

TTTD-106-1 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.			PY51345
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<u>TECHNICAL SPECIFICATION FOR WATER SPRAY SYSTEM</u> PROJECT : ROURKELA PP-II EXPANSION PROJECT (1X250 MW) CUSTOMER : NTPC-SAIL POWER COMPANY (P) LIMITED CONSULTANT : MECON LTD , RANCHI						
Revisions :						
Prepared by:						
Checked by:						
Approved By:						
Date						
00						
Sumant						
Amit						
M.N.S.R						
15.04.2018						

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		<u>IMPORTANT INSTRUCTION TO BIDDER</u> DOCUMENTS TO BE SUBMITTED WITH THE BID TO ENABLE BHEL TO EVALUATE THEIR OFFER TECHNO-COMMERCIALLY: The bidder must submit the following documents along with their bid. a) Un-priced price bid indicating “Quoted” or “Not quoted” against each line item. b) Signed copy of the Technical Specification. c) Filled-in Checklist (Annexure-8) . d) No Deviation certificate/Confirmation		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		1. INTENT OF SPECIFICATION: 1.1. The intent of this document is to establish the minimum requirement of design, engineering, manufacture, shop assembly, quality assurance, quality control, inspection, shop testing, shop painting, packing, transportation and delivery at site, and supervision of Erection & Commissioning works as mentioned hereinafter for the Water Spray system, which form part of project. 1.2. It is not possible to completely specify all details of design, manufacture and construction. But the intent is that the equipment and supply shall confirm to high standard of engineering and shall be capable of performing in continuous commercial operation in a manner acceptable to the Purchaser and end customer. 1.3. This is a lump sum fixed price contract. Bidder must furnish the quotation as per this technical specification and ensure their quotation meets the intent of the specification. 2. SPECIAL NOTES TO BIDDERS 2.1. This specification shall be read in conjunction with all its enclosures. In case of any discrepancy arising between this job specification & its enclosures, the same shall be brought to the notice of BHEL in pre-bid queries for BHEL's decision. The discrepancies/ queries after pre-bid stage or during order execution stage, it shall be binding on the bidder to comply with the final decision made by the BHEL without any techno-commercial implications. 2.2. All materials supplied under this contract shall be new and unused. All equipment connected with the above systems shall be UL/FM/ ISI approved, as applicable. 2.3. Any additional equipment, material, services etc., which are not specifically mentioned in this specification, but required to make the Water Spray system complete in all respects, in accordance with the intent of this technical specification, contractual agreement, statutory requirements, relevant/applicable codes/standards, good engineering practices, and for safe and trouble-free operation, shall be deemed to be covered under the scope of this specification. 2.4. The Bidder shall accept full responsibility for the completeness and for the faultless working of all the equipments and the Water Spray system as a whole. 2.5. Bidder offer shall be strictly as per these specification requirements. Unsolicited or Alternate offers from the bidders will not be entertained. 2.6. The design information, specifications and drawings indicate the "Minimum" requirements and are intended to enable Bidders to ascertain the extent of the work involved. Bidders are expected to supplement the information included in this specification as required and submit a comprehensive bid. 2.7. Bidder to refer to the Special Conditions of the contract (SCC) & General Conditions of the Contract (GCC) of tender specifications.		
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	<table border="1"> <tr> <td>1.</td> <td>Owner</td> <td>NTPC-SAIL Power Company (P) Limited</td> </tr> <tr> <td>2.</td> <td>Project</td> <td>Rourkela PP-II Expansion Project (1x250 MW)</td> </tr> <tr> <td>3.</td> <td>Consultant</td> <td>Mecon Ltd, Ranchi</td> </tr> <tr> <td>4.</td> <td>Location</td> <td>Rourkela, Odisha</td> </tr> <tr> <td>5.</td> <td>Nearest Airport</td> <td>Ranchi</td> </tr> </table> 1x250 MW Thermal Power Station would be set up by NTPC-SAIL Power Company (P) Limited(NSPCL) at Rourkela in the Odisha state, named as Rourkela PP-II Expansion Project (1x250 Mw).			1.	Owner	NTPC-SAIL Power Company (P) Limited	2.	Project	Rourkela PP-II Expansion Project (1x250 MW)	3.	Consultant	Mecon Ltd, Ranchi	4.	Location	Rourkela, Odisha	5.	Nearest Airport
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4. GENERAL PLANT REQUIREMENT																	
4.1. Water Spray System shall be designed considering the continuous operation with a operating life span of minimum 20 years. The system shall be highly reliable as this is the most important facility to counter the fire accidents. 4.2. The design of the system, apart from fulfilling its intended function, shall facilitate easy testing, inspection and maintenance. 4.3. After award of contract, the bidder shall consider the layouts/ floor plans/Foundationsof other systems (if any) while freezing the layout of WATER SPRAY system. If necessary, bidder may carry out site survey to identify the location & details of existing facilities that may interfere with his works. In case of any interference with existing or already planned systems, bidder shall re-work WATER SPRAY system documentation to avoid any sort of interference. 4.4. No claim in terms of cost or relaxation in time shall be entertained for any redesign, rework and for the safety measures provided. 4.5. Supplies shall be rendered in conformity with proven design principles. The purpose of this contract must be fulfilled in its entirety and the maximum of reliability and economy guaranteed. All the components shall be so designed that repairs and overhauling is minimum and can be carried out easily in the shortest possible time. 4.6. The engineering and supply shall strictly conform to the applicable standards. Approval of the drawings/ documentation do not relieve the bidder from the responsibility of conforming the engineering works and supplies to the applicable codes/standards. If any discrepancy/ deviation/ non-conformance to the applicable codes/standards found in the engineering or supply as covered by scope of work of this specification, the same shall be rectified by bidder without any additional commercial implications to purchaser.																	
5. APPLICABLE CODES & STANDARDS																	
5.1. The design, engineering, installation, testing, commissioning of the package shall be as per all relevant & applicable codes/standards, however specifically the following: a) Tariff Advisory Committee (TAC) of India guidelines : Spray Manual,																	
Ref. Doc																	

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b) NFPA standards

- NFPA 15: Standard for water spray fixed systems for fire protection

c) IS: 1239 – Mild Steel Tubes, Tubular and other Wrought Steel Fitting

d) IS: 14846 – Sluice Valve for Water Works Purpose (50 to 300 mm)

e) Malleable Cast Iron to IS:1879 ,Galvanized as per IS: 4759GI pipes

5.2. Latest edition of applicable codes/Standards/Statutory Regulations along with applicable latest addenda, referred to in the Bid Document shall correspond to the edition as on the date of issue of bid.

6. BIDDER'S SCOPE OF SUPPLY

6.1. The Water Spray System of this project shall consists of the following major systems which are included in bidder's scope of design, engineering, supply and supervision of erection - commissioning.

