKW	Quantity
1	PW pumps for entire CHP						(1W+1S)
2	DFDS pumps						(1W+1S)
3	Compressors with air receiver & drier for DFDS system						(1W+1S)
4	DS pumps for stockpiles, ERH & make up water stacker cum reclaim machine						(1W+1S)
5	Sump pumps (30 CMH capacity)						(1W+1S)
6	Coal pile run off pit / pond pump						(2W+2S)
7	Portable Sump pumps (20 CMH capacity)						(1W+1S)
8	Make up water pumps						(1W+1S)
9	Service water pumps						(1W+1S)

Bidder to make all efforts to optimize and restrict the sizes of pump houses (i.e. L x B x H).

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

Note: In case the above table is not filled or if it is incomplete, technical bid shall not be evaluated & considered.

4.0 TECHNICAL REQUIREMENT:

4.1 Water System (Plain water DS, DFDS, Service water)

1) Codes and Standards:

The design, manufacture, inspection and testing of complete water system (Dust Control - plain water & DFDS type, Drinking water, Service water) & Miscellaneous Systems shall comply with all the currently applicable statutes, regulations and safety codes in the locality where the equipment is to be installed. The Dust Control & Miscellaneous Systems shall conform to the latest edition of the following standards and codes. Other internationally acceptable standards/codes, which ensure equal or higher performance than those specified, shall also be accepted. Nothing in this specification shall be construed to relieve the contractor of the required statutory responsibility.

IS: 778: Gun Metal gate, globe & check valves for general purpose.

BS: 5150: Cast Iron Gate Valve for water works purposes

BS: 5152: Cast Iron Globe Valve for water works purposes

BS: 5312: Cast Iron Check Valve for water works purposes

IS: 1239: Mild Steel tubes & fittings.

IS: 2379: Colour for the identification of pipe line.

IS: 3589: Electrically welded steel pipes for water, gas & sewage (200 to 2000 mm)

IS: 5312: Swing check type reflux (non return) valves.

IS: 1520: Horizontal centrifugal pump for clean, cold fresh water.

IS: 5120: Centrifugal pump for clean, cold & fresh water.

BS: 5169 & BS: 1123: Air Receivers.

ANSI B 31.1: Code for pressure piping.

Hydraulic institute Standards of U.S.A.

- 2) However, Piping, fittings and valves material specifications & design requirements shall be as per TANGEDCO specifications & amendments. Bidders to follow the same.
- 3) Bidder must consider double Stream operation of all the conveyors when arriving at pipe sizes and other accessories of DFDS system.

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

- 4) All motors related to the given package (including free supply items, if any) alignment with drive system, supply of base frames, its bolts etc. shall be in bidder's scope.
- 5) Bidder shall incorporate the DS system nozzles, piping, and other accessories which need to be mounted on the discharge hood, feeding hood of conveyor on the drgs which shall be provided by BHEL.
- 6) All mounting arrangement for nozzles shall be in bidder's scope.
- 7) Material of construction of all Nozzles, sprinklers, valves etc. for plain water type dust suppression shall be selected so as to avoid any type of corrosion or blocking and the same shall be subject to TANGEDCO / BHEL's approval.
- 8) Hoists in pump house shall be in bidder's scope. Hoists shall be provided with VVVF
- 9) Supply, E&C of all pipe supporting angles and its fixing required for Pipes/ Equipment/ items/ systems during erection shall be done by bidder in association & coordination with BHEL's civil & structural contractor.
- 10) Provision of any temporary supports/ platforms required for E& C of mechanical equipment /items shall be in the scope of bidder.
- 11) Base frame and fixing/ foundation bolts for all Pump /compressors & its motor and couplings shall be in Bidder's scope.
- 12) For all water/air piping, pipe clamps/hangers etc. painting specification mentioned in referred TANGEDCO -NIT document to be followed. The painting colour code shall be provided to the Contractor during detail engineering.
- 13) The tentative conveyor profile, TP GA drgs, crusher house, coal flow diagram and Plot plan attached with enclosed TANGEDCO bid document which are indicative only and don't show comprehensive scope of work and actual conveyor profile, GA of TP drg., GA of crusher houses may vary during detail engineering.
- 14) All interface work; preparation of GA drgs of auxiliary system with all TP's, Crusher houses, WT complexes, ERHs, other buildings & proposed pump houses with BHEL's other package vendor shall be in bidder's scope.
- 15) Bidder to note & confirm that location of proposed pump house & coal settling pond as shown in the plot plan is tentative and it may change during details engineering based on layout constraints. The same shall be finalized during detail engg subject to BHEL/ TANGEDCO approval. And any changes required in its location or pump capacity or head shall be taken care during details engineering without any cost implication to BHEL.

