

TTTD-106-1 Rev No. 5 Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.			PY51276													
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<u>PURCHASE SPECIFICATION</u> <u>FOR</u> <u>SUPPLY OF HYDRANT BASED FIRE PROTECTION EQUIPMENTS</u>																		
PROJECT : 4 x 270 MW BHADRADRI TPS CUSTOMER : TELANGANA STATE POWER GENERATION CO. LTD. CONSULTANT : DESEIN CONSULTING ENGINEERS, NEW DELHI																		
<table border="1"> <tr> <td rowspan="2">Revisions :</td> <td>Prepared by:</td> <td>Checked by:</td> <td>Approved By:</td> <td rowspan="2">Date</td> </tr> <tr> <td>-SD-</td> <td>-SD-</td> <td>-SD-</td> </tr> <tr> <td>00</td> <td>Aviral</td> <td>Amit</td> <td>MNSR</td> <td>07/08/2017</td> </tr> </table>						Revisions :	Prepared by:	Checked by:	Approved By:	Date	-SD-	-SD-	-SD-	00	Aviral	Amit	MNSR	07/08/2017
Revisions :	Prepared by:	Checked by:	Approved By:	Date														
	-SD-	-SD-	-SD-															
00	Aviral	Amit	MNSR	07/08/2017														

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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: The bidder must submit the following documents along with their bid. a) Un-priced copy of price format indicating quoted/ not quoted against each line item. b) Signed copy of the Technical Specification. c) Checklist d) No Deviation certificate BHEL's decision will be final in case vendor fails to submit above documents.		
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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 Supply including selection, manufacture, assembly, inspection, shop testing, shop painting, packing, transportation and delivery at Bhadradi TPS site in proper condition and Supervision of Erection & Commissioning at site for Hydrant Based Fire Protection equipments, which form part of 4 X 270 MW Bhadradi TPP. 2. 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 OR the most stringent of all shall be followed. It is the responsibility of bidder to read and understand the specification and the enclosures. Any queries on the specification shall be raised by bidders during pre-bid stage and clarifications may be sought from BHEL. If the queries on the specification are raised 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/VDs/LPCB/ISI approved. 2.3. Bidder to confirm that the performance guarantee of the equipment shall be as per data meeting specification requirements and system requirement. 2.4. All erection hardware including structural steel, fittings, brackets, U clamps, nuts & bolts etc. that are required for the erection of Hydrant based FPS equipment (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. 2.5. The Bidder shall accept full responsibility for the completeness and for the faultless working of all the equipment and the Hydrant Based FPS equipment system as a whole. 2.6. Bidder offer shall be strictly as per these specification requirements. Unsolicited or Alternate offers from the bidders will not be entertained. 2.7. Only calibrated instruments shall be used for testing of the equipment. 2.8. Bidder shall include all the accessories that are associated with the equipment mentioned in the scope of supply. If bidder feels that some variations are necessary in the scope of supply or otherwise, the same shall be brought out in the pre-bid queries – for which a prescribed format is enclosed in Annexure-2. All the issues shall be resolved in the pre-bid stage only and no deviation is allowed in the contract. 2.9. 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.		
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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.	2.10. Bidder to refer to the Special Conditions of the contract (SCC) & General Conditions of the Contract (GCC) of tender specifications.																	
	3. PROJECT DESCRIPTION																	
	<table border="1"> <tr> <td>1.</td> <td>Owner</td> <td>Telangana State Power Generation Corporation Ltd.</td> </tr> <tr> <td>2.</td> <td>Project</td> <td>4 x 270 MW Bhadradi TPP</td> </tr> <tr> <td>3.</td> <td>Consultant</td> <td>Desein Consulting Engineers, New Delhi</td> </tr> <tr> <td>4.</td> <td>Location</td> <td>Manuguru, Telangana</td> </tr> <tr> <td>5.</td> <td>Nearest Airport</td> <td>Hyderabad</td> </tr> </table>			1.	Owner	Telangana State Power Generation Corporation Ltd.	2.	Project	4 x 270 MW Bhadradi TPP	3.	Consultant	Desein Consulting Engineers, New Delhi	4.	Location	Manuguru, Telangana	5.	Nearest Airport	Hyderabad
	1.	Owner	Telangana State Power Generation Corporation Ltd.															
	2.	Project	4 x 270 MW Bhadradi TPP															
	3.	Consultant	Desein Consulting Engineers, New Delhi															
	4.	Location	Manuguru, Telangana															
	5.	Nearest Airport	Hyderabad															
	4x270 MW Thermal Power Station would be set up by Telangana State Power Corporation Ltd. (TSGENCO) at Village Bhadradi near to Manuguru in the Telangana state, named as Bhadradi Thermal Power Station (BTPS).																	
	4. BIDDER'S SCOPE OF SUPPLY:																	
4.1. The supply for major equipment/items of Hydrant Based Fire Protection System (HBFPS) of this project shall consists of the following:																		
A. Air Release Valve Air Release valve as specified in the Datasheet (Annexure-7) shall be in scope of bidder.																		
<table border="1"> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> <tr> <td>1</td> <td>Air release Valve - 25 NB</td> <td>45 Nos.</td> </tr> </table>			Sl. No.	Description	Quantity	1	Air release Valve - 25 NB	45 Nos.										
Sl. No.	Description	Quantity																
1	Air release Valve - 25 NB	45 Nos.																
B. Branch pipes and accessories Branch pipes and accessories as specified in the Datasheet (Annexure-7) shall be in scope of bidder.																		
<table border="1"> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> <tr> <td>1</td> <td>Branch pipes and accessories</td> <td></td> </tr> <tr> <td>1.1</td> <td>Branch pipe with Triple purpose/Universal type nozzle</td> <td>182 Nos.</td> </tr> <tr> <td>1.2</td> <td>Branch pipe with Fog type nozzle</td> <td>20 Nos.</td> </tr> </table>			Sl. No.	Description	Quantity	1	Branch pipes and accessories		1.1	Branch pipe with Triple purpose/Universal type nozzle	182 Nos.	1.2	Branch pipe with Fog type nozzle	20 Nos.				
Sl. No.	Description	Quantity																
1	Branch pipes and accessories																	
1.1	Branch pipe with Triple purpose/Universal type nozzle	182 Nos.																
1.2	Branch pipe with Fog type nozzle	20 Nos.																
Testing Requirements: The branch pipe, coupling and nozzles shall be subject to a hydrostatic test pressure to detect any leakage.																		
C. Hose Cabinet Hose cabinet as specified in the Datasheet (Annexure-7) shall be in scope of bidder.																		
<table border="1"> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> <tr> <td>1</td> <td>Hose cabinet (750 mm x 600 mm x 250 mm)</td> <td>167 Nos.</td> </tr> </table>			Sl. No.	Description	Quantity	1	Hose cabinet (750 mm x 600 mm x 250 mm)	167 Nos.										
Sl. No.	Description	Quantity																
1	Hose cabinet (750 mm x 600 mm x 250 mm)	167 Nos.																
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.	D. Fire Hose with SS Fittings Complete Assembly Fire hose along with Hose Coupling as specified in the Datasheet (Annexure-7) shall be in scope of bidder.								
	<table border="1"> <tr> <th>Sl. No.</th> <th>Size</th> <th>Quantity</th> </tr> <tr> <td>1</td> <td>15 m length with Hose Coupling</td> <td>404 Nos.</td> </tr> </table>			Sl. No.	Size	Quantity	1	15 m length with Hose Coupling	404 Nos.
	Sl. No.	Size	Quantity						
	1	15 m length with Hose Coupling	404 Nos.						
	Testing Requirements: Rubber lined impregnated woven jacketed hoses shall be tested as per IS-636, Type-II and first aid fire protection hose shall be tested as per IS-444. In both cases, following tests shall be included. a) Percolation test b) Pressure test c) Burst test								
	E. Hose Reel Hose reel as specified in the Datasheet (Annexure-7) shall be in scope of bidder.								
	<table border="1"> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> <tr> <td>1</td> <td>Hose reel</td> <td>42 Nos.</td> </tr> </table>			Sl. No.	Description	Quantity	1	Hose reel	42 Nos.
	Sl. No.	Description	Quantity						
	1	Hose reel	42 Nos.						
	F. Hydrant Valves Hydrant valves as specified in the Datasheet (Annexure-7) shall be in scope of bidder.								
<table border="1"> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> <tr> <td>1</td> <td>Hydrant Valves-63 NB</td> <td>292 Nos.</td> </tr> </table>			Sl. No.	Description	Quantity	1	Hydrant Valves-63 NB	292 Nos.	
Sl. No.	Description	Quantity							
1	Hydrant Valves-63 NB	292 Nos.							
Testing Requirements: (For details manufacturing quality plan, Annexure-5) Flow test shall be conducted on the hydrant valves. The flow through the valve shall not be less than 900 liters/min. Vender may submit type test report of similar size of valves duly certified by reputed TPIA (e.g. Lloyds, BV etc.) or by ISI. Leak tightness test of the valve seat shall be conducted.									
G. Water Monitor Water monitor as specified in the Datasheet (Annexure-7) shall be in scope of bidder.									
<table border="1"> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> <tr> <td>1</td> <td>Water Monitor-80 NB</td> <td>45 Nos.</td> </tr> </table>			Sl. No.	Description	Quantity	1	Water Monitor-80 NB	45 Nos.	
Sl. No.	Description	Quantity							
1	Water Monitor-80 NB	45 Nos.							
H. Gunmetal Gate Valve Gunmetal gate valve shall be in scope of bidder.									
<table border="1"> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> <tr> <td>1</td> <td>Gunmetal gate valve-25 NB</td> <td>45 Nos.</td> </tr> </table>			Sl. No.	Description	Quantity	1	Gunmetal gate valve-25 NB	45 Nos.	
Sl. No.	Description	Quantity							
1	Gunmetal gate valve-25 NB	45 Nos.							
I. Air Compressor Air-Compressor as specified in the Datasheet (Annexure-7) shall be in scope of bidder.									
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.		<table border="1"> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> <tr> <td>1</td> <td>Air-Compressors Package</td> <td>Two (2) Sets</td> </tr> </table> One Set of compressor shall comprise of compressor along with drive motor and accessories as mentioned in datasheet. J. Hydro-pneumatic Tank (HPT) Assembly Hydro-pneumatic Tank assembly as specified in the Datasheet (Annexure-7) including following accessories/instruments shall be in scope of bidder. <table border="1"> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> <th>Reference</th> <th rowspan="9"> Please refer P&ID of FWPH (Annexure-9) for set point of instrument. </th> </tr> <tr> <td>1</td> <td>Hydro-pneumatic Tank (18M³)</td> <td>1 No.</td> <td>Annexure-8</td> </tr> <tr> <td>2</td> <td>Pressure Transmitter complete with Hook up material assembly (All transmitters shall be smart type with HART protocol)</td> <td>2 Set</td> <td>Annexure-6</td> </tr> <tr> <td>3</td> <td>Level Transmitter complete with Hook up material assembly (All transmitters shall be smart type with HART protocol)</td> <td>2 Set</td> <td>Annexure-6</td> </tr> <tr> <td>4</td> <td>Solenoid operated safety valve Set Point: Solenoid Valve Open – 12.0 kg/cm²(g) Solenoid Valve close – 11.6 kg/cm²(g)</td> <td>1 No.</td> <td>Annexure-7</td> </tr> <tr> <td>5</td> <td>Pressure Safety Valve – Pop Type (25NB) Set point: 12.5 kg/cm² (g)</td> <td>1 No.</td> <td>Annexure-7</td> </tr> <tr> <td>6</td> <td>Pressure Gauge complete with Hook up material assembly (Range : 0-20kg/cm²)</td> <td>1 Set</td> <td>Annexure-7</td> </tr> <tr> <td>7</td> <td>Level Indicator</td> <td>1 No.</td> <td>Annexure-7</td> </tr> <tr> <td>8</td> <td>Manhole</td> <td>1 No.</td> <td>Bidder to indicate</td> </tr> </table> One set shall include Instrument complete with following hook-up materials: - Accessories mentioned in Annexure-7 - Instrument Root valve (Globe valve SS316) - Nipple, Half-coupling, Adapter required for installation as per approved Instrument Hookup Drgs. Design Requirement of HPT: - Design of Hydro pneumatic tank shall conform to IS-2825/ASME Section-VIII, Div.1. Design pressure should be the maximum expected pressure (15 Kg/cm² (g)) to which the vessel may be subjected plus 5% extra margin. - Corrosion allowance of 2 mm (minimum) on shell and dished ends shall be considered while designing the tank. Suitable mill-allowance shall also be considered for shell and dished ends. Thinning/scaling allowance of 2 mm (minimum) shall be considered for dished ends. - Plates shall be cold rolled through plate bending machine by several number of passes to true curvature and joined by welding. - Tank seams shall be so positioned that they do not pass through vessel connections. Inside seam weld shall be ground smooth, suitable for application of corrosion resistant coating.				Sl. No.	Description	Quantity	1	Air-Compressors Package	Two (2) Sets	Sl. No.	Description	Quantity	Reference	Please refer P&ID of FWPH (Annexure-9) for set point of instrument.	1	Hydro-pneumatic Tank (18M ³)	1 No.	Annexure-8	2	Pressure Transmitter complete with Hook up material assembly (All transmitters shall be smart type with HART protocol)	2 Set	Annexure-6	3	Level Transmitter complete with Hook up material assembly (All transmitters shall be smart type with HART protocol)	2 Set	Annexure-6	4	Solenoid operated safety valve Set Point: Solenoid Valve Open – 12.0 kg/cm ² (g) Solenoid Valve close – 11.6 kg/cm ² (g)	1 No.	Annexure-7	5	Pressure Safety Valve – Pop Type (25NB) Set point: 12.5 kg/cm ² (g)	1 No.	Annexure-7	6	Pressure Gauge complete with Hook up material assembly (Range : 0-20kg/cm ²)	1 Set	Annexure-7	7	Level Indicator	1 No.	Annexure-7	8	Manhole	1 No.	Bidder to indicate