6.1.1 **Automatic High Velocity Water Spray System (HVWS) for the following areas:**

6.1.1.1. The following Trasformers as listed in the table are to be protected:

Sl.	Transformer Description	Rating	Nomenclature	Qty	Reference Drawing
1.	Generator Transformer	315 MVA, 3Ph	GT # 1	1 Nos.	OGA of Generator Transformer (BP-DG-427-301-0001-Rev-01)
2.	Station Transformer	37.5 MVA	ST # 1	1 Nos.	OGA of Station Transformer(345800509 25-Rev-03)
3.	Unit auxiliary Transformers	37.5 MVA	UT # 1, UT # 2	2 Nos.	OGA of Unit auxiliary Transformer(145600509 58-Rev-01)

6.1.1.2. The following equipment are to be covered by HVWS system:

Sl. No.	Description of Equipments	Qty.	Reference Drawing	Remarks
1.	Main turbines lube oil tanks, oil coolers & purifier unit	1 sets	PE-DG-427-100-M003-Rev-01, 0-13100-D5004-Rev-00	Each oil room arrangement consists of Main oil tank, oil cooler, centrifuge, duplex cooler etc, Spray system shall be covered all these equipments. Reference drawing indicates the plan arrangement of the Main lube oil system, GA drawings of equipments shall be made available during contract stage. Bidder to assume suitably and bid.
2.	Central lube oil tanks (both clean &	1 set	PE-DG-427-100-M003-Rev-01,	Cetral lube oil system consists of COT, DOT, Purifier, Pumps etc. Spray

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	Note: Wherever typical reference drawings are referred as above are attached as an Annexures and same shall be used for bid purpose only, however the final drawings shall be furnished during detailed engineering. A tap-off shall be provided from the nearest spray network (by BHEL) shall be provided to bidder for the HVWS spray system at required pressure. Composite layout of Spray network is attached as an Annexures as reference drawing. Spray network is available around the TG building as well as in Transformer yard area. Tap-off connection for above equipments shall be given from this network.																																							
	6.1.2 Automatic Medium velocity water spray system (MVWS) for the following areas:																																							
	i. Coal conveyors as specified below:																																							
	<table border="1"> <thead> <tr> <th>Sl no</th> <th>Name of the conveyer</th> <th>Reference drawing</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>BCN 1A/1B</td> <td>Ref. Drg IS-1-GA-708-101-M006, R1</td> </tr> <tr> <td>2.</td> <td>BCN 2A/2B</td> <td>Ref. Drg IS-1-GA-708-101-M007, R1</td> </tr> <tr> <td>3.</td> <td>BCN 3A/3B</td> <td>Ref. Drg IS-1-GA-708-101-M010, R2</td> </tr> <tr> <td>4.</td> <td>BCN 4 A</td> <td>Ref. Drg IS-1-GA-708-101-M011, R2 (covered poertion of the conveyer shall be protected)</td> </tr> <tr> <td>5.</td> <td>BCN 5A/5B</td> <td>Ref. Drg IS-1-GA-708-101-M012, R2</td> </tr> <tr> <td>6.</td> <td>BCN 4B</td> <td>Ref. Drg IS-1-GA-708-101-M013, R2</td> </tr> <tr> <td>7.</td> <td>BCN 6A/6B</td> <td>Ref. Drg IS-1-GA-708-101-M014, R2</td> </tr> <tr> <td>8.</td> <td>BCN 7A/7B</td> <td>Ref. Drg IS-1-GA-708-101-M015, R2</td> </tr> <tr> <td>9.</td> <td>BCN 8A/8B</td> <td>Ref. Drg IS-1-GA-708-101-M016, R3</td> </tr> <tr> <td>10.</td> <td>BCN 8C/8D</td> <td>Bunker bay Conveyor (Ref. Drg IS-1-GA-708-101-M017, R3 Water curtain nozzle shall be provided at the starting of Bunker building in addition to normal MVWS system)</td> </tr> <tr> <td>11.</td> <td>BCN 6C</td> <td>Ref. Drg IS-1-GA-708-101-M018, R2</td> </tr> </tbody> </table>				Sl no	Name of the conveyer	Reference drawing	1.	BCN 1A/1B	Ref. Drg IS-1-GA-708-101-M006, R1	2.	BCN 2A/2B	Ref. Drg IS-1-GA-708-101-M007, R1	3.	BCN 3A/3B	Ref. Drg IS-1-GA-708-101-M010, R2	4.	BCN 4 A	Ref. Drg IS-1-GA-708-101-M011, R2 (covered poertion of the conveyer shall be protected)	5.	BCN 5A/5B	Ref. Drg IS-1-GA-708-101-M012, R2	6.	BCN 4B	Ref. Drg IS-1-GA-708-101-M013, R2	7.	BCN 6A/6B	Ref. Drg IS-1-GA-708-101-M014, R2	8.	BCN 7A/7B	Ref. Drg IS-1-GA-708-101-M015, R2	9.	BCN 8A/8B	Ref. Drg IS-1-GA-708-101-M016, R3	10.	BCN 8C/8D	Bunker bay Conveyor (Ref. Drg IS-1-GA-708-101-M017, R3 Water curtain nozzle shall be provided at the starting of Bunker building in addition to normal MVWS system)	11.	BCN 6C	Ref. Drg IS-1-GA-708-101-M018, R2
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	reflected in each layout drawing) network / grid from downstream of deluge valve upto the protected equipment including all fittings Entire spray water system including network of sprayers. e. Structural steel, bolting material , anchor fastner , U bolt f. Paint and primer (for all pipes (MS & GI) , fittings , structural steel and other equipment applicable) g. Pressure break-down orifices as required for spray system (shall be decided mutually as per the hydraulic calculations) h. Globe type instrument root valves for mounting the instruments. i. Pressure Switches j. Pressure gauges k. Instrumnet hook up materials for all instruments l. MS Pylon supports (as required) m. Control / instrumentation Cabling n. Junction boxes, if required. o. Instrumnet hook up materials for all instruments p. For periodic testing of deluge valve, QB detector with GI pipe & isolating valve connected to detector network shall be provided for each of transformers. Testing arrangement should not interfere with main spray system. q. Any additional item/ equipment required to make the HVW/MVW spray system complete as per the scope given above Bidder to follow the data sheets given in Annexure-7 for the above equipment. All the supplied equipment shall provide intended services after erection . Bidder should include the main equipment along with all applicable assesories and support equipment so that the supplied equipment shall meet intended service. Following scope matrix shall be followed by bidder. <table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>Supply</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Fire water Pumps for spray system</td> <td>BY BHEL</td> </tr> <tr> <td>2.</td> <td>Spray water pipe network (field pipe network for spray system)</td> <td>BY BHEL</td> </tr> <tr> <td>3.</td> <td>Tap-off connection for the deluge valve from nearest header</td> <td>BY BIDDER</td> </tr> <tr> <td>4.</td> <td>Bypass line of Deluge valve (i.e. upstream and downstream pipes of isolation by pass valve)including valve , flanges and other piping accesories</td> <td>BY BIDDER</td> </tr> <tr> <td>5.</td> <td>Deluge valve & Accessories</td> <td>BY BIDDER</td> </tr> <tr> <td>6.</td> <td>Deluge valve isolation valves (both upstream and downstream of DV) along with counter flanges , pipe fittings,gaskets , stud nuts as well as bypass isolation valve (Refer P & ID of HVWS/ MVWS system)</td> <td>BY BIDDER</td> </tr> <tr> <td>7.</td> <td>Deluge Valve Local control panel (Refer Scheme of DVLCP)</td> <td>BY BIDDER</td> </tr> <tr> <td>8.</td> <td>All the equipment, piping, fittings, flanges, instruments, pipe supports, solenoid valves, QBs, spray nozzles and any other accessories down stream of deluge valve</td> <td>BY BIDDER</td> </tr> <tr> <td>9.</td> <td>Canopy / shed for deluge valve</td> <td>BY BHEL</td> </tr> </tbody> </table>			Sl. No.	Description	Supply	1.	Fire water Pumps for spray system	BY BHEL	2.	Spray water pipe network (field pipe network for spray system)	BY BHEL	3.	Tap-off connection for the deluge valve from nearest header	BY BIDDER	4.	Bypass line of Deluge valve (i.e. upstream and downstream pipes of isolation by pass valve)including valve , flanges and other piping accesories	BY BIDDER	5.	Deluge valve & Accessories	BY BIDDER	6.	Deluge valve isolation valves (both upstream and downstream of DV) along with counter flanges , pipe fittings,gaskets , stud nuts as well as bypass isolation valve (Refer P & ID of HVWS/ MVWS system)	BY BIDDER	7.	Deluge Valve Local control panel (Refer Scheme of DVLCP)	BY BIDDER	8.	All the equipment, piping, fittings, flanges, instruments, pipe supports, solenoid valves, QBs, spray nozzles and any other accessories down stream of deluge valve	BY BIDDER	9.	Canopy / shed for deluge valve	BY BHEL
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1. For minimum details please refer P&ID of HVWS System, Drg. No. PY-DP-1-M087-8315-02_R01 and P&ID of MVWS system, Drg. No. PY-DP-1-M087-8315-03-Rev-02P.																																													
2. Tentative BOQ (for major items) for HVWS system are as follows:																																													
1. Deluge Valves = 10 Sets 2. Y Strainers = 10 Nos (Upstream of DV) 3. Isolation Gate Valves = 10 Nos (Downstream of DV) 4. Fast acting Butterfly Valves = 20 Nos (bypass valve to DV and upsteam of Dv) 5. DVLCP = 10 Nos 6. Isolation valves for test lines in Detector header = 20 Nos																																													
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1. Deluge Valves = 46 Sets 2. Y Strainers = 46 Nos (Upstream of DV) 3. Isolation Gate Valves = 46 Nos (Downstream of DV) 4. Fast acting Butterfly Valves = 92 Nos (bypass valve to DV and upstream of DV) 5. DVLCP = 46 Nos																																													
Bidder to note that the BOQ as listed above are tentative and only for information to the bidder. Based on the engineering, bidder to work out the actual BOQ (which may vary from the BOQ given above) and shall quote accordingly.																																													
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6.1.4 **The following items shall be considered by bidder as a part of scope of supply.**