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

- 16) Bidder to note that BHEL has considered Skirt Board of all the single point feeding conveyors as minimum 3 m extended ahead of front edge of chute and 500 mm beyond rear edge of chute and the height of skirt board shall be 750 mm and width as 2/3rd of the belt width for each belt ". Bidder to consider the DFDS system for conveyors considering these parameters and confirm the effectiveness and interface with their proposed DFDS system.
- 17) Bidder to consider filters/strainers at each suction point and isolation valve in all terminal points of input water (which shall be subject to TANGEDCO/ BHEL approval during detailed engineering) to suit the equipment, piping's etc offered by the bidder for various systems.
- 18) Bidder to furnish all the information without deviating from nomenclature of Conveyor numbers, PH's, Crusher House, TP's, MCC's etc as given in the Technical Enquiry Specification.
- 19) Bidders shall furnish and confirm the working principle of Dry Fog Dust Suppression system and also ensure that the Dry Fog Dust Suppression system should be suitable for uncrushed coal size also.
- 20) Bidders shall specify the Application Points of Dust Suppression systems, Plain Water Dust suppression system, Service Water System and Potable Water System. Same shall be subjected to approval from end customer.
- 21) Bidders to note that the Material of construction (MOC) for all Mechanical items like, pipes etc shall be as per the Technical requirements furnished along-with the Technical Enquiry Specification and no deviation in this regard shall be accepted. For all other parts for which MOC is not mentioned specifically in this technical spec & its annexure/enclosures, the same shall be subject to TANGEDCO /BHEL approval during detail engg. However, if the same is not approved/accepted during detail engineering by TANGEDCO /BHEL, same shall be taken care by bidder without any price implication to BHEL/TANGEDCO.
- 22) The length and details of the Stockpile shall be as per the BHEL/ TANGEDCO Approved Drawings and all the systems shall be as per TANGEDCO / BHEL approved Design Basis Report.
- 23) Bidder to consider manually/ electrically operated Globe valves for the sprinklers as per NIT.
- 24) Bidder must fill the complete Data sheet for Capacity, Head, Guaranteed Power & Motor Rating of various pumps compressors, receivers & dryers in the same format and without any deviation as per the Technical Enquiry Specification of the Package except in the

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

'Head' of compressors for DS system where bidders must indicate the discharge pressure.

- 25) Bidder shall provide Flow Activation Stations for the Dust Suppression Systems.
- 26) Bidder shall provide overflow and drain connection to nearest drain of TANGEDCO for all water tanks.
- 27) Bidder to note that insert plates shall be embedded in concrete and it shall be provided by BHEL's civil contractor as per approved Mechanical GA drg prepared by successful bidder, but any additional inserts or anchor fasteners required during pipe erection which were not shown in Mech. GA drg prepared by vendor shall be in bidder's scope.
- 28) Bidder to note & confirm that conveyor distances indicated in plot plan are tentative and may undergo some minor changes, bidder to take care the same in their offer without any price implication to BHEL during detail engg.
- 29) List of Quality assurance plans of various equipments/ items shall be frozen with the successful bidder during detail engg. as per TANGEDCO /BHEL/ TCE QC requirement.
- 30) Cleaning of any debris produced by the bidder during E&C shall be done immediately at each front.
- 31) Drilling of required holes in the structure of TP's, Crusher houses ERH etc in CHP area for erection of equipments shall be the bidder's scope
- 32) Bidders to provide Duplex Filters with Back Flush Line and Y-Strainers for all the systems of the Water Package.
- 33) Bidder to note that duplex filter at each terminal point shall be in bidder's scope.
- 34) The bill of materials reqd. for each system shall be finalized as per system requirement at the time of detailed engineering with BHEL/ TANGEDCO approval.
- 35) Under Belt Switch These switches shall be installed under the belt for detecting the presence of material on the belt whose contacts shall in turn be used for operating solenoid valves of dust suppression system elaborated elsewhere. The minimum degree of protection of switch shall be IP-65. The switch shall be capable of detecting three events simultaneously. Those are (i) belt loaded (ii) belt running at more than preset speed (iii) preset initial start delay.