		Sl. No.	Description	Quantity																																												
1	Air-Compressors Package	Two (2) Sets																																														
Sl. No.	Description	Quantity	Reference	Please refer P&ID of FWPH (Annexure-9) for set point of instrument.																																												
1	Hydro-pneumatic Tank (18M ³)	1 No.	Annexure-8																																													
2	Pressure Transmitter complete with Hook up material assembly (All transmitters shall be smart type with HART protocol)	2 Set	Annexure-6																																													
3	Level Transmitter complete with Hook up material assembly (All transmitters shall be smart type with HART protocol)	2 Set	Annexure-6																																													
4	Solenoid operated safety valve Set Point: Solenoid Valve Open – 12.0 kg/cm ² (g) Solenoid Valve close – 11.6 kg/cm ² (g)	1 No.	Annexure-7																																													
5	Pressure Safety Valve – Pop Type (25NB) Set point: 12.5 kg/cm ² (g)	1 No.	Annexure-7																																													
6	Pressure Gauge complete with Hook up material assembly (Range : 0-20kg/cm ²)	1 Set	Annexure-7																																													
7	Level Indicator	1 No.	Annexure-7																																													
8	Manhole	1 No.	Bidder to indicate																																													
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	K. Simplex Basket Type Strainer Simplex Basket Strainer as specified in the Datasheet (Annexure-7) shall be in scope of bidder.								
	<table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Simplex Basket Type Strainer-250 NB</td> <td>Two (2) Nos.</td> </tr> </tbody> </table>			Sl. No.	Description	Quantity	1	Simplex Basket Type Strainer-250 NB	Two (2) Nos.
	Sl. No.	Description	Quantity						
	1	Simplex Basket Type Strainer-250 NB	Two (2) Nos.						
Testing Requirements: Pressure drop test shall be carried out for Basket strainers.									
L. Pressure Gauge Pressure Gauge as specified in the Datasheet (Annexure-7) shall be in scope of bidder.									
<table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Pressure Gauge complete with Hook up material assembly (Range : 0-20kg/cm2)</td> <td>18 Sets</td> </tr> </tbody> </table>			Sl. No.	Description	Quantity	1	Pressure Gauge complete with Hook up material assembly (Range : 0-20kg/cm2)	18 Sets	
Sl. No.	Description	Quantity							
1	Pressure Gauge complete with Hook up material assembly (Range : 0-20kg/cm2)	18 Sets							
One set shall include Instrument complete with following hook-up materials: - Accessories mentioned in Annexure-6 - Instrument Root valve (globe valve SS316) - Nipple, Half coupling, Adapter required for installation as per approved Instrument Hookup Drgs. Hook up drawings the instrument shall be submitted by bidder.									
M. Pressure Transmitter Pressure Transmitter as specified in the Datasheet (Annexure-6) shall be in scope of bidder.									
<table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Pressure Transmitter complete with Hook up material assembly (Range : 1 – 20 bar)</td> <td>21 Sets</td> </tr> </tbody> </table>			Sl. No.	Description	Quantity	1	Pressure Transmitter complete with Hook up material assembly (Range : 1 – 20 bar)	21 Sets	
Sl. No.	Description	Quantity							
1	Pressure Transmitter complete with Hook up material assembly (Range : 1 – 20 bar)	21 Sets							
One set shall include Instrument complete with following hook-up materials: - Accessories mentioned in Annexure-6 - Instrument Root valve (globe valve SS316) - Nipple, Half coupling, Adapter required for installation as per approved Instrument Hookup Drgs. Hook up drawings the instrument shall be submitted by bidder.									
N. Differential Pressure Switch Differential Pressure switch as specified in the Datasheet (Annexure-6) shall be in scope of bidder.									
<table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Differential Pressure switch complete with Hook up material assembly</td> <td>01 Set</td> </tr> </tbody> </table>			Sl. No.	Description	Quantity	1	Differential Pressure switch complete with Hook up material assembly	01 Set	
Sl. No.	Description	Quantity							
1	Differential Pressure switch complete with Hook up material assembly	01 Set							
Differential Pressure switch (DPS) shall be installed across the Simplex basket strainer.									
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.	One set shall include Instrument complete with following hook-up materials: - Accessories mentioned in Annexure-6 - Instrument Root valve (globe valve SS316) - Nipple, Half coupling, Adapter required for installation as per approved Instrument Hookup Drgs. Hook up drawings the instrument shall be submitted by bidder. O. Differential Pressure Indicator Differential Pressure indicator as specified in the Datasheet (Annexure-6) shall be in scope of bidder. <table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Differential Pressure indicator complete with Hook up material assembly</td> <td>01 Set</td> </tr> </tbody> </table> Differential Pressure indicator (DPI) shall be installed across the Simplex basket strainer. One set shall include Instrument complete with following hook-up materials: - Accessories mentioned in Annexure-6 - Instrument Root valve (globe valve SS316) - Nipple, Half coupling, Adapter required for installation as per approved Instrument Hookup Drgs. Hook up drawings the instrument shall be submitted by bidder. P. Safety Relief Valve Safety relief valve as specified in the Datasheet (Annexure-7) shall be in scope of bidder. <table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Item</th> <th>Size</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Safety Relief Valve Set Point: 15 kg/cm² Water Flow: 510 m³/hr</td> <td>To be decided by Bidder</td> <td>Two (2) Nos.</td> </tr> </tbody> </table> Q. Spanner and Hammer for Hose station <table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Spanner</td> <td>6 Nos</td> </tr> <tr> <td>2</td> <td>Hammer</td> <td>6 Nos</td> </tr> </tbody> </table> R. Wrapping & Coating with Synthetic primer Wrapping & coating with synthetic primer as specified in the Datasheet (Annexure-7) shall be in scope of bidder. <table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Wrapping & Coating (2mm thickness & minimum 150mm width)</td> <td>13200 M2</td> </tr> <tr> <td>2</td> <td>Synthetic Chlorinated primer</td> <td>1000 Litres</td> </tr> <tr> <td>3</td> <td>Thinner for above primer</td> <td>As required</td> </tr> </tbody> </table> A separate document indicating the details of all the items having shelf life shall be furnished.			Sl. No.	Description	Quantity	1	Differential Pressure indicator complete with Hook up material assembly	01 Set	Sl. No.	Item	Size	Quantity	1	Safety Relief Valve Set Point: 15 kg/cm ² Water Flow: 510 m ³ /hr	To be decided by Bidder	Two (2) Nos.	Sl. No.	Description	Quantity	1	Spanner	6 Nos	2	Hammer	6 Nos	Sl. No.	Description	Quantity	1	Wrapping & Coating (2mm thickness & minimum 150mm width)	13200 M2	2	Synthetic Chlorinated primer	1000 Litres	3	Thinner for above primer	As required
	Sl. No.	Description	Quantity																																			
	1	Differential Pressure indicator complete with Hook up material assembly	01 Set																																			
	Sl. No.	Item	Size	Quantity																																		
	1	Safety Relief Valve Set Point: 15 kg/cm ² Water Flow: 510 m ³ /hr	To be decided by Bidder	Two (2) Nos.																																		
Sl. No.	Description	Quantity																																				
1	Spanner	6 Nos																																				
2	Hammer	6 Nos																																				
Sl. No.	Description	Quantity																																				
1	Wrapping & Coating (2mm thickness & minimum 150mm width)	13200 M2																																				
2	Synthetic Chlorinated primer	1000 Litres																																				
3	Thinner for above primer	As required																																				
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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.	Prior permission from BHEL shall be taken before dispatch of any of the item having shelf life. It may be noted that items having shelf life may be required after 12-18 months from order placement. 4.2. 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. <table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>QTY</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Spanner double end fix type confirming to IS:2028 (size : 1/8 " - 3/16" to 5/8" - 3/4")</td> <td>1</td> <td>No</td> </tr> <tr> <td>2.</td> <td>Spanner ring type (size :1/8" x 3/16" to 5/8" x 3/4")</td> <td>1</td> <td>No</td> </tr> <tr> <td>3.</td> <td>Screw driver with transparent green handle confirming to is:844 insulated</td> <td></td> <td></td> </tr> <tr> <td>3.1</td> <td>Size : 150 mm long x 8 mm blade dia</td> <td>1</td> <td>No</td> </tr> <tr> <td>3.2</td> <td>Size : 250 mm long x 8 mm blade dia</td> <td>1</td> <td>No</td> </tr> <tr> <td>3.3</td> <td>Size : 300 mm long x 8 mm blade dia</td> <td>1</td> <td>No</td> </tr> <tr> <td>4.</td> <td>M.S. Chissel. 1/4" x 3" long</td> <td>1</td> <td>No</td> </tr> <tr> <td>5.</td> <td>Machinist file flat smooth (300 mm)</td> <td>1</td> <td>No</td> </tr> <tr> <td>6.</td> <td>Machinist file hand bastard (300 mm)</td> <td>1</td> <td>No</td> </tr> <tr> <td>7.</td> <td>Combination plier insulated with thick C.A. sleeve confirming to IS:3650 (having length of 205 mm)</td> <td>1</td> <td>No</td> </tr> <tr> <td>8.</td> <td>Tommy bar hexagonal</td> <td>1</td> <td>No</td> </tr> <tr> <td>9.</td> <td>Hammer with handle confirming to IS:841 (ball pein & cross pein) (500 gms)</td> <td>1</td> <td>No</td> </tr> <tr> <td>10.</td> <td>Plyer</td> <td>1</td> <td>No</td> </tr> </tbody> </table> 4.3. Supply of Spares: 4.3.1. Recommended Spares: The Contractor shall provide a list of recommended spares giving unit prices and total prices for 2 years of normal operation of the plant for spares of indigenous origin, and for 5 years of normal operation for spares of non-indigenous origin. This list shall take into consideration the mandatory spares specified elsewhere in the specification and should be a separate list. Price of recommended spares will not be used for evaluation of the bids. The price of these spares will remain valid up to 12 months after placement of notification of Award for the main equipment. If the recommended spares are the same as mandatory spares, the prices shall be the same. The prices of any recommended spares, which are not common with mandatory spares, shall be subject to review by the Owner, and shall be finalized after mutual discussion within the price validity period. These spares shall be ordered by Owner of power plant. Owner will have the option to procure any or all of the recommended spares at his discretion.			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
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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.	4.3.2. 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. Bidder shall provide list of start-up and commissioning spares after the award of contract and the same shall be identified in Billing Break-Up.				
	4.3.3. Mandatory Spare Parts: List of Mandatory Spare applicable:				
	Sl. No.	Mandatory Spares	Quantity for each type of equipment/ instrument	Estimated Qty.	Unit
	1.	VALVES			
	1.1.	Hydrant valves	10% of each type and size of total population or minimum 1(one) No. whichever is higher	30	Nos.
	1.2.	Seat Valve & Rubber Ring for Hydrant Valves	5% of each type and size of total population or minimum 1(one) No. whichever is higher	15	Nos.
	1.3.	Gun Metal Gate Valve-25NB	2 Nos. for each type, Class and size	02	Nos.
	2.	Branch Pipe with Nozzle			
	2.1.	Branch pipe with Triple purpose/Universal type nozzle	10% for each type of total population	19	Nos.
	2.2.	Branch pipe with Fog type nozzle	10% for each type of total population	2	Nos.
	3.	Fire Hose with SS Fittings Complete Assembly	10% for each type of total population	41	Nos.
	4.	C&I Items			
	4.1.	Pressure Gauge complete with Hook up material assembly	10% of total or at least two (whichever is higher) for each type along with accessories	02	Nos
	4.2.	Level gauge complete with Hook up material assembly	10% of total or at least two (whichever is higher) for each type along with accessories	02	Nos.
	4.3.	Pressure Transmitter complete with Hook up material assembly	10% of total or at least two (whichever is higher) for each type along with accessories	02	Nos.
4.4.	Level Transmitter complete with Hook up material	10% of total or at least two (whichever is higher) for each	02	Nos.	