Sl no	Name of the Item	Decription	Quantity	Specification reference
1.	MS WELDED 350 NB Large bore Pipes	355.6mm X 8.0 mm Thick ness as per IS3589FE410.	94 meter	Refer annexure-14
2.	U-BOLT	U-BOLT GALVZD 6"	100 numbers	Refer annexure-15

6.1.5 **Tools and Tackles:**

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 tools & tackle shall be separately packed and sent to site. The Bidder shall also ensure that these tools are not used for erection purpose. The price of Tools and Tackles shall be included in the price of main supply.

Sl. No.	Description	QTY	Unit
1.	Spanner double end fix type confirming to IS:2028 (size : 1/8 " - 3/16" to 5/8" - 3/4")	1	No
2.	Spanner ring type (size :1/8" x 3/16" to 5/8" x 3/4")	1	No
3.	Screw driver with transparent green handle confirming to is:844 insulated		
3.1	Size : 150 mm long x 8 mm blade dia	1	No
3.2	Size : 250 mm long x 8 mm blade dia	1	No
3.3	Size : 300 mm long x 8 mm blade dia	1	No
4.	M.S. Chissel. 1/4" x 3" long	1	No
5.	Machinist file flat smooth (300 mm)	1	No
6.	Machinist file hand bastard (300 mm)	1	No
7.	Combination plier insulated with thick C.A. sleeve confirming to IS:3650 (having length of 205 mm)	1	No
8.	Tommy bar hexagonal	1	No
9.	Hammer with handle confirming to IS:841 (ball pein & cross pein) (500 gms)	1	No
10.	Plyer	1	No

6.2. All erection hardware including structural steel, fittings, brackets, U clamps, nuts & bolts (considering a margin of at least 10% over the total quantity, as fire protection system is site intensive package) etc. that are required for the erection of spray system (as per the scope of this bid) shall be included in the scope of bidder and the same shall be included in the base price.

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		6.3. Paints and primers as required for complete package shall be included in the scope of supply . 6.4. Supply of Spares: General 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. 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. All cases, containers or other packages are liable to be opened for examination as may be considered necessary by the Engineer. All the spares shall be delivered to site as per the dispatch instructions by BHEL. Spares shall be dispatched only after the dispatch of main equipment only. 6.4.1. Start-up Commissioning Spares : The Bidder shall indicate and include in his scope of supply all the necessary start-up/ commissioning spares for the equipment supplied by them. This shall be included in the basic price of bid. No separate price shall be quoted by bidder for start-up/ commissioning spares. 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 E&C 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 start-up and commissioning spares shall be included in the price of main supply. The following Mimum BOQ shall be considered as start up and comissioning spare . <table border="1" data-bbox="344 1592 1406 1883"> <thead> <tr> <th>Sl number</th> <th>Name of the Item</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>MVWS spray nozzle</td> <td>5 number of each type and size</td> </tr> <tr> <td>2</td> <td>HVWS spray nozzle</td> <td>5 number of each type and size</td> </tr> <tr> <td>3</td> <td>QBD</td> <td>10 Numbers</td> </tr> <tr> <td>4</td> <td>Gasket</td> <td>10 % of each type and size</td> </tr> </tbody> </table> Aparat from the above list , Bidder shall provide if any additional item of start-up and commissioning spares after the award of contract and the same shall be identified in Billing Break-Up.			Sl number	Name of the Item	Quantity	1	MVWS spray nozzle	5 number of each type and size	2	HVWS spray nozzle	5 number of each type and size	3	QBD	10 Numbers	4	Gasket	10 % of each type and size
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		6.4.2. Mandatory Spare Parts : 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 cannot 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. Bidder should finalise the list of mandatory spare as per requirement furnished below after completion of engineering of all equipments. Spares shall be dispatched after the dispatch of main supplies . The mandatory spares dispatch shall be taken up by bidder based on the delivery instructions of BHEL. Following mandatory spares shall be quoted by by bidder. <table border="1" data-bbox="344 1086 1511 1783"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>1.0.</td> <td>VALVES (GATE/GLOBE/BUTTERFLY/NRV) ACCESSORIES</td> <td></td> </tr> <tr> <td>1.1</td> <td>Reduction gear operator (Gate/Globe/Butterfly)</td> <td>10% of the population of each</td> </tr> <tr> <td>1.2</td> <td>Flap/Door with pin (NRV)of each type & size</td> <td>10% of the population</td> </tr> <tr> <td>1.3</td> <td>Disc (butterfly/globe)</td> <td>5% of the population of each type & size</td> </tr> <tr> <td>1.4</td> <td>Seal rings (all types)</td> <td>10% of the population of each type & size</td> </tr> <tr> <td>1.5</td> <td>Flap rings (NRV)</td> <td>10% of the population of each type & size</td> </tr> <tr> <td>1.6</td> <td>Gaskets</td> <td>10% of the population of each type & size</td> </tr> <tr> <td>1.7</td> <td>Bearing</td> <td>10% of the population of each type & size</td> </tr> <tr> <td>2.0.</td> <td>Y-TYPE STRAINERS</td> <td></td> </tr> <tr> <td>2.1</td> <td>Strainer elements with O-range and stiffeners</td> <td>20% of the population of each type & size</td> </tr> </tbody> </table> Bidder shall quote itemwise separate prices as per attached price bid format and these are under evaluation.			Sl. No.	Description	Quantity	1.0.	VALVES (GATE/GLOBE/BUTTERFLY/NRV) ACCESSORIES		1.1	Reduction gear operator (Gate/Globe/Butterfly)	10% of the population of each	1.2	Flap/Door with pin (NRV)of each type & size	10% of the population	1.3	Disc (butterfly/globe)	5% of the population of each type & size	1.4	Seal rings (all types)	10% of the population of each type & size	1.5	Flap rings (NRV)	10% of the population of each type & size	1.6	Gaskets	10% of the population of each type & size	1.7	Bearing	10% of the population of each type & size	2.0.	Y-TYPE STRAINERS		2.1	Strainer elements with O-range and stiffeners	20% of the population of each type & size
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1.0.	VALVES (GATE/GLOBE/BUTTERFLY/NRV) ACCESSORIES																																				
1.1	Reduction gear operator (Gate/Globe/Butterfly)	10% of the population of each																																			
1.2	Flap/Door with pin (NRV)of each type & size	10% of the population																																			
1.3	Disc (butterfly/globe)	5% of the population of each type & size																																			
1.4	Seal rings (all types)	10% of the population of each type & size																																			
1.5	Flap rings (NRV)	10% of the population of each type & size																																			
1.6	Gaskets	10% of the population of each type & size																																			
1.7	Bearing	10% of the population of each type & size																																			
2.0.	Y-TYPE STRAINERS																																				
2.1	Strainer elements with O-range and stiffeners	20% of the population of each type & size																																			
Ref. Doc																																					