4.2 Potable Water System:

- 1) Potable water connections are to be provided in all transfer points, Crusher House, all tripper floors, dozer shed and all Control rooms/ MCC rooms and toilets (in line with water

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

package DBR enclosed) etc. The same to be accordingly incorporated in the application points of Potable water system and shall comply with the NIT specs.

- 2) No. of Tapping points and No. of HDPE Tanks for providing Drinking water at Pump Houses, Crusher House, TP's, Toilets, MCC's and Bunker Units shall be finalized as per TANGEDCO /BHEL/ TCE approved drawings/documents during detail engineering without any price implication to BHEL.
- 3) Capacity & location of water storage tank shall be as per water package DBR (annexure-5) provided along with NIT.
- 4) Piping of potable water shall be ASTM A-312, TP-316L.
- 5) Bidder to confirm that following things are considered in their scope of work as per specifications and the enclosed tentative single line diagram.
 - a) All HDPE Overhead drinking water tanks of required capacity with thermal insulation to avoid heating of water with proper arrangement for drain and cleaning on all transfer points, crusher houses, MCC, Control rooms, Bunker floors etc of CHP area shall be in bidder's scope.
 - b) Straight piping, bends, tees, elbows, branches, laterals, crosses, reducing unions, couplings, caps, blank flanges, saddles etc. necessary for making reliable piping system, Hose Pipe, Quick Fix Coupling.
 - c) Drain valves at drinking water tanks.
 - d) Gaskets, ring joints, jointing materials etc. as required.
 - e) Instrument tapping connections, stubs etc.
 - f) Gate, globe & check valves to start/stop, regulate and to prevent back flow.
 - g) Duplex strainers with DP Switch and DP Indicator shall be interlocked with the pump and Y-strainers.
 - h) Anchors, hangers, supports and hardware as required including secondary steel embedment etc.
 - i) Underground pipe protection for all underground pipe work.
 - j) All MCC's shall be provided with HDPE Overhead tanks of minimum 500 Litres capacity for storage of service water for toilet use with proper arrangement for drain and cleaning.
 - k) Each drinking water tap point shall have an isolating valve before it.

5.0 ELECTRICAL AND C&I SCOPE: AS PER ANNEXURE-2

6.0 EXCLUSIONS:

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

- 1) Civil & structural work of Pump houses, its sump & pump foundations. However the frames for the pumps, grouting etc are in bidder's scope.
- 2) Civil & structural work of TP's, ERH and Crusher houses are excluded. However, all associated civil and structural work as mentioned above in scope of work for E&C of DSS, SW, PW/ DW & CW SYSTEMS and its equipment, piping & accessories, etc. shall be in the scope of bidder.
- 3) Monorail for hoists. However hoists required in pump house and for handling coal settling pond pump shall be in bidder's scope. The maintenance platform for hoist shall be also in bidder's scope.

7.0 TERMINAL POINTS:

- 1) Supply of the Equipments as per the specifications.
- 2) Supply of Spares, tools & tackles (if any) as mentioned in NIT
- 3) Erection & Commissioning as per NIT
- 4) Performance Guarantee as per NIT
- 5) Water supply connections for dust suppression, service water system, potable water shall be provided at one location (Near JNT-6) by BHEL. Further network of piping including all pumps, tanks, necessary accessories, supports and fittings etc. for distribution of potable water, water for dust suppression and service water system in all TPs, crusher house, ERH, Dozer shed, control rooms, MCC rooms, Tripper floors, toilets, etc. shall be under the scope of the bidder. Vendor to note that the minimum length of pipes to be considered from JNT-6 to DSPH are:
 - 850m of 200NB pipe for DS system
 - 850m of 100 NB pipe for SW system
 - 850m of 80NB pipe for PW system