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4.4. Bidder's Scope of Services (Supervision of Erection & Commissioning):																																																																											
Supervision of erection, commissioning performance testing till final handing over to end customer for the supplied equipments shall be included in bidder's scope of service.																																																																											
Bidder to note that the supervision charges for erection & commissioning shall consists of the following:																																																																											
a. Per day supervision charges of an Engineer including all other expenses like boarding, lodging, local travel, insurance etc.																																																																											
b. Travel expenses (inclusive of any clearance charges like Visa fee etc, insurance) from / to vendor works to site.																																																																											
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 a total no of 40 man-days to be covered in 3 visits have been considered. However, either or both of the number of man-days or no of visits may change on either side based on the actual site requirement.																																																																											
All payments towards supervision of E&C shall be made only after BHEL-site supervision.																																																																											
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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.		Bidder to mobilize concerned competent person for supervision of Erection & commissioning activities within a period of 7 days of receipt of intimation in this regard by BHEL. Bidder to quote supervision of erection and commissioning activities strictly as per BHEL's price format. 4.5. Documentation and Deliverables: 4.5.1. Engineering Documentation: a) Engineering documents as per the master documentation list given in Annexure-3 must be furnished by bidder to BHEL. 4.5.2. Project Documentation: a) Billing Break-up b) QAP c) Inspection reports and test certificates as applicable d) Schedule of delivery e) Packing lists of each consignments f) Site storage instructions 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 deemed to be included in bidder's scope without any commercial implication to the purchaser. 5. EXCLUSIONS: i. Storage, preservation of Materials/Equipment at site (however detailed storage and preservation procedure shall be furnished by bidder) ii. All Erection and Commissioning works iii. All civil works 6. GENERAL TECHNICAL DETAILS: 6.1. Applicable Codes & Standards The codes and standards shall applicable as mentioned in the respective datasheets. 6.2. Latest edition of applicable codes/Standards/Statutory Regulations referred to in the Bid Document shall correspond to the edition as on the date of issue of bid. 6.3. All addenda including the latest addenda to all the above codes and standards (latest editions) shall be followed by the bidder. 6.4. All equipment/items supplied shall conform to the provisions of statutory & other regulations in force in India and the State/Province where the project is executed, such as the Indian Factories Act, Indian Electricity (Supply) Act, Indian Electricity Act, Indian Electricity Rules, International Electric Technical Commission (IEC) Publication, Environmental Rules, etc. Obtaining of all permission and approvals from statutory authorities for the installation of the plant and		
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		GAUGES BOURDON INDIA																																													
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						FORBES MARSHALL (HYD) PVT LIMITED,
						PRECISION MASS PRODUCTS PVT LTD
						H.GURU INSTRUMENTS(S.I)PVT.LTD
						WALCHANDNAGAR INDUSTRIES LIMITED
						SCIENTIFIC DEVICES (BOMBAY) PVT. LT
						BAUMER TECHNOLOGIES
						GAUGES BOURDON INDIA
						A.N. INSTRUMENTS PVT. LTD.,
						PROTECH CONTROL INSTRUMENTS
				5	PR. & DIFF. PR. TRANSMITTERS (ELECTRONIC - SMART)	EMERSON PROCESS MGT (I) PVT LTD
						ABB INDIA LIMITED, HYD
						YOKOGAWA INDIA LIMITED
						ENDRESS + HAUSER (INDIA) PVT. LTD.
						HONEYWELL AUTOMATION INDIA LIMITED
				6	SAFETY RELIEF VALVES	BOPP & REUTHER SICHERHEITS- UND
						BLISS ANAND PVT. LTD.,
						INSTRUMENTATION LTD
						WEIR BDK VALVES
						FORBES MARSHALL LTD.,
						FAINGER LESER VALVES PVT. LTD.
						PENTAIR SANMAR LIMITED
				7	INSTRUMENT HOOK UP MATERIAL PACKAGE	KWALITY FORGED FITTINGS
						UNIQUE ENGINEERING ENTPS. P. LTD.
						PRESHZINGER ENGINEERING
						CARLO DYNATECH INDUSTRIES,
						U I PIPE FITTINGS PVT. LTD.
						TRUE FORGE PVT.LTD.,
						TRUE FAB ENGINEER (P) LTD.
						P.K. TUBES & FITTINGS PVT. LTD.
						DYNAFLUID VALVES AND FLOW CONTROLS
						PANAM ENGINEERS PVT. LTD.
						SWASTIK ENGINEERING WORKS
						NAV DURGA FORGING AND FITTINGS
				8	LEVEL TRANSMITTER (RADAR, NON-CONTACT TYPE)	EMERSON PROCESS MGT (I) PVT LTD
						MAGNETROL INTERNATIONAL N.V.
						ENDRESS + HAUSER (INDIA) PVT. LTD.
						PUNE TECHTROL PVT LTD
						SAAB ROSEMOUNT TANK GUAGING
						HONEYWELL AUTOMATION INDIA LIMITED
		VEGA INDIA LEVEL & PRESSURE MEASURE				
9	SURGE/PRESSURE VESSELS	EXCEL INDUSTRIES,				
		RUKSAN ENGINEERS PVT.LTD.				
		P S A NITROGEN LIMITED.				
		BARODA EQUIPMENT AND VESSELS				
		FABTECH PROJECTS & ENGINEERS				
		RAVI INDUSTRIES				
		MAHATHI INFRA SERVICES PVT LTD				
10	STRAINERS (Y-TYPE / T-TYPE /	GUJARAT OTOFILT,				

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Note: 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. 8. INSPECTION AND TESTING (Refer GCC, SCC, Annexure 4 & 5) 8.1. Bidder shall maintain an effective Quality Assurance System, to ensure that all equipment and material supplied as a part of the Hydrant based Equipment Package meet required Quality standards and specifications. 8.2. Bidder to follow the Quality plan for the equipment /items as attached as Annexure 4 & 5. After award of contract bidder shall submit Quality Plan for approval as per the attached format only (for equipment /items, where QAP are not attached). The quality plan shall be submitted in BHEL quality plan format.																						
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	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.			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 absolve the bidder from in-correct/faulty design or manufacturing of equipment/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. Bidder shall furnish the first set of drawings/document within 30 days progressively. All revised drawings/documents after incorporating the comments shall be furnished within 7 calendar days. BHEL shall furnish comments (if any) /approval on the documents within 7 calendar days after the receipt of same. 9.4. Engineering Completion a) The Engineering shall be considered as completed after the following activities are finished: • Final approval of all the 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) • Submission of erection and commissioning procedures. • Submission of O&M manuals 9.5. Erection & Commissioning Documentation a) 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 • Safety procedures to be followed during erection/installation. • Pre-commissioning checks and tests. • Commissioning procedures b) Following may be noted w.r.t the drawing submission schedule:	
			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.			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 equipment ii. Approved drawings/Datasheets iii. GA drawing and catalogue of all equipment iv. Quality plan v. Test certificates vi. Installation procedure 10. PRICE BID FORMAT (Refer Annexure-1) 10.1. Supply of Water based FPS equipment as envisaged in this bid document shall be executed by the bidder on Lump Sum Turnkey (LSTK) basis for supply part. 10.2. 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. 10.3. Prices quoted by the bidder shall remain firm till the successful handing over of the Water based FPS equipment 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. 10.4. 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. 10.5. 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. 11. BILLING BREAKUP METHODOLOGY: Billing break-up (BBU) shall be submitted to BHEL in following methodology: 11.1. The BBU shall be prepared only for the pro-rata billing purpose. 11.2. 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. 11.3. For any changes in quantity or items, the BBU shall suitably revised. 11.4. 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. 11.5. 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 without any	
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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.	additional commercial implication to BHEL. All the contractual stipulations/clauses shall be valid for these additional items also.																																					
	12. DEVIATIONS TO SPECIFICATIONS: 12.1. Any deviation or variation from the scope, requirement and/or intent of this specification shall be clearly defined under relevant attachment (refer Annexure - 3) 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. 12.2. 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. 12.3. 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 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. System wise BOQ shall be finalized based on approved drawings during detail engineering stage. 13. LIST OF ANNEXURES: <table border="1"> <thead> <tr> <th colspan="3">LIST OF ANNEXURES</th> </tr> <tr> <th>Sl. No</th> <th>Drawings/Documents</th> <th>Drg/Doc no</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>PRICE BID FORMAT</td> <td>Annexure-1</td> </tr> <tr> <td>2.</td> <td>PRE BID QUERY FORMAT</td> <td>Annexure-2</td> </tr> <tr> <td>3.</td> <td>MASTER DOCUMENT LIST</td> <td>Annexure-3</td> </tr> <tr> <td>4.</td> <td>QAP_GUIDELNES_BHEL_FORMAT</td> <td>Annexure-4</td> </tr> <tr> <td>5.</td> <td>MANUFACTURING QUALITY PLAN FOR EQUIPMENTS</td> <td>Annexure-5</td> </tr> <tr> <td>6.</td> <td>CUSTOMER SPECIFICATION FOR INSTRUMENTS</td> <td>Annexure-6</td> </tr> <tr> <td>7.</td> <td>DATASHEETS FOR EQUIPMENT'S</td> <td>Annexure-7</td> </tr> <tr> <td>8.</td> <td>HYDRO-PNEUMATIC TANK ASSEMBLY</td> <td>Annexure-8</td> </tr> <tr> <td>9.</td> <td>P&ID FOR FWPH</td> <td>Annexure-9</td> </tr> <tr> <td>10.</td> <td>CHECKLIST</td> <td>Annexure-10</td> </tr> </tbody> </table> Bidder to note that the above annexures are preliminary in nature. These drawings may get revised and /or new drawings will be furnished to bidder. Bidder to however note that they will not be eligible to raise any extra charges on account of this.			LIST OF ANNEXURES			Sl. No	Drawings/Documents	Drg/Doc no	1.	PRICE BID FORMAT	Annexure-1	2.	PRE BID QUERY FORMAT	Annexure-2	3.	MASTER DOCUMENT LIST	Annexure-3	4.	QAP_GUIDELNES_BHEL_FORMAT	Annexure-4	5.	MANUFACTURING QUALITY PLAN FOR EQUIPMENTS	Annexure-5	6.	CUSTOMER SPECIFICATION FOR INSTRUMENTS	Annexure-6	7.	DATASHEETS FOR EQUIPMENT'S	Annexure-7	8.	HYDRO-PNEUMATIC TANK ASSEMBLY	Annexure-8	9.	P&ID FOR FWPH	Annexure-9	10.	CHECKLIST
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	Rev. No.	Date	Revision Details	Revised By	Checked By	Approved By	
	00	07/08/17	ORIGINAL ISSUE	-SD-	-SD-	-SD-	
	Ref. Doc.						