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		6.5. Scope of services 6.5.1. Supervision of Erection and Commissioning Bidder shall quote for the following services: a) Charges for supervision of E&C works of HV and MV spray system for 112 man days with per diem rate. b) Charges for 10 site visits for supervision of E&C works with per visit rate. For details refer Cl. No. 9.22. 6.5.2. Packing and transportation of all materials upto site. 6.5.3. Material re-conciliation will be done jointly by Purchaser's erection office & Sub- vendor. Bidder to note that the payment towards the supply for any item will be made only after the completion of the material reconciliation activity at site. All costs for material reconciliation activity shall be included in supply price by bidder. 6.5.4. The system shall be TAC compatible. (For details refer Cl. No. 9.23) 6.6. Deliverables with Supply (for items mentioned in Cl. No. 6.1 & 6.2) 6.6.1. Engineering Documentation: a) Detailed Engineering of the spray package including preparation of P&IDs, layouts, Datasheets, GA drawings, Catalogues, Hydraulic calculations b) Interface engineering c) Procurement engineering d) Preparation of all fabrication drawings e) Submission and approvals of engineering documents as per the master documentation list given in Annexure-3 f) O&M manuals g) Erection documents (the list will be finalised during Kick-off meeting after order) h) As built documentation. 6.6.2. Project Documentation: a) Billing Break-up b) Sub-vendor lists c) Inspection reports and test certificates as applicable d) Schedule of delivery e) Packing lists of each consignments f) Site storage instructions 6.6.3. All necessary engineering and documentation support required for approval of TAC shall be provided by bidder. The cost towards this services shall be included in main price . NOTE: Bidder to note that the above list is not exhaustive and any other service required as per the intent of this specification/project requirements/good engineering practice shall be		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		deemed to be included in bidder's scope without any commercial implication to the purchaser. All the formalities including preparation of documents, furnishing clarifications, information etc. as and when required, for obtaining any of the permissions and approvals related to the Water Spray System will have to be done by the bidder. 6.7. Bidders shall refer to the data sheets enclosed to the specification and include the features in their bid. 7. EXCLUSIONS The following items are excluded from bidder scope of supply:- a) Storage, preservation of Materials/Equipments at site (however detailed storage and preservation procedure shall be furnished by bidder during detail engineering stage. Please refer the documentation schedule for the same). b) Erection and Commissioning works. c) TAC approvals d) Fire water tanks, Spray water main pumps, supply water pipe network upto the deluge valve e) Cables between DVLCP and main FDA panel f) IR detection system for conveyors g) LHS cable system and detectors Terminal points: a) Fire water : Bidder to take tap up from nearest header. b) Cables: At the terminals of DV LCP (inlet/outlet) 8. BOQ METHODOLOGY: 8.1. Bidder shall refer to the format (annexure -11) given for BOQ finalizations. Bidder shall provide BOQ for each system (each drawing) strictly as per format . All variety of items , including pipes and fittings shall be included in BOQ. If bidder has to dispatch several items , before completion of engineering , then bidder must furnish estimates BOQ for systems that are not completed . The dispatches shall be made only after approval of BOQ. No dispatch be allowed without furnishing the BOQ by bidder . System wise BOQ shall be finalized based on approved drawings during detail engineering stage. Format of the BOQ is attached as Annexure-11. Bidder to submit the BOQ in the attached format during detailed engineering. 8.2. Material tracability : Bidder shall furnish the detail list of bill of quantity as per the format given in annexure-11. Each material / line item in the BOQ shall be provided with unique number. The line items of BOQ given on the drawing(construction isometric) shall be tabulated with this same unique number . Bidders dispatches and packing list shall reflect these unique number against item number on packing list so that material can be traced from the drawing BOQ to dispatches through		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		packing list . In other words each line items shall be provided with a unique number which will be used in the drawing BOQ and packing list . Bidder shall provide dispatch detail against each line item on the BOQ format so that every item written in the drawing BOQ will be traced the respective dispatch consignment which will be handy for the erection agency. 9. DESIGN DESCRIPTION OF SYSTEMS: 9.1. Automatic High Velocity Water Spray System (HVWS) 9.1.1. Design Guidelines: ➤ The density of spray will be 10.2 lpm/m² of the surface area for the HVWS system as per cl. No. 3.2.3.6.1 of TAC manual for Spray System. ➤ The minimum running water pressure at any spray nozzles will not be less than 3.5 kg/cm² (g) and not greater than 5.0 kg/cm² (g). The velocity in feed pipes shall not be more than 10m/s as per cl. No. 3.2.3.6.2.7 of TAC manual for Spray System. ➤ The system shall be designed as per TAC norms. 9.1.2. System Description: ➤ The spray system has been provided in accordance with Cl. No. 8.8.1 of IS 3034 (Fire Safety of Industrial Buildings - Electrical Generating and Distributing Stations) - which specifies that no fixed fire protection equipment (such as high velocity water spray) is required for transformers below 10 MVA or in the case of oil filled transformers with oil capacity of 2000 liters and below. ➤ The detection in HVWS system is through heat sensing detectors of fusible type (Quartzoid Bulb). In the event of fire, the surrounding temperature increases. As the surrounding temperature reaches the rated temperature of QB detector, the detector bulb bursts and allows water in detection line to flow out. This creates a pressure drop in the detection line. The pressure drop in detection line will open the deluge valve and water starts projecting out from the spray nozzles. ➤ The water supply to HVWS system will be controlled by wet pilot type deluge valve which will be operated hydraulically and is normally closed by water pressure. Water for deluge valves shall be supplied from spray header. Gate valves shall be provided for each deluge valve on upstream and downstream. Fast acting butterfly valve is provided in the bypass line of deluge valve. Y- Strainer shall be provided at upstream of each deluge valve. ➤ A provision is also made to operate the HVWS system manually through local push button station and remotely from fire alarm panel. The system will automatically detect, control and extinguish any outbreak of fire and simultaneously give audible alarm.		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		9.1.3. Operation of HVWS System: The mode of operation of HVWS system will be as follows: ➤ The water supply to the HVW spray system is controlled by deluge valve. The location of wet pilot type deluge valve shall be kept away from the equipment to be protected. Deluge Valve shall be operated hydraulically and this valve normally remains closed by water pressure. The water pipe forms a ring around the equipment to be protected and quartzoid frangible bulb type detectors are mounted on this water line at selected places as per TAC norms. When the surrounding temperature rises more than the rated temperature of the detector, the detector's quartzoid bulb collapses and consequently the pressure in water line falls sharply. This fall of pressure opens the deluge valve and water starts projecting out from the projectors. Suitable detectors shall be provided for the oil tanks for initiation of HVWS system automatically. Local audible alarm is produced by water motor gong. No separate local push button units envisaged for the deluge valve. 9.2. Medium Velocity Water Spray System (MVWS) 9.2.1. Design Guidelines: ➤ In case of MVW spray system minimum and maximum pressure shall be 1.4 kg/cm² and 3.5 kg/cm² respectively as per Cl. 4.5.2.5 of TAC spray Manual. However for cable vaults/ cable spreader rooms and cable galleries, a minimum running pressure of 2.8 kg/cm² (g) shall be achieved at the hydraulically remotest nozzle/sprayer as per Cl. 4.8.3 of TAC spray Manual. ➤ The density of spray and pressure required at the hydraulically remotest point for various equipment covered in MVWS system are indicated in the following table: <table border="1" data-bbox="316 1444 1513 1648"> <thead> <tr> <th>S. No.</th> <th>Equipment to be protected</th> <th>Density of Spray</th> <th>Min. Press. Required</th> <th>Type of Detection</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Cable Gallery in TG Bldg & ESP Building</td> <td>12.2 lpm/m²</td> <td>2.8 bar</td> <td>LHS Cable & Multi Sensor Detector.</td> </tr> <tr> <td>2.</td> <td>Coal Conveyors, Bunker Bay</td> <td>10.2 lpm/m²</td> <td>1.4 bar</td> <td>LHS Cable, IR Detector</td> </tr> </tbody> </table> ➤ Pressure at most favourable sprayer in conveyer shall not more than 3.5 bars. ➤ The velocity in main header pipe shall not exceed 3m/sec and in feed pipe after deluge valve shall not exceed 5m/sec . 9.2.2. System Description: ➤ Medium velocity Water Spray (MVWS) System is provided as per table given above. ➤ The detection in MVWS system is through optical Linear Heat Sensing (LHS) cable. In the event of fire, the surrounding temperature increases. As the surrounding			S. No.	Equipment to be protected	Density of Spray	Min. Press. Required	Type of Detection	1.	Cable Gallery in TG Bldg & ESP Building	12.2 lpm/m ²	2.8 bar	LHS Cable & Multi Sensor Detector.	2.	Coal Conveyors, Bunker Bay	10.2 lpm/m ²	1.4 bar	LHS Cable, IR Detector