8.0 ERECTION, SUPERVISION AND COMMISSIONING:

- 1) Bidder shall make their own arrangements well in advance for heavy erection equipments like bigger cranes that are required for erection of equipments which are at higher height.
- 2) Bidder shall depute continuously and maintain following minimum nos. of engineers and supervisors, not limited to nos. to be deputed at site for supervision of E&C, coordination and commercial activity for the package.
 - a) Resident Manager- **1 no.**
 - b) Mech. Engineer (min 2 yrs site exp.) or mech. Supervisor (min 5 yrs exp.)-**1 nos.**
 Bidder shall depute their mechanical engineer to site during construction of civil & structural works for cross-checking the correctness/ compatibility of civil & structural works w.r.t. E&C of mechanical systems/ equipments which are in the scope of mechanical main package bidder.

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

- c) Elect. Engineer (min 2 yrs site exp.) or Elect. Supervisor (min 5 yrs exp.)-**1 no.**
- d) Non-engineer- **1no.** storekeeper
- e) Non-engineer- **1no.** commercial activity

In case Bidder fails to maintain the above minimum manpower /site staff at site till project completion, suitable pro-rata deductions shall be made from RAB payables, for the duration of such absences, at the prevailing rate of BHEL manpower cost as penalty at the sole discretion of BHEL whose decision shall be final and binding.

However during erection bidder to increase the manpower to meet the project schedule.

9.0 DRAWING & DOCUMENTS:

Bidder to also consider following things in their scope apart from referred bid document and broad scope mentioned above:

- 1) Bidder shall furnish the complete electrical and mechanical load list of drives and equipments, P&ID diagram within 10 days of LOA.
- 2) Bidder shall furnish the complete GA of all pump house & coal settling pond along with the civil assignment drgs within 20 days of LOA.
- 3) Bidder shall furnish the L-2 project schedule for complete project indicating various milestones and constraints along with the bid. Successful bidder shall furnish the L-3 project schedule in line with the L-2 schedule after award of the contract.
- 4) Air and water requirements, Pump House sizes and calculations pertaining to Dust Suppression system, potable water system and service water system shall be as per TANGEDCO commented Design Basis report (which shall be finalized during detailed engineering with TANGEDCO / BHEL approval). Total water consumption should not exceed given in DBR.
- 5) Bidder to note that time is the essence of this contract, thus they shall submit the submission schedule for the list of drgs. indicated in this document in no. of days from zero date i.e. LOI date. No delay shall be entertained later on.
- 6) The list of drgs. / documents to be submitted by bidder shall be finalized with BHEL after award of the contract and bidder shall furnish the drgs./docs accordingly. Engineering drg/doc must contain the following but not limited to these and any drg/doc required by BHEL shall be furnished by the vendor during detail engineering:
 - a) P & I for Dust Suppression, Service water and drinking water systems including water requirement and pipe sizes

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

- b) Design Basis Report of Dust Suppression System for both plain and DFDS, PWDS, MW, SW, SA & DW System.
 - c) Schematic Diagram of Sprinkler type plain water Dust Suppression System for stockpiles and spray header type plain DS
 - d) Technical Data Sheet - Water Pumps, compressors, receivers, driers, motors, Valves, Strainers, MS pipe and GI Pipes (for DW system), Local control panel (wherever applicable/required) for DSS & SW system.
 - e) GA of Dust Suppression system component.
 - f) GA of Drinking Water system Pumps / motors.
 - g) GA of Dust Suppression Water system Pumps / motors
 - h) GA of Service Water system Pumps/ motors.
 - i) Piping Layout Drg. for Stockpile DS System.
 - j) Piping Layout Drg. of DFDS, plain water system, SW, CW and DW System for all TP's, conveyors, pump houses, ERH, crusher houses etc as applicable for entire CHP.
 - k) Piping layout drg. of service air line for entire CHP system
 - l) General arrangement drgs. of equipments in pump houses, its floor plans, coal settling pond etc as per system requirement.
 - m) Civil assignment drgs. with Load data.
 - n) Various schedules.
 - o) Design calculations.
 - p) Data sheets.
 - q) Review and vetting of Fabrication drgs & other structures (if applicable).
 - r) O&M manuals (06 No. of hard copies to be submitted)
 - s) PG test procedures.
 - t) Quality plan
 - u) File quality plan (FQP)
- 7) Bidder to note that preparation and sizing of complete GA of Pump Houses, its sumps and its hoists and monorail sizes along with the civil assignment drgs shall be in the scope of the bidder. Pump house (sl. 68, indicated in plot plan for