ANNEXURE-1
PRICE BID FORMAT FOR WATER BASED FPS EQUIPMENTS
PROJECT- 4 x 270 MW BHADRADRI TPS,
SPEC NO: PY51276, Rev 00

Sl. No.	Description	Qty.	Unit	PRICE in INR (Refer notes below)	
				Unit Price (INR)	Total Price (INR)
A.	Supply of Equipments				
1.	Air Release valve	45	No.'s		
2.	Branch pipe with Triple purpose/Universal type nozzle	182	No.'s		
3.	Branch pipe with Fog type nozzle	20	No.'s		
4.	Hose Cabinet	167	No.'s		
5.	Fire Hose with SS Fittings Complete Assembly	404	No.'s		
6.	Hose Reel	42	No.'s		
7.	Hydrant valves	292	No.'s		
8.	Water Monitor	45	No.'s		
9.	Gunmetal gate valve	45	No.'s		
10.	Air Compressor Package	02	Sets		
11.	Hydro-pneumatic Tank (HPT) Assembly	01	Set		
12.	Simplex Basket Type Strainer	02	No.'s		
13.	Pressure Gauge with hookup assembly	18	Sets		
14.	Pressure Transmitter with hookup assembly	21	Sets		
15.	Differential Pressure Switch with hookup assembly	01	Set		
16.	Differential Pressure Indicator with hookup assembly	01	Set		
17.	Safety Relief Valve	02	Nos.		
18.	Spanner and Hammer for Hose station	06	Sets		
19.	Wrapping & Coating (2mm thickness & minimum 150mm width)	13200	Sq. M		
20.	Synthetic Chlorinated primer	1000	Litres		
21.	Tools and tackles	1	Lot		
22.	Start-up and commissioning spares	1	Lot		
B.	Mandatory Spares				
1.	Hydrant valves	30	Nos.		
2.	Seat Valve & Rubber Ring for Hydrant Valves	15	Nos.		
3.	Gun Metal Gate Valve-25NB	02	Nos.		
4.	Branch pipe with Triple purpose/Universal type nozzle	19	Nos.		
5.	Branch pipe with Fog type nozzle	2	Nos.		
6.	Fire Hose with SS Fittings Complete Assembly	41	Nos.		
7.	Pressure Gauge complete with Hook up material assembly	02	Nos.		
8.	Level gauge complete with Hook up material assembly	02	Nos.		
9.	Pressure Transmitter complete with Hook up material assembly	02	Nos.		
10.	Level Transmitter complete with Hook up material assembly	02	Nos.		
11.	Differential Pressure switch complete with Hook up material assembly	02	Nos.		

ANNEXURE-1

12.	Differential Pressure indicator complete with Hook up material assembly	02	Nos.		
13.	Solenoid Operated Valve				
13.1.	Solenoid Valve Coil	02	Nos.		
13.2.	Plunger	01	No.		
13.3.	Seat	02	Nos.		
13.4.	Gaskets	02	Sets		
13.5.	O-Ring set	05	Sets		
14.	Process Connection Piping (Impulse piping/tubing, sampling piping / tubing & air supply piping as applicable) as per Specification requirement	1	Lot		
C.	Scope of Services				
1.	Per diem rate for the supervision of erection, testing, commissioning & performance testing for the supplied Equipments/Items shall be offered	40	Days		
2.	Travel expenses (inclusive of all other charges like visa fee (if applicable), insurance etc.) from / to vendor works to site for Engineer per visit for supervision of commissioning of TPI	3	Visits		
		Grand Total			

Notes:

- Bidder to quote for all the items as per price bid format. Incomplete/partial offer shall make bidder's offer liable for rejection.
- Price bid evaluation will be based on total price quoted as per Sl. No. A to C of the above.
- The unit rates of all the items quoted by the bidder shall firm till the execution of contract.
- The above items shall be quoted as per tender specification. Responsibility of ensuring correctness & completeness of scope of supply as per spec. requirement solely lies with bidder.
- The BOQ indicated in this Price Format are for tender evaluation only. However the BOQ shall be finalized during detailed engineering stage and shall be binding on the bidder as per the firm Unit rate.
- Bidder to note that the variation in quantities of any item shall be limited to (-) 0 % to (+) 10 %.
- Bidder to quote the base rates only. Applicable taxes and duties to be indicated separately.
- Bidder is required to furnish confirmation to this priced bid format in their technical offer by indicated 'Quoted' against all the items listed above, failing which their offer may be liable for rejection.
- Bidder to note that the number of man-days and visits considered under Sl. No. C is only for the purpose of tender evaluation. However, either or both of the number of man days or no of visits may change on either side based on the actual site requirement and final payment shall be based on actual number of man-days and visits.

BIDDER'S SIGNATURE
NAME:
DATE
COMPANY SEAL

ANNEXURE-2
(Pre-bid Queries/Clarifications)

PROJECT : 4x270 MW Bhadradri TPS				
PACKAGE : Hydrant Based FPS Equipment (HBFPS)				
RFQ/NIT REF:				
S.NO	CLAUSE NO	DESCRIPTION AS PER SPEC	QUERIES BY BIDDER	BHEL REPLIES

ANNEXURE-3 MASTER DOCUMENT SCHEDULE												
1	LIST OF SUPERCEDED DRAWINGS / DOCUMENTS				S	TO INDEX PAGE		NO COMMENTS				1
2	LIST OF ACTIVE DRAWINGS / DOCUMENTS				A	TODAY'S DATE		COMMENTS AS MARKED CLEARED FOR MANUFACTURE				2
3	LIST OF DRAWINGS/DOCUMENTS UNDER PREPARATION				UP			COMMENTS AS MARKED				3
4	LIST OF BHEL APPROVED DRAWINGS				ADS			RETAINED FOR INFORMATION				4
S. NO	DRAWING/ DOCUMENTS	DWG. NO.	REV	SCHEDULE OF SUBMISSION	APPR (A/I)	SENT BY BIDDER (SOFT COPY)	HARD COPY RECEIVED FROM BIDDER	COMMENTS SEND TO BIDDER	STS	PEND	BHEL APP STATUS	REMARKS
1	Drawings & Documents Pending with BIDDER								A	P-BIDDER	1	
2	Drawings & Documents Pending with BHEL								A	P-BHEL	2	
3	Drawings & Documents Approved by BHEL								A	ADS	3	
4	Superceded Drawings								S	S	4	
1	DATASHEET AND GA DRG OF AIR RELEASE VALVE			Within 30 days after placement of Purchase Order	A							
2	DATASHEET AND GA DRG OF BRANCHPIPE AND ACCESSORIES			Within 30 days after placement of Purchase Order	A							
3	DATASHEET AND GA DRG OF HOSE BOX			Within 30 days after placement of Purchase Order	A							
4	DATASHEET AND GA DRG OF FIRE HOSE ALONG WITH HOSE COUPLING			Within 30 days after placement of Purchase Order	A							
5	DATASHEET AND GA DRG OF HOSE REEL			Within 30 days after placement of Purchase Order	A							
6	DATASHEET AND GA DRG OF HYDRANT VALVES			Within 30 days after placement of Purchase Order	A							
7	DATASHEET AND GA DRG OF WATER MONITOR			Within 30 days after placement of Purchase Order	A							
8	DATASHEET AND GA DRG OF GUNMETAL GATE VALVE			Within 30 days after placement of Purchase Order	A							
9	DATASHEET AND GA DRG OF AIR-COMPRESSOR			Within 30 days after placement of Purchase Order	A							
10	DATASHEET AND GA DRG OF HYDRO-PNEUMATIC TANK			Within 30 days after placement of Purchase Order	A							
11	DATASHEET AND GA DRG OF BASKET STRAINER			Within 30 days after placement of Purchase Order	A							
12	DATASHEET AND GA DRG OF PRESURE GAUGE			Within 30 days after placement of Purchase Order	A							
13	DATASHEET AND GA DRG OF PRESURE TRANSMITTER			Within 30 days after placement of Purchase Order	A							
14	DATASHEET AND GA DRG OF DIFFERENTIAL PRESSURE SWITCH			Within 30 days after placement of Purchase Order	A							
15	DATASHEET AND GA DRG OF DIFFERENTIAL PRESSURE INDICATOR			Within 30 days after placement of Purchase Order	A							
16	DATASHEET AND GA DRG OF FLOW SWITCH			Within 30 days after placement of Purchase Order	A							
17	DATASHEET AND GA DRG OF PRESSURE SAFETY VALVE			Within 30 days after placement of Purchase Order	A							
18	DATSHEET FOR SPANNER AND HAMMER			Within 30 days after placement of Purchase Order	A							
19	DATSHEET FOR WRAPPING COATING AND PRIMER			Within 30 days after placement of Purchase Order	A							
20	DATASHEET AND GA DRG OF LEVEL GAUGE			Within 30 days after placement of Purchase Order	A							
21	DATASHEET AND GA DRG OF LEVEL TRANSMITTER			Within 30 days after placement of Purchase Order	A							
22	DATASHEET AND GA DRG OF SOLENOID VALVE			Within 30 days after placement of Purchase Order	A							

23	DATSHEET OF HOOK UP DRAWINGS FOR ALL INSTRUMENTS		Within 30 days after placement of Purchase Order	A								
24	ERECTION PROCEDURE		Within 60 days after placement of Purchase Order	I								
25	PRE-COMMISSION PROCEDURE		Within 60 days after placement of Purchase Order	I								
26	COMMISSIONING PROCEDURE		Within 60 days after placement of Purchase Order	I								
27	STORAGE PROCEDURE		Within 60 days after placement of Purchase Order	I								
28	BILLING BREAKUP		Within 45 days after placement of Purchase Order	A								
29	PACKING LIST		Within 90 days after placement of Purchase Order	I								
30	LIST OF SPECIAL TOOLS AND TACKLES		Within 45 days after placement of Purchase Order	I								
31	LIST OF STARTUP AND COMMISSIONING SPARES		Within 45 days after placement of Purchase Order	I								
32	LIST OF RECOMMENDED SPARES		Within 45 days after placement of Purchase Order	I								
33	LIST OF MANDATORY SPARES		Within 30 days after placement of Purchase Order	A								
34	O&M MANUALS FOR ALL THE COMPONENTS/ ITEMS IN THIS CONTRACT		ONE WEEK BEFORE RAISING INVOICE OF THE COMPONENTS/ ITEMS.									

Note:

- 1 Bidder to furnish the documents as per the schedule date of submission. Delay in submission of documents shall be calculated based on the above schedule
- 2 All drawings / documents shall be reviewed by the purchaser with 14 working days of receipt of drawing at Purchaser's end.
- 3 All drawings / documents shall be revised and resubmitted by the Bidder with 7 working days of receipt of observations/comments from Purchaser's end

	Form No.  HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE- 2 to PY 51276 Rev No. 00 Page 2 of 3
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.		GUIDELINES TO VENDORS FOR PREPARATION OF QUALITY ASSURANCE PLAN - QAP shall be made in landscape mode on A4 size paper as per the format enclosed. Font size shall be minimum 10. - Each page of QAP shall contain the following information. - Vendor's name & address. - Customer: BHEL, Hyderabad. - Project. - BHEL Product Standard Number/revision number as referred in P.O. - BHEL Purchase Order Number & Date. - Product as per P.O. description. - QAP Number (unique and shall not repeat)/revision number/date. - Page number and number of pages - QAP shall contain four parts / stages as follows. - Raw materials and bought out items. - In process Control / Inspection. - Final assembly, Inspection & Testing. - Painting, preservation & packing. - Under 'Component', indicate name of the component (say casing, rotor, pressure gauge, etc). - Under 'Characteristics', indicate appropriately (say chemical analysis, mechanical properties, NDT (UT,DP etc.), hydrostatic test, calibration check etc.) - Under 'Class', indicate minor, major or critical depending on the importance of characteristic. - Under 'Type of check', indicate appropriately (say chemical, mechanical, UT, DP etc.) - Under 'Quantum of check', indicate appropriately (say 100%, 10%, sample, per melt, per heat, all pieces etc.) - Under 'Reference document' and 'Acceptance norms', appropriate National & International standards, BHEL standards, approved drawing references etc. should be indicated. It is not correct to mention as "Vendor's internal standards or Vendor's standard practice etc.". If vendors' internal standards are referred, same shall be in line with BHEL Spec. indicated in the P.O. These may require review & approval by our Engineering dept. - Under 'Format of record', indicate appropriately supplier's test certificate, calibration certificate, lab report, inspection report etc.	
Ref. Doc		Please refer 'Agency' in QAP format. Under P: Perform, W: Witness, V: Verify Indicate against each characteristic 1: (BHEL CQS/Nominated inspection agency), OR 2: (Vendor / Sub vendor)	

Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE- 2 to PY 51276
	Rev No. 00		
	Page 3 of 3		
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.		Note: Performing agency is normally vendor or his sub vendor (Legend 2). Where witness points are indicated in specification, P.O., Drawing etc., for such operations, under Witness (W) column use 1. Under 'Verify' column, use code1. 12. Under 'D' please put (☐ Tick) against each characteristic where vendor proposes to submit test certificate/report etc. OR as required as per BHEL Specification. 13. Vendor's signature & stamp should be available on each page of QAP. 14. Vendor should read the BHEL Product Standard thoroughly and QAP should be made only inline and relevant to the Specification & Approved Drawings. 15. The following operations/characteristics/check points may be included (AS APPROPRIATE) a) Visual check b) Dimensional check c) Mechanical and Chemical properties. d) Surface preparation before painting (by chemical cleaning, sand blasting, shot blasting etc. as the case may be.) e) Painting check for shade, Dry Film Thickness (DFT), Adhesion/ peel off test etc. f) Check for correctness for all components mounted as per General arrangement Drawing, Bill Of Materials (BOM), etc. for range, rating, make, color, size, location as per GA, quantity, label description including tag nos., annunciator facia, loose components, accessories, spares etc. g) Verification of test certificate for protection class for the enclosures. h) Mechanical functioning of switches. i) Continuity of earthing and provision of earth points. j) Colour coding of wiring, size, tightness & dressing of wiring. k) Review of test certificates of assembled items, raw materials, internal test reports etc. l) Witness of functional checks, which may include mechanical run & electrical run, H.V.test, IR measurement, Electrical and Mechanical tests etc. m) PQR, WPS, Welder Qualification Record, welding records (fit up, DP) etc. n) Material identification (for punch marks of serial numbers, Heat No, Melt No, Inspector's stamp etc.) o) Hydraulic Pressure Test, Pneumatic Pressure Test, Liquid Penetration Examination and other Non Destructive Tests. p) Tests on Galvanised items (Visual, Hammer Test, Knife Test, Thickness, Pierce Test (Copper sulphate test), Hydrogen evaluation test, Stripping test (for Mass of Zinc coating) q) All tests as per BHEL Product Standard & approved drawings including Type tests and Routine tests on individual items and on System as a whole. r) Packing and Preservation. 16. QAP Format enclosed. 17. Typical Manufacturing QAP is attached.	
		Ref. Doc	

VENDOR'S NAME & ADDRESS:			MANUFACTURING QUALITY PLAN						QP. NO.:				
									REV NO:		DATE:		
			CUSTOMER: BHEL, HYDERABAD – 32. PROJECT: PRODUCT:			BHEL P.O.NO.: P.O.DATE: BHEL SPEC:			REV:			PAGE 1 OF 1	
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
2.0	INPROCESS INSPECTION												
3.0	FINAL INSPECTION & TESTING												
4.0	PRESERVATION & PACKING												

VENDOR TO NOTE: THIS FORMAT IS IN MICROSOFT WORD. HEADER & FOOTER SHALL BE AVAILABLE IN EACH PAGE OF QP. QP SHALL BE IN LANDSCAPE & A4 SIZE ONLY. FONT SIZE SHALL BE MIN 10. VENDOR SHALL SIGN & STAMP IN EACH PAGE OF QP. LOI REF. & DATE ARE NOT ACCEPTABLE. P.O.NO. & DATE SHALL BE INDICATED. QP NO. SHOULD BE UNIQUE AND SHALL NOT REPEAT. ALL THE TESTS / CHECKS INDICATED IN THE BHEL SPEC. SHALL BE INDICATED IN THE QP.

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL CQS (OR BHEL NOMINATED INSPECTION AGENCY) & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.	PREPARED BY	APPROVED BY	APPROVED BY
	VENDOR'S SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP

बी एच ई एल BHEL		TYPICAL MANUFACTURING QUALITY PLAN (Annexure-5)							MQP. NO.:				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT: AIR RELEASE VALVE			REV NO:		DATE:		
									PAGE 1 OF 2				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
1.1	Body, Bonnet & Nozzle,Springs, Bellows etc.	Mechanical & Chemical	Major	UTS & Hardness	One Per Heat	Appd. Drw./datasheet/BHEL Spec.	Appd. Drw./datasheet/BHEL Spec.	TC of Testing LAB	√	2	2	1	
2.0	INPROCESS INSPECTION												
2.1	Machining Portion of body, Cover, Seats	Dimensions & Surface Defects	Major	Measurement	100%	Appd. Drw./datasheet/BHEL Spec.	Appd. Drw./datasheet/BHEL Spec.	IR	-	2	2	-	
2.2	Assembly	Overall Dimensions	Major	Measurement	100%	Appd. Drw./datasheet/BHEL Spec.	Appd. Drw./datasheet/BHEL Spec.	IR	-	2	2	-	
3.0	FINAL INSPECTION & TESTING												
3.1	(a) Assembly	Physical, Overall dimensions	Major	Visual & Measurement	100% for 2 & 10% for 1	Appd. Drw./datasheet/BHEL Spec.	Appd. Drw./datasheet/BHEL Spec.	IR	√	2	1	-	
3.2		Hydraulic Test,Seat leakage test, etc.	Critical	Leakage test for body & Seat	100% for 2 & 10% for 1	Appd. Drw./datasheet/BHEL Spec.	Appd. Drw./datasheet/BHEL Spec.	IR/TC	√	2	1	-	
3.3		Post weld heat treatment/Radiography/Magnetic particle testing on weld joint	Critical	NDT	100%	Appd. Drw./datasheet/BHEL Spec	Appd. Drw./datasheet/BHEL Spec	IR	√	2		1	*If applicable
4.0	PRESERVATION & PACKING												
4.1	Reshipment	Drying, Cleaning, Finishing, Painting, Packing & Marking	Major	Visual	100%	Appd. Drw./datasheet/BHEL Spec.	Appd. Drw./datasheet/BHEL Spec.	IR	-	2	2	-	

NOTE:-

1. This standard MQP should be read along with specification (latest revision), approved drawings & approved data sheet.
2. Drawing/data sheet shall prevail over quality plan for contradiction if any between quality plan and drawing/specification.
3. All test certificates/reports reviewed and certified by TPI/BHEL shall be submitted to BHEL as documentation package.
4. All type test reports submitted shall not be older than 5 yrs from the date of purchase order.

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.

		TYPICAL MANUFACTURING QUALITY PLAN (Annexure-5)						MQP. NO.:					
								REV NO:		DATE:			
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032						PRODUCT: AIR RELEASE VALVE				PAGE 2 OF 2	
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
									D	P	W	V	

5. Any project/customer specific requirements which shall be notified have to be fulfilled by the vendor at the time of execution of order.

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.

		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PRODUCT: BRANCH PIPE AND NOZZLE			REV NO:		DATE:			
								PAGE 1 OF 2					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
		CHEMICAL AND PHYSICAL	MAJOR	ANALYSIS TEST	ONE/LOT	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2		1	
2.0	INPROCESS INSPECTION												
3.0	FINAL INSPECTION & TESTING												
		VARIFICATION OF MANUFACTURER	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		VISUAL INSPECTION	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		DIMENSION	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		BOM CHECK	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		REVIEW OF TEST CERTIFICATE	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		HYDRO TEST	MAJOR	REVIEW	SAMPLE	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		

LEGEND: P: PERFORM, W: WITNESS, V: TEST CERTIFICATE REVIEW. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.

		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:					
								REV NO:		DATE:			
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PRODUCT: BRANCH PIPE AND NOZZLE			PAGE 2 OF 2					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
4.0	PRESERVATION & PACKING												

LEGEND: P: PERFORM, W: WITNESS, V: TEST CERTIFICAT REVIEW. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.

		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:					
								REV NO:		DATE:			
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PRODUCT: HOSE CABINET			PAGE 1 OF 1					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
2.0	INPROCESS INSPECTION												
3.0	FINAL INSPECTION & TESTING												
		VARIFICATION OF MANUFACTURER	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		VISUAL INSPECTION	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		DIMENSION	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		BOM CHECK	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		REVIEW OF TEST CERTIFICATE	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		PAINT	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
4.0	PRESERVATION & PACKING												

LEGEND: P: PERFORM, W: WITNESS, V: TEST CERTIFICATE REVIEW. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.

		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PRODUCT: HOSE PIPE AND REEL			REV NO:		DATE:			
								PAGE 1 OF 2					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
	HOSE PIPE AND REEL	CHEMICAL AND PHYSICAL	MAJOR	ANALYSIS TEST	ONE/LOT	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2		1	
2.0	INPROCESS INSPECTION												
3.0	FINAL INSPECTION & TESTING												
		VARIFICATION OF MANUFACTURER	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		VISUAL INSPECTION	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		DIMENSION	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		BOM CHECK	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		REVIEW OF TEST CERTIFICATE	MAJOR	VISUAL	100%	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2	1		
		BURST TEST	MAJOR	REVIEW	SAMPLE	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	√	2		1	

LEGEND: P: PERFORM, W: WITNESS, V: TEST CERTIFICATE REVIEW. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.

		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:					
								REV NO:		DATE:			
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PRODUCT: HOSE PIPE AND REEL			PAGE 2 OF 2					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
		HYDRO TEST	MAJOR	REVIEW	SAMPLE	BHEL SPEC./APPD DRG/APPD. DATA SHEET	BHEL SPEC./APPD DRG/APPD. DATA SHEET	IR	✓	2	1		
4.0	PRESERVATION & PACKING												

LEGEND: P: PERFORM, W: WITNESS, V: TEST CERTIFICAT REVIEW. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.

		TYPICAL MANUFACTURING QUALITY PLAN							MQP. NO.:				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PRODUCT: HYDRANT VALVE				REV NO:		DATE:		
									PAGE 1 OF 2				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
	Body, Bonnet, Female outlet	Chemical, Physical	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
	Spindle	Chemical, Physical	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
	Spring	Chemical	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
	Outer Washer, Seat Washer	Hardness	Minor	Measurement	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
2.0	INPROCESS INSPECTION												
	Water tightness Seat Test	Leakage	Major	Hydro Test	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
	Hydrostatic Pressure Test	Leakage	Major	Hydro Test	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
	Operation Test	Open-close	Major	Functional	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
	Flow Test	Flow	Major	Flow	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
3.0	FINAL INSPECTION & TESTING												
	Water tightness Seat Test	Leakage	Major	Hydro Test	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	

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		TYPICAL MANUFACTURING QUALITY PLAN							MQP. NO.:				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT: HYDRANT VALVE			REV NO:		DATE:		
									PAGE 2 OF 2				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
	Hydrostatic Pressure Test	Leakage	Major	Hydro Test	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	
	Operation Test	Open-close	Major	Functional	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	
	Flow Test	Flow	Major	Flow	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	
4.0	PRESERVATION & PACKING												
	Identification	Marking & Stamping	Major	Verification & Stamping	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	2	1	
	Painting	Final finish & Paint DFT	Major	Visual & Measurement	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Painting Report	√	2	1	-	
	Packing	Soundness of packing	Major	Verification	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	2	1	

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		MANUFACTURING QUALITY PLAN						QP. NO.: PE&SD/MQP/FIP/02 REV.00					
								REV NO: 00		DATE: 27/12/2013			
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032						PRODUCT: INSTRUMENT		PAGE 1 OF 12			
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS

DIFFERENTIAL PRESSURE SWITCH

1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
1.1	DIFFERENTIAL PRESSURE SWITCH	MATERIAL OF CONSTRUCTION	MAJOR	MATERIAL CONFIRMITY	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	MATERIAL COMPLIANCE CERTIFICATE	√	2	--	1	
2.0	FINAL INSPECTION & TESTING												
2.1	DIFFERENTIAL PRESSURE SWITCH	PHYSICAL VERIFICATION & MARKING CHECK	MAJOR	VISUAL	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	INSPECTION REPORT	√	2	1		
2.2		DIMENSIONAL VERIFICATION	MAJOR	MEASUREMENT	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	DIMENSION REPORT	√	2	1		
2.3		CALIBRATION	MAJOR	REVIEW	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	CALIBRATION TEST CERTIFICATE	√	2	--	1	

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	VENDOR's SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE)

--NA--

बी एच ई एल BHEL		MANUFACTURING QUALITY PLAN						QP. NO.: PE&SD/MQP/FIP/02 REV.00					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT: INSTRUMENT		REV NO: 00		DATE: 27/12/2013			
								PAGE 2 OF 12					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
2.4		WEATHER PROOF	MAJOR	VERIFICATION	FOR ONE SAMPLE OF APPLICABLE DESIGN	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	IP CERTIFICATE	√	2	--	1	
2.5		GUARANTEE PERFORMANCE	MAJOR	REVIEW	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	GUARANTEE CERTIFICATE	√	2	--	1	
3.0	PRESERVATION & PACKING												
3.1	COMPLETE ASSEMBLY	PACKING & PRESERVATION	MAJOR	PACKING	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	PACKING LIST	√	2	--	1	

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	VENDOR's SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE) --NA--