		S. No.	Equipment to be protected	Density of Spray	Min. Press. Required	Type of Detection													
1.	Cable Gallery in TG Bldg & ESP Building	12.2 lpm/m ²	2.8 bar	LHS Cable & Multi Sensor Detector.															
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		temperature reaches the set point temperature, the LHS cable gives a signal to main fire alarm panel. With the receipt of fire signal from LHS cable, the main fire alarm panel opens the solenoid valve placed in the detection line of deluge valve. As the solenoid valve opens, the water in detection line to flow out. This creates a pressure drop in the detection line. The pressure drop in detection line will open the deluge valve and water starts projecting out from the spray nozzles. ➤ In order to avoid total flooding of the area, the area will be divided into number of zones. Each zone will have separate water supply network controlled by a deluge valve. Gate valves shall be provided in the upstream and downstream of each deluge valve. ➤ The MVWS system for fuel oil pump house will be provided similar to that of the system provided for cable galleries except that there will not be any zoning in this area. The fire in the fuel oil pump house will be detected by a detection system (water filled quartzoid bulb detectors), which will actuate the deluge valve. The fuel pump skids in the fuel oil pump house shall be provided with MVWS pipe network. 9.2.3. Operation of MVWS System: ➤ On detection of fire the deluge valve is opened and water will be released from the spray nozzles. This will cause a pressure drop in the spray header from which water supply is taken for MVWS system. This pressure drop in the system will start the pumps as explained in HVWS system. 9.3. Required pressure (apprx 7 to 10.5 kg/cm²) shall be provided at the inlet of the deluge valve. The location of the spray header is indicated in the Composite layout of Hydrant and Spray system. (Attached as an input drawings). A tap up connection shall be provided from the nearest spray network up to the upstream isolation valve of the deluge valve . From the tap up point bidder has to take the routing for the complete spray system. BHEL shall provide the pipe connction from nearest spray header upto the Deluge valve. 9.4. Bidder to submit the hydraulic calculation of each protected equipment by considering the following things: 9.4.1. Pressure drop model in PIPENET for any equipment should include water spray network (from Pumping system upto the DV inlet of the protected equipment) in a single hydraulic calculations. Inputs such as Composite layout of Hydrant and Spray system & Pump characteristics curve shall be made available during detailed engineering. The pipenet model of spray network shall be made available to successful bidder for making hydraulic calculation of spray model of respective equipment . This is to estimate tap –up pressures at inlet of DV and also to finalise orifice plate at DV inlet. 9.5. There are two fire pumps (one working and one standby) envisazed for spray system . Working pump is motor driven and diesel engine driven pump is standby . capacity of each pump is 410m³/h @120 mwc. Bidder to note that the maximum flow available for single largest protected equipment is 410 m³/hr accordingly bidder has to size the zoning details applicable for the protected equipment/area.		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		9.6. System shall be pressurized continuously to normal working pressure up to deluge valves. 9.7. Based on the hydraulic calculation required restriction orifice along with the fittings / flanges shall be provided by bidder. 9.8. Chrome plated Nozzles shall be arranged in the form of ring to all transformers and nos. of such rings/tiers shall be decided considering maximum gaps between two (2) consecutive tier of rings as 3.0 M. The distance of the deluge valves from the transformers shall be approx. 6 metres. 9.9. All HVWS/MVWS nozzles shall be of Stainless Steel. All nozzles shall be open sprayer type and chrome plated. 9.10. No. of nozzles for any particular risk shall be selected considering the characteristic of nozzles provided by the bidder and also the density of water needed to protect completely the risk as per above/NFPA. 9.11. Cable vaults/cable spreader rooms shall be suitably zoned. Total water requirement for each zone shall be limited to one-third the capacity of each spray water pump (410 m³/hr). 9.12. Conveyor belt shall be suitably zoned. Length of each zone shall be so selected such that water requirement of each zone shall be limited to one-third the capacity of each spray water pump (410 m³/hr). and in case of fire, three (3) zones (one forward and one backward and the zone under fire) shall be flooded. 9.13. Each zone of conveyor belt shall be provided with one (1) no. Solenoid operated deluge valve. 9.14. Water sprayer shall be placed in such a way so that the "spray cone" overlaps each other. The overlapping arrangement shall be engineered in such a way that these are no shadow areas. This is applicable for all transformers, cable vaults, conveyor belts and other areas where MVW or HVW spray system has been asked for. 9.15. Pressure gauges at both upstream and downstream of deluge valves shall be provided. 9.16. Strainer wire shall be SS (AISI 316), 30 SWG, 30 mesh. Strainer area shall be at least 6 times the pipe cross-section at the pipe inlet, pressure drop across strainer in clean condition shall not exceed 0.15 kg/cm² at design flow of deluge valve. Blowing arrangement shall be provided with removable plug at the outlet. 9.17. Deluge valve along with trims like pressure gauge, pressure switch, water motor gong, etc. shall be UL/FM or equivalent approved / listed. The deluge valve (auto resetting type) assembly shall consist of accessories such as water motor gong, alarm test valves, drain valves, strainers for these valves, hydraulic releasing system, solenoid valves, etc. Further, the design features and make of all the projectors / spray nozzles shall be UL/FM or equivalent approved / listed. 9.18. A strainer ('Y' type) be provided at upstream of deluge valve.		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		9.19. Pressure switches be provided in spray and detector piping to exhibit "FIRE" and "SPRAY ON" annunciations and as well as for interlock. 9.20. Wet type pipe detector network shall be provided for spray system using quartzoid bulb detectors. 9.21. Each of the outdoor deluge valve and accessories shall be provided with housing. Remote manual operation of the deluge valves shall be possible from the respective fire alarm cum control panel (by others) through the keyboard operation of PC monitoring station (by others) when the system is selected in remote manual mode. The remote manual selection for the operation of spray system on any equipment or any zone shall also be through the monitoring station of the respective panel. Apart from the automatic operation of the deluge valve, the system shall have provision for manual operation of the deluge valve by means of hand operated lever close to the deluge valve assembly. There shall also be a provision to operate deluge valve electrically from a nearby local panel. 