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

location) with complete pipe routing & all other accessories shall be in bidder's scope. The reference coordinate of pump house is (17.733W, 1446.510N)

- 8) Bidder to note that preparation GA of Coal settling pond (2 Nos) shall be in bidder's scope. Coal settling pond/run off pond is marked as SI No 28 in the plot plan
- 9) Bidder to ensure submission of 06 sets of all engineering drg/doc to BHEL and for all such subsequent revisions in hard form along with a soft copy sent thru email addressed to Project manager and concerned project team.

10.0 QUALITY ASSURANCE:

10.1 Quality Assurance Documents:

Bidder shall be required to submit in six (6) copies the following quality assurance documents within two weeks after dispatch of the equipment:

- 1) All non destructive examination procedures, stress relief and weld repair procedure actually used during fabrication.
- 2) Welding procedures, welder's qualification certificates.
- 3) Welder identification list, listing welders and welding operators' qualification procedures and welding identification symbols.
- 4) Material mill test reports on components.
- 5) The inspection plan with verification, inspection plan check points, verification sketches, if used and method used to verify that the inspection and testing points, in the inspection plan were performed satisfactorily.
- 6) Sketches & drawings used for indicating the method of tractability of the radio graphics to the location on the equipment.
- 7) Non destructive examinations result reports including radiography interpretation reports.
- 8) Stress relief time temperature charts.
- 9) Factory tests results for testing required as per applicable codes and standards.
- 10) Inspection records duly signed by Quality assurance personnel of the employer and contractor for agreed inspection hold points. The same shall be recorded during course of inspection. Also the copy of repair / upgrading process & procedures, requiring employers' approval shall be provided in documentation package.
- 11) Record of disposition of deviations duly authorized by employer.

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

- 12) Notification of conformity certifying that the equipment is in compliance with finalized specification requirement.

10.2 General Requirements - Quality Assurance:

- 1) The detailed quality plans for manufacturing and field activities to be drawn up by bidder, separately as per BHEL format and should be submitted for customer approval.
- 2) Manufacturing quality plan will detail out all the components of equipment, various tests/inspection, to be carried out as per the requirement of the specification and standards mentioned and quality practices & procedures followed by bidder, the relevant reference documents and standard, acceptance norms, inspection documents raised etc. during all stages of materials procurement, manufacture, assembly and final testing / performance testing shall be submitted
- 3) Field quality plan will detail out for all the equipments, the quality practices and procedures etc. to be followed by the contractor during various stages of site activities from receipt of materials/equipment at site to commissioning
- 4) Bidder shall also furnish copies of reference documents/plant standards/acceptance norms test and inspection, procedure, etc. as referred in quality plans. These quality plans and reference documents/standards etc. will be subject to customer approval without which manufacture shall not proceed.
- 5) No material shall be dispatched from the manufacturers work before the same is accepted subsequent to pre dispatch final inspection including verification of records of all previous tests / inspection by employers engineer/Authorized representative and duly authorized for dispatch, issuance of MDCC.
- 6) All materials used for equipment manufacture including castings and forgings etc. shall be tested for quality as per relevant codes/standards. Details of results of the tests conducted to determine the mechanical properties, chemical analysis and details of heat treatment procedure shall be recorded on certificates and time temperature charts. Tests shall be carried out as per applicable material standards and/or agreed details.
- 7) All welding /brazing shall be carried out as per procedure drawn and qualified in accordance with, requirements of ASME section IX/BS-4870 or other international equivalent standard acceptable to the customer.
- 8) All brazers / Welders and welding operators employed on any part of the contract either in contractors/ his subcontractors works or at site or elsewhere shall be qualified as per ASME section IX or BS 4871 or other equivalent international standards acceptable to the customer.