		MANUFACTURING QUALITY PLAN						QP. NO.: PE&SD/MQP/FIP/02 REV.00					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT: INSTRUMENT		REV NO: 00		DATE: 27/12/2013			
		PAGE 3 OF 12											
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS
PRESSURE SWITCH													

1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
1.1	PRESSURE SWITCH	MATERIAL OF CONSTRUCTION	MAJOR	MATERIAL CONFIRMITY	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	MATERIAL COMPLIANCE CERTIFICATE	√	2	--	1	
2.0	FINAL INSPECTION & TESTING												
2.1	PRESSURE SWITCH	PHYSICAL VERIFICATION & MARKING CHECK	MAJOR	VISUAL	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	INSPECTION REPORT	√	2	1		
2.2		DIMENSIONAL VERIFICATION	MAJOR	VISUAL	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	DIMENSION REPORT	√	2	1		
2.3		CALIBRATION	MAJOR	REVIEW	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	CALIBRATION TEST CERTIFICATE	√	2	--	1	
2.4		WEATHER PROOF & HAZARDOUS AREA CERTIFICATE	MAJOR	VERIFICATION	FOR ONE SAMPLE OF APPLICABLE DESIGN	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	IP CERTIFICATE	√	2	--	1	

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	VENDOR's SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE)

--NA--

		MANUFACTURING QUALITY PLAN						QP. NO.: PE&SD/MQP/FIP/02 REV.00					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT: INSTRUMENT		REV NO: 00		DATE: 27/12/2013			
								PAGE 4 OF 12					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
2.5		GUARANTEE PERFORMANCE	MAJOR	REVIEW	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	GUARANTEE CERTIFICATE	√	2	--	1	
3.0	PRESERVATION & PACKING												
3.1	COMPLETE ASSEMBLY	PACKING & PRESERVATION	MAJOR	PACKING	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	PACKING LIST	√	2	--	1	

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4. All type test reports submitted shall not be older than 5 yrs from the date of purchase order.
5. Any project/customer specific requirements which shall be notified have to be fulfilled by the vendor at the time of execution of order.

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	VENDOR's SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE) --NA--

		MANUFACTURING QUALITY PLAN						QP. NO.: PE&SD/MQP/FIP/02 REV.00					
								REV NO: 00		DATE: 27/12/2013			
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032						PRODUCT: INSTRUMENT		PAGE 5 OF 12			
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
LEVEL SWITCH													

1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
1.1	LEVEL SWITCH	MATERIAL OF CONSTRUCTION	MAJOR	MATERIAL CONFIRMITY	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	MATERIAL COMPLIANCE CERTIFICATE	√	2	--	1	
2.0	FINAL INSPECTION & TESTING												
2.1	LEVEL SWITCH	PHYSICAL VERIFICATION & MARKING CHECK	MAJOR	VISUAL	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	INSPECTION REPORT	√	2	1		
2.2		DIMENSIONAL VERIFICATION	MAJOR	VISUAL	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	DIMENSION REPORT	√	2	1		
2.3		HIGH VOLTAGE TEST AT 2KV	MAJOR	TEST	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	TEST REPORT	√	2	--	1	
2.4		WEATHER PROOF	MAJOR	VERIFICATION	ON ONE SAMPLE OF APPLICABLE DESIGN/ MODEL	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	IP CERTIFICATE	√	2	--	1	

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	VENDOR's SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE)

--NA--

		MANUFACTURING QUALITY PLAN						QP. NO.: PE&SD/MQP/FIP/02 REV.00					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT: INSTRUMENT		REV NO: 00		DATE: 27/12/2013			
								PAGE 6 OF 12					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
2.5		GUARANTEE PERFORMANCE	MAJOR	REVIEW	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	GUARANTEE CERTIFICATE	√	2	--	1	
2.6	EXTERNAL CHAMBER, FLOAT AND OTHER PRESSURE PARTS	IBR CERTIFICATE*	MAJOR	REVIEW	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	IBR FORM-III C	√	2	--	1	*if applicable
3.0	PRESERVATION & PACKING												
3.1	COMPLETE ASSEMBLY	PACKING & PRESERVATION	MAJOR	PACKING	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	PACKING LIST	√	2	--	1	

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	VENDOR's SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE) --NA--

		MANUFACTURING QUALITY PLAN						QP. NO.: PE&SD/MQP/FIP/02 REV.00					
								REV NO: 00		DATE: 27/12/2013			
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032						PRODUCT: INSTRUMENT		PAGE 7 OF 12			
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	

PRESSURE GAUGE

1.0 RAW MATERIALS & BOUGHT OUT ITEMS													
1.1	PRESSURE GAUGE	MATERIAL OF CONSTRUCTION	MAJOR	MATERIAL CONFIRMITY	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	MATERIAL COMPLIANCE CERTIFICATE	√	2	--	1	
2.0 FINAL INSPECTION & TESTING													
2.1	PRESSURE GAUGE	VISUAL & MARKING CHECK	MAJOR	VISUAL	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	INSPECTION REPORT	√	2	1		
2.2		CALIBRATION	MAJOR	REVIEW	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	CALIBRATION TEST CERTIFICATE	√	2	--	1	
2.3		WEATHER-PROOFNESS	MAJOR	TYPE TEST	ON ONE SAMPLE OF APPLICABLE DESIGN/ MODEL	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	IP CERTIFICATE	√	2	--	1	
2.4		GUARANTEE PERFORMANCE	MAJOR	REVIEW	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	GUARANTEE CERTIFICATE	√	2	--	1	
LEGEND: P: PERFORM, W: WITNESS, V: TEST CERTIFICATE REVIEW. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.						PREPARED BY VENDOR's SIGNATURE & STAMP		APPROVED BY BHEL QA SIGNATURE & STAMP		APPROVED BY --NA-- CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE)			

बी एच ई एल BHEL		MANUFACTURING QUALITY PLAN						QP. NO.: PE&SD/MQP/FIP/02 REV.00					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT: INSTRUMENT		REV NO: 00		DATE: 27/12/2013			
								PAGE 8 OF 12					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
3.0 PRESERVATION & PACKING													
3.1	COMPLETE ASSEMBLY	PACKING & PRESERVATION	MAJOR	PACKING	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	PACKING LIST	√	2	--	1	

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	VENDOR's SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE) --NA--

		MANUFACTURING QUALITY PLAN						QP. NO.: PE&SD/MQP/FIP/02 REV.00					
								REV NO: 00		DATE: 27/12/2013			
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032						PRODUCT: INSTRUMENT		PAGE 9 OF 12			
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
DIFFERENTIAL PRESSURE GAUGE													

1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
1.1	DIFFERENTIAL PRESSURE GAUGE – SENSOR & CASE OF INSTRUMENT etc.	MATERIAL OF CONSTRUCTION	MAJOR	MATERIAL CONFIRMITY	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	MATERIAL COMPLIANCE CERTIFICATE	√	2	--	1	
2.0	FINAL INSPECTION & TESTING												
2.1	DIFFERENTIAL PRESSURE GAUGE	PHYSICAL VERIFICATION & MARKING CHECK	MAJOR	VISUAL	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	INSPECTION REPORT	√	2	1		
2.2		CALIBRATION	MAJOR	REVIEW	100%			CALIBRATION TEST CERTIFICATE	√	2	--	1	
2.3		WEATHER PROOF	MAJOR	TYPE TEST	ON ONE SAMPLE OF APPLICABLE DESIGN/ MODEL			IP CERTIFICATE	√	2	--	1	
2.4		ACCURACY TEST	MAJOR	TYPE TEST	ON ONE SAMPLE OF APPLICABLE DESIGN/ MODEL			TEST CERTIFICATE	√	2	--	1	

LEGEND: P: PERFORM, W: WITNESS, V: TEST CERTIFICATE REVIEW. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.	PREPARED BY	APPROVED BY	APPROVED BY
	VENDOR's SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE)

--NA--

बी एच ई एल BHEL		MANUFACTURING QUALITY PLAN							QP. NO.: PE&SD/MQP/FIP/02 REV.00				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT: INSTRUMENT			REV NO: 00		DATE: 27/12/2013		
									PAGE 10 OF 12				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS
2.5		MAXIMUM WORKING PRESSURE WITHSTAND ABILITY	MAJOR	TYPE TEST	ON ONE SAMPLE OF APPLICABLE DESIGN/ MODEL	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	TEST CERTIFICATE	√	2	--	1	
2.6		GUARANTEE PERFORMANCE	MAJOR	REVIEW	100%			GUARANTEE CERTIFICATE	√	2	--	1	
3.0	PRESERVATION & PACKING												
3.1	COMPLETE ASSEMBLY	PACKING & PRESERVATION	MAJOR	PACKING	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	PACKING LIST	√	2	--	1	

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		MANUFACTURING QUALITY PLAN						QP. NO.: PE&SD/MQP/FIP/02 REV.00					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT: INSTRUMENT		REV NO: 00		DATE: 27/12/2013			
								PAGE 11 OF 12					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	

LEVEL GAUGE

1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
1.1	LEVEL GAUGE	MATERIAL OF CONSTRUCTION	MAJOR	MATERIAL CONFIRMITY	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	MATERIAL COMPLIANCE CERTIFICATE	√	2	--	1	
2.0	FINAL INSPECTION & TESTING												
2.1	LEVEL GAUGE	PHYSICAL VERIFICATION & MARKING CHECK	MAJOR	VISUAL	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	INSPECTION REPORT	√	2	1		
2.2		CORROSION TEST	MAJOR	TEST	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	TEST CERTIFICATE	√	2	--	1	
2.3		THERMAL SHOCK TEST	MAJOR	TEST	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	TEST CERTIFICATE	√	2	--	1	
2.4		HYDRAULIC TEST	MAJOR	TEST	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	TEST CERTIFICATE	√	2	--	1	

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	VENDOR's SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE) --NA--

		MANUFACTURING QUALITY PLAN						QP. NO.: PE&SD/MQP/FIP/02 REV.00					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT: INSTRUMENT		REV NO: 00		DATE: 27/12/2013			
								PAGE 12 OF 12					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS
2.5		IBR CERTIFICATE*	MAJOR	REVIEW	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	IBR FORM - III C	√	2	--	1	*if applicable
2.6		GUARANTEE PERFORMANCE	MAJOR	REVIEW	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	GUARANTEE CERTIFICATE	√	2	--	1	
3.0	PRESERVATION & PACKING												
3.1	COMPLETE ASSEMBLY	PACKING & PRESERVATION	MAJOR	PACKING	100%	Approved Datasheet/ Approved Drawing/ Tech. spec.	Approved Datasheet/ Approved Drawing/ Tech. spec.	PACKING LIST	√	2	--	1	

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	VENDOR's SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	--NA-- CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE)

		MANUFACTURING QUALITY PLAN							MQP. NO.: SMQP/FPS/24/092013				
PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032						PRODUCT: VALVES			REV NO: 00		DATE: 01/09/2013		
PAGE 1 OF 4													
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
									D	P	W	V	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
	Casting and forging (Body, Bonnet, Disc, Stem, Body Rings,)	Surface Quality MPT for Hydrogen Service. Dimension, Chemical and Mechanical Properties (Not Special Requirements of heat treatment, Hardness, Impact, Bend, Tensile Test etc. for H2 service and NACE)	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
	All Castings Materials	Heat Treatment as per Specs	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
	Casting, forgings for Austenitic Stainless Steel body and bonnet only.	Inter Granular Corrosion (IGC) Test and Stabilisation Heat Treatment	Major	Analysis Test	Per Heat /Per solution Annealed Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
	All Castings	Radiography Examination	Minor	Analysis Test	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
	Bars for Trim Materials	Chemical Analysis	Minor	Chemical Analysis	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
	Stems, Gaskets, Gear Unit, Fastener, Gland, Packing etc.	Surface Defects, Dimension, Physical and chemical properties	Major	Chemical Analysis	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
2.0	INPROCESS INSPECTION												
LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.						PREPARED BY BHEL QA SIGNATURE & STAMP		APPROVED BY BHEL QA SIGNATURE & STAMP		APPROVED BY CUSTOMER'S SIGNATURE & STAMP			

बी एच ई एल 		MANUFACTURING QUALITY PLAN							MQP. NO.: SMQP/FPS/24/092013				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT:VALVES			REV NO: 00		DATE:01/09/2013		
									PAGE 2 OF 4				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
		WPS/PQR/WPQ	Major	Chemical Analysis	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
3.0	FINAL INSPECTION & TESTING												
		Shell Test Gate/Globe/Check Back Seat-Gate/Globe Seat Test- Gate/Globe/Check	Major	Visual	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	
		Functional/Operational Test (For motor Operated /Actuator Operated)	Major	Functional Test	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	
		PMI Check Finished Valve (Body, Bonnet, Stem)	Major	PMI Check	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	