9.22. <u>Supervision of Erection & Commisioing:</u> The spay system shall be erected by BHEL site. Howeve site engineers need supervision support from bidder. Hence bidder shall provide services for supervision and E & C. Supervision of erection, commissioning, performance testing & demonstration for the supplied system shall be included in bidder's scope of service. The purchase order for supervision services of bidder shall be placed by BHEL site administration. All the invoicing and cash collection shall be handled with site administration by bidder. Bidder to note that the supervision charges for erection & commissioning shall consists of the following: • Per day supervision charges of an Engineer including all other expenses like boarding, lodging, local travel etc. • Travel expenses: one visit means travel from vendor works to site and return with all associated expenses. Per diem charges shall be applicable from the day bidder's person reaches site, up to the day he leaves the site. For the purpose of tender total number of 112 man days to be covered in 10 visits have to be been considered by bidder . However, Total number of man days and number of visits may change (either increase or decrease) as per site requirement. Bidders services shall be compensated as per per diem rate & rate per visit basis only. Bidder to depute the most competent engineers for supervision of Erection & commissioning activities within a period of one weeks after the receipt of intimation from BHEL site. Bidder to quote supervision of erection and commissioning activities strictly as per BHEL's price format (Annexure-1).		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		9.23. TAC compliance: The offered Spray system shall be compliant to TAC norms. The system shall be designed for maximum insurance rebate. TAC approval shall be taken separately and it is not in the scope of Bidder. However, any non-compliance of TAC norms, if found before the expiry of warranty period, shall be complied by bidder by supplying required materials without any additional claims. Bidder should provide engineering support and documentation support for obtaining TAC approval (by BHEL) after completion of E & C of spray system. All activities related to this including preparation of documents, furnishing clarifications, information etc. as and when required, till final approval is obtained, will be included in bidder's scope. 9.24. For further details on equipments please refer Datasheet as attached as an Annexure-7. 10. INSPECTION AND TESTING (Refer GCC, SCC, Annexure 5 & 6) 10.1 Bidder shall maintain an effective Quality Assurance System, to ensure that all equipment and material supplied as a part of the Water Spray System package meet required Quality standards and specifications. 10.2 Bidder to follow the Quality plan for the equipments/items as attached as Annexure 5 & 6. After award of contract bidder shall submit Quality Plan for approval as per the attached format only (for equipments/items, where QAP are not attached). The quality plan shall be submitted in BHEL quality plan format. 10.3 Bidder to confirm that instruments required for performance testing of various Equipments / systems of the package shall be arranged by bidder at site without any cost Implication to BHEL. 10.4 The instruments and test kits required for pre-commissioning checks (for the equipments under scope of supply) shall be provided by bidder. Bidder can take these items back after the checks are performed at site. No additional cost shall be claimed for this purpose. The checks shall be performed with calibrated instruments only. 10.5 Bidder to confirm that all instruments for testing shall be calibrated before taking up testing. 10.6 All the items (including fittings , gaskets , loose items etc) supplied to site shall be properly packed before sending to site. The packing shall be suitable for outdoor storage. 10.7 Inspection and Testing requirement for items are as follows, but not limited to the followings: <table border="0" data-bbox="405 1832 1501 2018"> <tr> <td>Packing of loose items</td> <td>:</td> <td>No loose items shall be sent to site by bidder. Every item shall be sent with proper packing list with item description and unique identification number only.</td> </tr> <tr> <td>Identification of mandatory spares</td> <td>:</td> <td>Mandatory spares should be supplied separately with green colour painted box.</td> </tr> </table>			Packing of loose items	:	No loose items shall be sent to site by bidder. Every item shall be sent with proper packing list with item description and unique identification number only.	Identification of mandatory spares	:	Mandatory spares should be supplied separately with green colour painted box.
Packing of loose items	:	No loose items shall be sent to site by bidder. Every item shall be sent with proper packing list with item description and unique identification number only.								
Identification of mandatory spares	:	Mandatory spares should be supplied separately with green colour painted box.								
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		Shelf life items : A packing list covering items having shelf life are to be intimated to site. Also, shelf life items shall be packed separately in black color painted box for easy identification at site. 11. DOCUMENTATION 11.1. Master document list (Refer Annexure – 3) - Bidder shall ensure submission of all documentation as per Master Document List as attached in the purchase specification. Bidder to note that the list as indicated in MDL are minimum documents, however additional documents required to complete the Spray package shall be included in MDL in contract execution stage. - Bidder shall ensure that all drawings and documents shall be PDF for official submission. However AutoCAD version of drawings shall be submitted alongwith official submission for our records. - The first submission of drawings shall start within 15 days from the date of Purchase order. All the first submission shall be completed within 60 days from the date of Purchase order. - All the engineering documentation including revised submission shall be completed within 90 days from the date of purchase order. In other words, the system engineering shall be completed within 3 months from the date of purchase order. - BHEL shall consider the submission of soft copy as the submission date for the drawing. Submission of soft copy shall be followed by submission of two sets of Hard copies for review and return. - Approved documentation/ As built documentation shall be submitted in 10 sets of hard copies and three compact Discs/ DVDs. - Bidder shall ensure submission of all documentation as per approved Master Document List. 11.2. Drawing approval / review category: - Following classes of review shall be followed for all the documents engineered by the bidder - APPROVAL (A) Approval is mandatory and bidder cannot proceed without obtaining Purchaser's approval (eg. Layouts, schemes etc.) - INFORMATION / RECORDS (I)		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		This type of documents shall be submitted to Purchaser for his information (eg. data sheets, GA drawings etc.) Type of Code used as per BHEL for approval/commnets of Documents: Code-1 : Approved Code-2 : Approved with comments . Vendor can proceed with manufacturing by compliancing with comment. Code-3 : vendor to resubmit drawing by implementing comments Code-4 : Retained for information Type of Code used as per MECON / CUSTOMER for approval/commnets of Documents: Code-I : Approved Code-II : Approved with comments . Vendor can proceed with manufacturing by compliancing with comment. Code-III : vendor to resubmit drawing by implementing comments Code-IV : Retained for information 11.3. Drawings review and approvals a) Bidder to understand that efficient handling of drawings and documents to be prepared by him under the contract is the key to the timely completion of the WATER SPRAY system. By accepting the contract the bidder undertakes to ensure that all drawings and documents to be submitted by him to the Purchaser/ End Customer shall be of professional quality and conforming to the contractual requirements. b) Each drawing submitted by the bidder shall be clearly marked with the name of the Owner, the unit designation, the specifications, title, the specification number and the name of the Project with revision No. and date. If standards, catalogue pages are submitted the applicable items shall be indicated therein. All titles, noting, markings and writings on the drawings shall be in English. c) Approval/review of drawings do not obsolev the bidder from in-correct/faulty design or manufacturing of equipments/materials. It is the sole responsibility of bidder to rectify the faulty or incorrect designs at any stage of contract. d) Review of drawings and documents issued by bidder shall be carried out by Purchaser /End customer. e) After receiving the inputs, bidder shall furnish the first set of drawings within 15 days progressively. All revised drawings after incorporating the comments shall be furnished within 7 days. BHEL shall furnish comments approval on the documents within 7 days after the receipt of same. Engineering shall be completed within 90 days from the date of purchase order.		
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11.4. Engineering Completion