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

- 9) Test results of qualification tests and specimen testing shall be furnished for approval.
- 10) All the heat treatment results shall be recorded on time temperature charts and verified with recommended regimes.
- 11) No welding shall be carried out on cast iron components for repair.
- 12) Unless otherwise proven and specifically agreed, welding of dissimilar materials and high alloy materials shall be carried out at shop only.
- 13) All non destructive examination shall be performed in accordance with written procedures as per international standard. NDT shall be recorded in a report which includes details of methods and equipment used, result evaluation, job data and identification of personnel employed and details of correlation of the test report with the Job.
- 14) Quality plan submitted by bidder shall detail out, various stages of manufacture and installation , the quality practices and procedures, the relevant reference documents / standards used, acceptance level, inspection of documentation raised etc.
- 15) Quality audit / Surveillance / approval of the results of tests and inspection will not however, prejudice the right of the customer to reject the equipment if it does not comply with the specification when erected or does not give complete satisfaction in service and the above shall in no way limit the liabilities and responsibilities of the contractor in ensuring complete conformance of the materials / equipment supplied to relevant specification, standard, data sheets, drawings, etc.
- 16) For all spares and replacement items, the quality requirement as agreed for the main equipment supply shall be applicable.
- 17) Repair / rectification procedures to be adopted to make the Job acceptable shall be subject to the customer approval.

11.0 INSPECTION & TESTING:

- 1) Bidder shall give 15 days' advance written notice of equipment being ready for testing. The customer / Inspector, unless the witnessing of the tests is virtually waived, will attend such tests within 15 days of the date on which the equipment is notified as being ready.
- 2) Type & routine test report / certificates shall include details of standard to which the tests are performed, test parameters, acceptance criteria, test set up etc. used during the testing along with the test piece details / rating and the detailed test record and final test result.
- 3) All inspection, measuring and test equipment used by the contractor shall be calibrated periodically. Bidder shall maintain all relevant records of periodic calibration, instrument

BHEL- ISG, BANGALORE 	Technical Enquiry Specification- DFDS & Water Systems Pkg for Coal Handling System for 2 X 660 MW UDANGUDI STPP	DOC. No IS-1-17-2002/009
	Customer : TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD-TANGEDCO	Rev. No.: 00 Dtd: 23.07.19

identification, and shall provide for inspection by bidder wherever asked specifically; bidder shall calibrate measuring / testing equipment in the presence of employer.

- 4) The details of the checks to be carried out for various components (MQP) are to be submitted within one month from the date of Purchase order by bidder for customer approval. However, some indicative checks on different items are given below which should necessarily form part of the Quality Assurance Plan to be agreed with the customer.
- 5) All plates above 20 mm thickness to be ultrasonically tested for laminations.
- 6) Shaft forgings suspension bars to be checked for hardness, microstructure and ultrasonic testing in addition to check for chemical and mechanical properties.
- 7) Following minimum NDT requirement to be ensured for welds:
 - a) Butt welds - 10% UT/RT and 100% MT.
 - b) Fillet welds - 10%MT.

12.0 LIST OF ENCLOSURES:

Following enclosures are an integral part of this technical enquiry and must be signed and stamped and submitted along with the offer: .

- 1) Flow diagram (IS-1-FL-714-100-M001)
- 2) Plot plan (PE-DG-435-100-M001)
- 3) Design Basis Report for Water system (IS-4-DB-714-111-M079)
- 4) Conveyor profile drawing (IS-1-GA-714-101-M004). This drawing is only a preliminary revision and shall be used only for assessment and doesn't convey the complete scope of work.
- 5) TANGEDCO NIT DOCUMENTS
 - Volume-II, Section-1: GTS
 - Volume-II Section-2: DTS- Mechanical
 - Volume-II Section-3: DTS- Electrical
 - Volume-II Section-4: DTS- C & I
 - Volume-II Section-6: Technical schedules
- 6) Annexure-1:- List of Mandatory spares
- 7) Annexure-2: Electrical and C&I Scope