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		MANUFACTURING QUALITY PLAN							MQP. NO.: SMQP/FPS/24/092013				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT:VALVES			REV NO: 00		DATE:01/09/2013		
									PAGE 3 OF 4				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
	Finished Valve (Body, Bonnet,Stem)	Visual (TC Verification,SINO Marking, Flange Finish, Tag no) Bevel, Dimension and Special Requirements in PR, Painting of Carbon and Low alloy Steel and provision of bypass arrangement (if applicable)	Major	Test	Visual 100% by Supplier and PURCHASER / END CUSTOMER. Dimension-100% by supplier and at random by PURCHASER / END CUSTOMER subject to a minimum of 10 %	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	
	Pre-qualification Test	Fire safe test (soft seated ball,plug, butterfly and lubricated plug valves) cryogenic test	Major	Test	1 valve per Type/size and order	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1		

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बी एच ई एल BHEL		MANUFACTURING QUALITY PLAN								MQP. NO.: SMQP/FPS/24/092013				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT:VALVES				REV NO: 00		DATE:01/09/2013		
										PAGE 4 OF 4				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS	
										P	W	V		
		BOM CHECK	Major	Visual	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1			
4.0	PRESERVATION & PACKING													
	Identification	Marking & Stamping	Major	Verification & Stamping	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	2	1		
	Painting	Final finish & Paint DFT	Major	Visual & Measurement	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Painting Report	√	2	1	-		
	Packing	Soundness of packing	Major	Verification	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	2	1		

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		MANUFACTURING QUALITY PLAN							MQP. NO.: SMQP/FPS/07/092013				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT:SOLENOID VALVE			REV NO: 00		DATE:01/09/2013		
									PAGE 1 OF 3				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
	Body, Bonnet, Female outlet	Chemical, Physical	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
	Spindle	Chemical, Physical	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
	Spring	Chemical	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
	Outer Washer, Seat Washer	Hardness	Minor	Measurement	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
2.0	INPROCESS INSPECTION												
	Water tightness Seat Test	Leakage	Major	Hydro Test	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
	Hydrostatic Pressure Test	Leakage	Major	Hydro Test	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
	Operation Test	Open-close	Major	Functional	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
	Flow Test	Flow	Major	Flow	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
3.0	FINAL INSPECTION & TESTING												
		VISUAL & DIMENSION CHECK	Major	Visual	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	

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	BHEL QA SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP

		MANUFACTURING QUALITY PLAN							MQP. NO.: SMQP/FPS/07/092013				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT:SOLENOID VALVE			REV NO: 00		DATE:01/09/2013		
									PAGE 2 OF 3				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
		HV TEST	Major	Hydro Test	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	
		SEAT LEAKAGE TEST	Major	Leakage	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	
		IR TEST	Major	Electrical	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	
		PNEUMATIC TEST	Major	Pneumatic	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1		
		OPERATIONAL TEST INCLUDING VERIFICATION OF PICKUP AND DROP VOLTAGE	Major	Operational test	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1		
		BOM CHECK	Major	Verification	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1		
4.0	PRESERVATION & PACKING												
	Identification	Marking & Stamping	Major	Verification & Stamping	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	2	1	
	Painting	Final finish & Paint DFT	Major	Visual & Measurement	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Painting Report	√	2	1	-	
	Packing	Soundness of packing	Major	Verification	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	2	1	

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		MANUFACTURING QUALITY PLAN							MQP. NO.: SMQP/FPS/07/092013				
									REV NO: 00		DATE:01/09/2013		
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032					PRODUCT:SOLENOID VALVE			PAGE 3 OF 3			
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
									D	P	W	V	

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	BHEL QA SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP

		MANUFACTURING QUALITY PLAN							MQP. NO.: SMQP/FPS/15/092013				
PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032						PRODUCT: STRAINER			REV NO: 00		DATE: 01/09/2013		
PAGE 1 OF 2													
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
	Body, Cover	Mechanical & Chemical Properties	Major	Mech., Chem. Analysis	One per lot	BHEL Spec/Appd. Dwg/ Datasheet	BHEL Spec/Appd. Dwg/ Datasheet	MTC	√	2		1	
		Non Destructive Examination	Major	NDT Test	100%	BHEL Spec/Appd. Dwg/ Datasheet	BHEL Spec/Appd. Dwg/ Datasheet	TC	√	2		1	
	Screen	Chemical Properties, Degree of Filtration	Major	Chem. Analysis, Measure ment	One Sample	BHEL Spec/Appd. Dwg/ Datasheet	BHEL Spec/Appd. Dwg/ Datasheet	MTC, TC	√	2		1	
	Gasket, Drain Plug, Fasteners	Mechanical & Chemical Properties	Major	Mech., Chem. Analysis	One per Lot	BHEL Spec/Appd. Dwg/ Datasheet	BHEL Spec/Appd. Dwg/ Datasheet	MTC	√	2		1	
2.0	INPROCESS INSPECTION												
		Manufacturing processes	Major	Process Controls	Each lot	BHEL Spec/ Vendor's Own process	BHEL Spec/ Vendor's Own process	--	-	2	2		
3.0	FINAL INSPECTION & TESTING												
	Strainer Assy.	Dimensional	Major	Measure ment	As per IS:2500	BHEL Spec/Appd. Dwg/ Datasheet	BHEL Spec/Appd. Dwg/ Datasheet	TC	√	2	1		
		Hydrostatic Test	Critical	Hydro Test	100%	BHEL Spec/Appd. Dwg/ Datasheet	BHEL Spec/Appd. Dwg/ Datasheet	TC	√	2	1		
LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.					PREPARED BY BHEL QA SIGNATURE & STAMP		APPROVED BY BHEL QA SIGNATURE & STAMP		APPROVED BY CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE)				

बी एच ई एल BHEL		MANUFACTURING QUALITY PLAN							MQP. NO.: SMQP/FPS/15/092013				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT:STRAINER			REV NO: 00		DATE: 01/09/2013		
									PAGE 2 OF 2				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
		PMI Check	Critical	PMI	10%	BHEL Spec/Appd. Dwg/ Datasheet	BHEL Spec/Appd. Dwg/ Datasheet	TC	√	2	1		
		NDT TEST	Critical	NDT	10%	BHEL Spec/Appd. Dwg/ Datasheet	BHEL Spec/Appd. Dwg/ Datasheet	TC	√	2		1	
4.0	PRESERVATION & PACKING												
		Painting, Marking (Shade, DFT Check)	Major	Visual, Measure ment	Random	BHEL Spec/Appd. Dwg/ Datasheet	BHEL Spec/Appd. Dwg/ Datasheet	TC	√	2	1		
		Packing*	Major	Visual	Random	BHEL Spec/Appd. Dwg/ Datasheet	BHEL Spec/Appd. Dwg/ Datasheet	Packing List	√	2		1	

NOTE:-

1. This standard MQP should be read along with specification (latest revision), approved drawings & approved data sheet.
2. Drawing/data sheet shall prevail over quality plan for contradiction if any between quality plan and drawing/specification.
3. All test certificates/reports reviewed and certified by TPI/BHEL shall be submitted to BHEL as documentation package.
4. All type test reports submitted shall not be older than 5 yrs from the date of purchase order.
5. Any project/customer specific requirements which shall be notified have to be fulfilled by the vendor at the time of execution of order.

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.	PREPARED BY	APPROVED BY	APPROVED BY
	BHEL QA SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP (IF APPLICABLE)

		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PRODUCT: WATER MONITOR			REV NO:		DATE:			
								PAGE 1 OF 3					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
	BASE FLANGE	MECHANICAL & CHEMICAL	MAJOR	TENSIL & CHEMICAL	ONE PER Lot	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	√	2		1	
		DIMENSIONS	MAJOR	MEASUREMENT	ONE PER Lot	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	√	2		1	
	ELBOW	MECHANICAL & CHEMICAL	MAJOR	TENSIL & CHEMICAL	ONE PER Lot	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	√	2		1	
		DIMENSIONS	MAJOR	MEASUREMENT	ONE PER Lot	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	√	2		1	
	SWIVEL JOINTS	MECHANICAL & CHEMICAL	MAJOR	TENSIL & CHEMICAL	ONE PER Lot	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	√	2		1	
	NOZZLE	MECHANICAL & CHEMICAL	MAJOR	TENSIL & CHEMICAL	ONE PER Lot	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	√	2		1	
	WATER BARREL	MECHANICAL & CHEMICAL	MAJOR	TENSIL & CHEMICAL	ONE PER Lot	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	√	2		1	

LEGEND: P: PERFORM, W: WITNESS, V: TEST CERTIFICATE REVIEW. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.

		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PRODUCT: WATER MONITOR			REV NO:		DATE:			
								PAGE 2 OF 3					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
	REDUCER	MECHANICAL & CHEMICAL	MAJOR	TENSIL & CHEMICAL	ONE PER Lot	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	√	2		1	
2.0	FINAL INSPECTION & TESTING												
	WATER MONITOR	DIMENSIONS	MAJOR	MEASUREMENT	100%	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	√	2	1		
		WPS/PQR/WPQ & PENETRANT TEST ON WELDS	MAJOR	REVIEW	100%	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	√	2	1		
		HYDRO TEST	MAJOR	HYDRO TEST	100%	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	√	2	1		
		PERFORMANCE	MAJOR	WATER FLOW & WATER REACH	100%	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	√	2	1		
	IDENTIFICATION	MARKING & STAMPING	MAJOR	VARIFICATION & STAMPING	100%	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	√	2	1		
	PAINTING	FINAL FINISH & PAINT DFT	MAJOR	VISUAL & MEASUREMMENT	100%	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	√	2	1		

LEGEND: P: PERFORM, W: WITNESS, V: TEST CERTIFICATE REVIEW. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.

		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:					
								REV NO:		DATE:			
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PRODUCT: WATER MONITOR			PAGE 3 OF 3					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
	PACKING	SOUNDNESS OF PACKING, LOADING e.t.c.	MAJOR	VARIIFICATION	100%	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	AS PER BHEL SPEC./APPD DRG./APPD DATA SHEET	IR	✓	2	1		

LEGEND: P: PERFORM, W: WITNESS, V: TEST CERTIFICATE REVIEW. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.

ANNEXURE-6

Telangana State Power Generation Corporation Ltd.
1x800 MW Kothagudem TPS

EPC Bid Document
e-PCT/TS/K/02/2014-15

VOLUME : VI SECTION-VII SUB SECTION - A FIELD INSTRUMENTS & FLOW ELEMENTS

DEVELOPMENT CONSULTANTS
(e-PCT-TS-K-02-2014-15_V-VI_S VII_SS A.DOC)

V VII/S-VII/SS-A: 1

1.00.00 SPECIFICATION FOR ELECTRONIC TRANSMITTERS

1.01.00 PRESSURE TRANSMITTER

1. Working Principle : Smart (HART Compatible)
2. Type : Microprocessor based, 2 – Wire
3. Output Signal : 4-20 mA DC along with superimposed digital signal
4. Measuring Element : Capsule / Diaphragm
5. Element material : SS-316 (Stainless Steel) or better
6. Static Pressure : 150 % of maximum span continuously, without affecting the calibration
7. Turn-down ratio : 100: 1
8. Span and Zero : Continuous, tamper proof, remote as well locally adjustable with zero elevation and suppression by 100% of span
9. Enclosure Class : IP-65 (Explosion proof for NEC Class-1, Division 1 area)
10. Output Indicator : LCD (Integral indicator of 5 digit display)
11. Nameplate : Tag number, service engraved in SS tag plate
12. Body : SS
13. Operating Voltage : 24V DC
14. Load : 600 Ohms (min.) at 24 Volts D.C.
15. Ambient Temperature : 0 - 50 °C
16. Performance: :
 - i. Accuracy : $\pm 0.075\%$ of Span or better

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- ii. Repeatability : $\pm 0.05\%$ of Span or better
17. Sealing/Isolation : Extended diaphragm (Silicon oil/ Fluorolub filled) with 5 meters SS armoured capillary for corrosive/viscous/solid bearing or slurry type fluid applications
18. Accessories :
 - a. Universal mounting bracket suitable for 2" pipe mounting
 - b. High tensile carbon steel U-bolts
 - c. Siphon for steam and hot water services
 - d. 1/2" NPT 2-valve stainless steel manifold, constructed from SS316 bar stock
 - e. Companion flange with nuts, bolts and gaskets
 - f. 1/2" NPT cable gland
 - g. Handheld calibrator
19. Adjustment/Calibration/ Maintenance : From handheld calibrator/ HART management system
- Notes: For primary air/ secondary air/ flue gas applications, DP type transmitters shall be provided for pressure measurement.
LVDT type is not acceptable.