a) The Engineering shall be considered as completed after the following activities are finished:

- Final approval of all the Drawings / Documents which are in 'Approval' Category as per Master Document List (MDL)
- After successful review of drawings/documents which are in 'Information' Category as per Master Document List (MDL)
- Final approval of detailed Bill of Quantity (BOQ).
- Submission of erection documentation.
- Submission of erection and commissioning procedures.
- Submission of O&M manuals
- As-built drawings.

11.5. Erection & Commissioning Documentation

a) Erection documentation

Erection document List shall be finalised during kick-off meeting (after award of contract) identifying all the DOCUMENTS / DRAWINGS required for completion of Erection activities of the complete system, to be submitted by the bidder as part of documentation.

b) Erection and commissioning procedures

The erection manuals shall be submitted prior to the supply of materials to site. The erection manual should contain the following as a minimum.

- Erection strategy.
- Sequence of erection.
- Erection instructions and procedures
- Critical checks and permissible deviation/tolerances.
- Safety procedures to be followed during erection/installation.
- Pre-commissioning checks and tests.
- Commissioning procedures

c) Following may be noted wrt the drawing submission schedule:

SL NO.	DESCRIPTION	NUMBER OF COPIES TO BE SUBMITTED	WHEN TO SUBMIT
1.	First submission of drawings / documents under approval and information category.	-	15 days from the date of Purchase Order progressively.(Auto cad copy also to be furnished)
2.	Revised drawings / documents incorporating BHEL's comments.	-	Within ONE week of receipt of commented drawings from BHEL (Auto cad copy need to be furnished)

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	<table border="1"> <tr> <td>3.</td> <td>Approved Final Drawings/ documents</td> <td>10</td> <td>Immediately after approval .</td> </tr> <tr> <td>4.</td> <td>Erection Drawings /documents</td> <td>10</td> <td>All erection documentation shall be submitted between 60 days to 120 days from the date of Purchase order</td> </tr> <tr> <td>5.</td> <td>Erection / Installation/ commissioning Manual</td> <td>7</td> <td>Within 4 months of purchase order.</td> </tr> <tr> <td>6.</td> <td>As built Drawings / documents</td> <td>7</td> <td></td> </tr> <tr> <td>7.</td> <td>Operation & Maintenance Manual</td> <td>7</td> <td>one months before the delivery date of equipment</td> </tr> <tr> <td>8.</td> <td>Type Test Certificate, if applicable</td> <td>2</td> <td>Within one month after dispatch of equipment</td> </tr> </table>			3.	Approved Final Drawings/ documents	10	Immediately after approval .	4.	Erection Drawings /documents	10	All erection documentation shall be submitted between 60 days to 120 days from the date of Purchase order	5.	Erection / Installation/ commissioning Manual	7	Within 4 months of purchase order.	6.	As built Drawings / documents	7		7.	Operation & Maintenance Manual	7	one months before the delivery date of equipment	8.	Type Test Certificate, if applicable	2	Within one month after dispatch of equipment
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Ref. Doc	11.6. Document submission procedure a) Hard copies of all the documents shall be forwarded to the following address: Name: (Name will be intimated during detail engineering) Address: Bharat Heavy Electrical Limited PESD NEW Building RC Puram, Hyderabad- 32 b) A copy document submittal note shall be furnished to purchase dept/BHEL. 11.7. Input drawings a) On receipt of order, it shall be solely the bidder's responsibility to spell out the requirement of the base engineering drawings/documents required by him to go ahead with the engineering of the package, and shall not expect the Purchaser to automatically supply the same after order placement – the required base drawings/documents shall be furnished to the Bidder within reasonable period of receipt of such requisition from Bidder. Any ultimate delay arising out of the delay by the successful bidder in putting up such a requisition shall solely be to the bidder's account. The issues related to engineering input data shall be settled within 30 days from the date of purchase order. b) A kick off meeting shall be organized at BHEL within 15 days after the award of contract to bidder. All the issues related to project like, engineering input exchange, communication procedure etc, shall be discussed and mutually agreed upon. c) Drawings attached with this specification are suitable for bidding purpose. These drawings may be revised and /or new drawings will be furnished to bidder during detail engineering. Bidder to however note that they will not be eligible to raise any extra charges on account of this. d) Bidder to note that they shall not be eligible to raise any extra claim on account of furnishing of new drawings or revised drawings by purchaser during offer execution stage.																										

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		e) Bidder shall ensure that the given input and comments of purchases incorporated in the drawings. The documentation shall follow a quality engineering practices. The delays for these reasons shall not be accepted by purchaser. 11.8. Review meetings & kick off meeting a) As and when required, the bidder will be called upon to attend design co-ordination meeting / review meeting with the end customer/BHEL during the period of the Contract. The Contractor shall attend such meetings at his own cost at venues decided by BHEL. 11.9. As built drawings a) As built drawings and documents will be generated within one month of completion of activities on respective items of work. b) Bidder shall furnish reproducible and electronic files of all the drawings under their scope to Owner/ certified as "As Built Issue." 11.10. Operation and Maintenance Manual a) Bidder shall prepare and submit draft maintenance manual to Purchaser for review at least one months before delivery date . b) Final maintenance manual incorporating all comments shall be submitted by bidder within one month after issue of comments. c) O&M shall consist of the following as minimum: i. Operation and maintenance procedures of all equipments ii. Approved drawings/Datasheets iii. GA drawing and catalogue of all equipments iv. Quality plan v. Test certificates vi. Installation procedure vii. Trouble shooting 11.11. Drawing Preparation: a) All variety of components (all sizes of pipes, DV, nozzles, QBD, fittings etc.) shall be drafted in different layers in AutoCAD. b) All drawings shall be prepared considering the following requirements: i. Location of tapping for DV from the nearest spray headers (Key plan shall be indicated) ii. Plan, elevation and side view of the equipments iii. Conceptual isometric along with supports details iv. Varieties of Supports (Quantity of each supports along with BOQ requirements of each supports shall be indicated. v. Construction isometric of each drawing		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		vi. Detailed BOQ of all items shall be indicated in the drawings with Tagging Bidder is requested to prepare all spray system drawings inline with above requirements. Typical spray system drawing is attached as an Annexure-10 for reference and bidder to submit the drawings inline with typical reference drawing. 12. SUB VENDOR LIST 12.1. All the equipment shall be sourced from recommended Bidders only as specified in this specification (Refer Annexure-2). 12.2. Sub vendor shall be ISO certified company. 12.3. Supply items for which no definite “make/brand” is indicated, shall be procured only from makes & models having proven track records and requires purchaser approval. If required, bidder may propose additional sub vendors with proven track record (validated with credentials) for the above items and subjected to BHEL / customer approval during post ordering of the package. The vendor experience at the time of bid submission date only will be considered. 12.4. Bidder to comply with sub-vendor list enclosed with the specification. If any item is not appearing in the given sub-vendor list, sub-vendor name shall be furnished to BHEL/ customer approval. Non-acceptance of any sub-vendor by BHEL / customer shall not have any commercial & delivery implication. While submitting sub-vendors for approval of BHEL, bidder shall furnish following documents : - ISO certificate of Sub-vendors - Proven track record for makes and models supplied earlier. 13. PRICE BID FORMAT (Refer Annexure-1) 13.1. Water Spray System as envisaged in this bid document shall be executed by the bidder on Lump Sum Turnkey (LSTK) basis for supply part. 13.2. All the items included in the price bid format shall be quoted as per tender specification and pre-bid clarifications, if any. Responsibility of ensuring correctness & completeness of scope of supply as per specification requirement solely lies with bidder. 13.3. Prices quoted by the bidder shall remain firm till the successful handing over of the Water Spray System to end customer. Any request for upward revision of price during any intermediate stage before handing over the plant to end customer will be rejected by BHEL. 13.4. Bidder to refer to GCC & SCC for the applicable taxes and duties. Bidder to quote only base rates for all the items. Applicable taxes and duties shall be indicated separately. 13.5. Bidder shall confirm that he has quoted all items by marking “Quoted” in the price bid and enclose the same in their technical offer. Price shall not be specified in the technical offer.		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		14. BILLING BREAKUP METHODOLOGY Billing break-up (BBU) shall be submitted to BHEL in following methodology: 14.1. The BBU shall be prepared only for the pro-rata billing purpose. 14.2. BBU will contain complete list of items required for the completion of the project as per specification and shall be dispatched by bidder irrespective of the items/quantities are indicated in the document or not. 14.3. For any changes in quantity or items, the BBU shall suitably revised. 14.4. Wherever “Lot” items are indicated, same shall be quantified in details in a separate annexure. Similarly all Accessories/ Instruments/ items are to be defined with comprehensive details. 14.5. In case any changes in items are envisaged at any stage of the contract, BBU shall be revised to reflect the same. However all these additional items shall be supplied as a ‘Zero Value Item’, without any additional commercial implication to BHEL. All the contractual stipulations/clauses shall be valid for these additional items also. 15. PAINTING (Refer Annexure-9) For details of paints and primer please refer Annexure-9. All the materials supplied by vendor shall be painted (including GI pipes and fittings) as per the painting specification . 16. DEVIATIONS TO SPECIFICATIONS 16.1. Any deviation or variation from the scope, requirement and/or intent of this specification shall be clearly brought out during pre bid stage in the relevant attachment (refer Annexure - 4) of the Bid forms irrespective of the fact that such deviations/ variations may be standard practice or a possible interpretation of the specification by the Bidder. Except for those deviations/ variations covered as a part of pre bid clarification, it will be the responsibility of the bidder to fully meet the intent and the requirements of the specification within the quoted price. No other deviation whatsoever from this specification, except for the have been specifically agreed by purchaser as a part of pre-bid clarification shall be considered. 16.2. Any contradictions in specification or queries brought out by bidder during post bid , shall be discussed and decision of BHEL will be final in this case. 16.3. In case the bidder considers requirement of additional instrumentation, controls, safety devices and any other accessories/auxiliaries essential for safe and satisfactory operation of the equipment, he shall recommend the same along with reasons in a separate section as a part of pre-bid query to enable purchaser take a suitable decision on the requirement of the same. 16.4. Information like Bill of materials (BOM), Instrument list, datasheets, and typical specifications enclosed by the bidder as a part of their bid, shall be retained for information only and shall		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		not be referred by contractor as contractual agreement. No implication shall be admissible on the basis of these documents during any stage of contract execution. 17. LIST OF ANNEXURES 17.1. Price Bid Format (Annexure-1) Bidder has to strictly quote his price as per this format. 17.2. Sub Vendor List (Annexure-2) Bidder has to strictly follow this list for procuring the equipments/items required for the system. 17.3. Master Document List (Annexure-3) Bidder shall furnish all the drawings listed in this document during detail engineering. 17.4. Pre Bid Query Format (Annexure-4) Bidder shall furnish a consolidated list of pre bid quires (if any) in this format. 17.5. QAP Guidelines (Annexure-5) Bidder shall follow the procedures related to inspection & testing listed in this document. 17.6. Quality Assurance Plan (QAP) (Annexure-6) Bidder shall adhere to this QAP for items pertaining to Water Spray system. 17.7. Techincal Datasheets Equipments (Annexure-7) 17.8. Checklist (Annexure-8) 17.9. Painting (Annexure-9) 17.10. Typ. Reference drawing for Spray system (Annexure-10) 17.11. Format for BOQ (Annexure-11) 17.12. Applicable drawings (Annexure-12) 17.13. Customer specification (Annexure-13) 17.14. Specification for Large bore Pipe(Annexure-14) 17.15. Specification for U bolt (Annexure – 15)		
Ref. Doc				

LIST OF DRAWINGS			
SI No	Documents	Drg/Doc no	Rev
1.	Composite layout of Hydrant & Spray system	PY-LP-1-M087-8315-11	01B
2.	P&ID of MVWS system	PY-DP-1-M087-8315-03	02
3.	P&ID HVWS system	PY-DP-1-M087-8315-02	01
4.	Plot Plan	PE-DG-427-100-M001	07
5.	Transformer Yard layout	PE_DG_427_100_E001	03
6.	TG Equipment Layout Drawing At Ground Floor	PE-DG-427-100-M003	01
7.	TG Equipment Layout Drawing At Mezzanine Floor(9 meter)	PE-DG-427-100-M004	01
8.	TGEquipment Plan At Operating Floor (15.5m and 21 m)	PE-DG-427-100-M005	03
9.	Electrical equipment and Cabling layout in ESP building	PE-DG-427-100-E008	03
10.	Cabling Layout below MV switch gear room (0.0 meter)	PE-DG-427-100-E009	00
11.	Cabling layout below LV switchgear room (8 . 0 meter)	PE-DG-427-100-E010	00
12.	Cabling layout below CCR/CER/ COMPUTER room at 12.5m & 11.5m EL.	PE-DG-427-100-E011	00
13.	Cabling Layout Below Boiler MCC	PE-DG-427-100-E013	00
14.	OGA of Generator Transformer	34590000678	01
15.	OGA of Station Transformer	34580050925	03
16.	OGA of Unit Transformer	14560050958	01
17.	Turbine lube oil canal	013100-D5001	01
18.	Oil Room arrangement	0-13100-D5004	00
19.	Coal Flow Diagram	IS-1-FL-708-100-M001	04
20.	Typical Cross Section of Conveyor Gallery & Tunnels	IS-1-GA-708-101-M003	03
21.	GA of All Conveyors Profiles	IS-0-GA-708-101-M004	02
22.	GA and Load Data of Conveyors 1A/1B	IS-1-GA-708-101-M006	01
23.	GA and Load Data of Conveyors 2A/2B	IS-1-GA-708-101-M007	01
24.	GA and Load Data of Conveyors 3A/3B	IS-1-GA-708-101-M010	02
25.	GA and Load Data of Conveyors 4A	IS-1-GA-708-101-M011	02
26.	GA and Load Data of Conveyors 5A/5B	IS-1-GA-708-101-M012	02
27.	GA and Load Data of Conveyors 4B	IS-1-GA-708-101-M013	02
28.	GA and Load Data of Conveyors 6A/6B	IS-1-GA-708-101-M014	02
29.	GA and Load Data of Conveyors 7A/7B	IS-1-GA-708-101-M015	02
30.	GA & LOAD DATA OF CONV-8A/8B	IS-1-GA-708-101-M016	03
31.	GA & LOAD DATA OF BUNKER CONV-8C/8D	IS-1-GA-708-101-M017	03
32.	GA & LOAD DATA OF CONV-6C	IS-1-GA-708-101-M018	02
33.	Key Plan of Boiler	0-00-512-93686	02
34.	GA of boiler side elevation	0-00-511-93657	02
35.	Central Lube Oil Purification Piping Layout	11705240625	00
36.	GA of Clean Oil tank	11705240624	00
37.	GA of Dirty Oil tank	11705240625	00

Ref. Doc