1.02.00 DIFFERENTIAL PRESSURE TRANSMITTER / FLOW TRANSMITTER

- 1. Working Principle : Smart (HART Compatible)
- 2. Type : Microprocessor based, 2 – Wire
- 3. Output Signal : 4-20 mA DC along with superimposed digital signal
- 4. Measuring Element : Capsule / Diaphragm

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- | | | | |
|-----|---------------------|---|---|
| 5. | Element material | : | SS-316 (Stainless Steel) or better |
| 6. | Static Pressure | : | 150 % of maximum span continuously, without affecting the calibration |
| 7. | Turn-down ratio | : | 100: 1 |
| 8. | Span and Zero | : | Continuous, tamper proof, remote as well locally adjustable with zero elevation and suppression by 100% of span |
| 9. | Enclosure Class | : | IP-65 (Explosion proof for NEC Class-1, Division 1 area) |
| 10. | Output Indicator | : | LCD (Integral indicator of 5 digit display) |
| 11. | Nameplate | : | Tag number, service engraved in SS tag plate |
| 12. | Body | : | SS |
| 13. | Operating Voltage | : | 24V DC |
| 14. | Load | : | 600 Ohms (min.) at 24 Volts D.C. |
| 15. | Ambient Temperature | : | 0 - 50 °C |
| 16. | Performance: | | |
| | i. Accuracy | : | ± 0.075% of Span or better |
| | ii. Repeatability | : | ± 0.05% of Span or better |
| 17. | Sealing/Isolation | : | Extended diaphragm (Silicon oil/ Fluorolub filled) with 5 meters SS armoured capillary for corrosive/viscous/solid bearing or slurry type fluid applications |
| 18. | Accessories | : | a. Universal mounting bracket suitable for 2" pipe mounting
b. High tensile carbon steel U-bolts |

- c. Siphon for steam and hot water services
- d. ½" NPT 5-valve stainless steel manifold, constructed from SS316 bar stock
- e. Companion flange with nuts, bolts and gaskets
- f. ½" NPT cable gland
- g. Handheld calibrator

19. Adjustment/Calibration/ Maintenance : From handheld calibrator/ HART management system

1.03.00 Displacer Type Level Transmitters

- 1. Type : Smart (HART Compatible)
- 2. Stages of operation : Continuous
- 3. Material :
- 4. i. Displacer SS-316
- 5. ii. Suspension wire SS-316
- 6. iii. Torque tube housing SS
- 7. iv. Torque tube Inconel
- 8. v. Displacer chamber SS
- 9. vi. Transmitter Housing SS
- 10. Operating Voltage : 24 V DC
- 11. Transmission : Microprocessor based, 2-wire
- 12. Output Signal : 4-20 mA DC along with superimposed digital signal
- 13. Static / overload : Maximum static pressure without

	pressure		permanent deformation or loss of accuracy
14.	Turn-down ratio	:	10 : 1 or better
15.	Zero & Span	:	Continuous, tamper proof, remote as well locally adjustable with zero elevation and suppression by 100% of span
16.	Enclosure Class	:	IP-65
17.	Output Indicator	:	LCD type (Integral indicator of 5 digit display)
18.	Nameplate	:	Tag number and Service engraved in stainless steel tag plate
19.	Ambient Temperature	:	0 - 50 °C
20.	Load Impedance	:	600 Ohms at 24 Volts (minimum)
21.	Process Connection	:	2" Flanged
22.	Performance - Accuracy	:	± 0.075 % of span or better
23.	Accessories	:	a) Counter Flange, nuts, bolts, gaskets etc b) Weights for 5 point calibration of instruments c) Vent and drain plugs d) ½" NPT Glands e) Handheld calibrator
24.	Preferred Features	:	a) Test plug connection and cutout terminals physically separated from other electronics b) Electronic Damping facility (adjustable)
25.	Adjustment/Calibration/ Maintenance	:	From handheld calibrator/ HART management system

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|-----|--------------|---|---|
| 26. | Applications | : | During detail engineering on Owner's approval |
|-----|--------------|---|---|
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|---------|-----------------|--|--|
| 1.04.00 | MASS FLOW METER | | |
|---------|-----------------|--|--|
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|---------|--------|--|--|
| 1.04.01 | SENSOR | | |
|---------|--------|--|--|
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|----|---------------------|---|---|
| 1. | Measuring Principle | : | Coriolis Mass flow |
| 2. | Primary Element | : | Flow Tube of 316SS or better |
| 3. | Heating Arrangement | : | Integral |
| 4. | Temperature Control | : | For heavy fuel oil application |
| 5. | Process Connection | : | Flanged of rating as per process requirement |
| 6. | Drain | : | Self-draining facility |
| 7. | Enclosure | : | Stainless steel |
| 8. | Accessories | : | Counter flanges, Mounting nuts, bolts, gaskets etc. |
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| 1.04.02 | TRANSMITTER | | |
|---------|-------------|--|--|
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|----|-------------------------|---|--|
| 1. | Measured quantities | : | Mass Flow rate, Total Mass Flow, Density |
| 2. | Input Signal Processing | : | Smart (HART compatible) |
| 3. | Display | : | LCD |
| 4. | Output | : | 2 nos. isolated output of 4-20mA DC selectable from four measured quantities |
| 5. | Load | : | < 750 ohms |
| 6. | Power supply | : | 240V AC, 50 Hz |

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|-----|---|---|---|
| 7. | Turn Down | : | 100:1 |
| 8. | Accuracy | : | ± 0.2 % of measured value |
| 9. | Housing | : | IP 65 (Explosion proof) |
| 10. | Nameplate | : | Tag number, service engraved in stainless steel tag plate |
| 11. | Accessories | : | <ul style="list-style-type: none"> a) Handheld calibrator b) Mounting U-bolts, nuts, bolts, prefab cable etc c) $\frac{1}{2}$"NPT cable gland |
| 12. | Adjustment/Calibration/
/Maintenance | : | From handheld calibrator/ HART management system |
| 13. | Applications | : | Fuel Oil service |

1.05.00 RADAR TYPE LEVEL MEASUREMENT

- | | | | |
|----|---------------------------|---|---|
| 1. | Type | : | Smart (HART Compatible) |
| 2. | Antenna | : | Co axial / guided wave radar /-Overspill protection |
| 3. | Principle | : | TDR (Time Domain Reflectometry) |
| 4. | Communication | : | Two wire 4-20mA DC with HART |
| 5. | Environmental temperature | : | 0 – 50 °C |
| 6. | Enclosure | : | IP-65 (Explosion proof for NEC Class-1, Division 1 area) |
| 7. | Calibration | : | <ul style="list-style-type: none"> a) Self calibration with internal reference b) Zero & Span calibration |
| 8. | Process Connection | : | External cage mounting
Flanged /screwed |
| 9. | Electronic Housing | : | Epoxy painted Die-Cast aluminium |

		alloy	
10.	Antenna / Flange assembly	:	316 SS or Hest alloy (as required)
11.	Power supply	:	24 V DC
12.	Output Indicator	:	LCD
13.	Accuracy	:	5 mm or 0.1% of probe length
14.	Accessories	:	a) Handheld calibrator
		:	b) Counter Flange, nuts, bolts, gaskets etc
		:	c) ½"NPT cable gland
		:	d) SS Nameplate
15.	Adjustment/Calibration/ Maintenance	:	From handheld calibrator/ HART management system
16.	Applications	:	Vessels under vacuum or low pressure applications, solid levels
1.06.00	ULTRASONIC LEVEL TRANSMITTER		
1.	Type	:	Microprocessor based, 2-wire, Smart (HART Compatible)
2.	Operating Principle	:	Detection of reflected ultrasonic pulse
3.	Output Signal	:	4-20 mA DC along with superimposed digital signal
4.	Operating frequency	:	10 KHz to 50 KHz (typical)
5.	Display	:	LCD
6.	Temperature Compensation	:	Built in –Programmable
7.	Power supply	:	24 V DC
8.	Enclosure	:	SS, IP-65 (Explosion proof for NEC Class-1, Division 1 area)

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|---|---|---|
| 9. Zero & Span | : | Continuous, tamper proof, remote as well locally adjustable. It shall be possible to calibrate the instrument without any level in the sump/ tank |
| 10. Accuracy & Repeatability | : | 0.15 % of span or better |
| 11. Resolution | : | 0.1 % of span |
| 12. Operating temp. | : | Transmitter- 500 C and Sensor - 800 C |
| 13. MOC Sensor | : | SS-316/Body- PVC and Face – Polyurethane |
| 14. Mounting | : | 4" Flanged/ 2" NPT for sensor and Transmitter on panel |
| 15. Accessories | : | <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">a)</div> <div>Handheld calibrator</div> </div> <div style="margin-top: 10px;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">b)</div> <div>Weather canopy for protection from direct sunlight and direct rain</div> </div> <div style="margin-top: 10px;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">c)</div> <div>½"NPT cable gland</div> </div> <div style="margin-top: 10px;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">d)</div> <div>All mounting hardware (SS-316), Prefab cable</div> </div> <div style="margin-top: 10px;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">e)</div> <div>SS Nameplate</div> </div> </div> </div> </div></div> |
| 16. Diagnosis | : | On-line |
| 17. Status Indication | : | Power On, HI, HI-HI, Lo, LO-LO, Fault |
| 18. Output Contacts | : | 2 SPDT, 230V, 5A |
| 19. Adjustment/Calibration/ Maintenance | : | From handheld calibrator/ HART management system |
| 20. Applications | : | Coal Bunker, Water Service etc. |

1.07.00 ULTRASONIC FLOW TRANSMITTER

1. Type : Ultrasonic – Clamp On
2. Accuracy : +/- 1 % of reading
3. Repeatability : +/- 0.3 % of reading
4. Rangeability : 400 : 1
5. Output Signal : 4-20 mA DC with HART
6. Measured Parameter : Volumetric flow, Totalized flow and flow Velocity
7. Display : LCD with internal Key Pad (Flow rate & Totalization)
8. Power Supply : 24 V DC (2 Wire)
9. Enclosure : SS (IP- 68 – Submersible)
10. Mounting : SS Chain or Strap
11. Accessories
 1. Handheld calibrator
 2. ½"NPT cable gland
 3. Transducer cable
 4. All mounting hardware (SS-316)
 5. SS Nameplate
12. Adjustment/Calibration/ Maintenance : From handheld calibrator/ HART management system
13. Applications : Plant water service

Note: Multi-path insertion type (minimum 4 path) Ultrasonic Flow meter shall be provided for Raw water/ Cooling Water flow measurements.

2.00.00 HART HAND HELD CALIBRATOR

Hand held calibrators (5 nos. for each type) shall be provided for adjustment/ calibration/maintenance of the HART compatible

transmitters. The hand held calibrator shall be suitable for all types of transmitters supplied in the package. If one type of hand held type calibrator is not suitable for communicating with all types of transmitters then separate hand held calibrator will be provided.

3.00.00 PROCESS ACTUATED SWITCHES

3.01.00 PRESSURE SWITCH

1. Type :
 - i. Piston for high pressure application
 - ii. Bellow / Diaphragm for low pressure application
2. Sensing element : SS-316.
material All other wetted part SS316
3. Case Material : SS
4. Setter Scale : Black graduation on white linear scale. Graduation 0-100% with red pointer for set points
5. Over range : 150 % of maximum pressure
6. Adjustments :
 - a) Internal Set Point
 - b) Differential adjustment
7. End Connection : 1/2" NPT bottom connected
8. Switch configuration : Two SPDT (240V, 5A AC/220V, 0.5A DC)
9. Switch Type : Snap acting, shock & vibration proof
10. Terminal Block : Suitable for full ring lugs
11. Enclosure Class : IP-65 (Explosion proof for NEC Class-1, Division 1 area)
12. Performance :
 - a) Repeat accuracy $\pm 1.0\%$
 - b) Accuracy of Setting Indication of $\pm 1.5\%$
13. Ambient temperature : 0 – 50 Deg.C

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14. Nameplate : Tag number, service engraved in SS tag plate
15. Accessories : a) Silicon oil/ Fluorolub filled Remote diaphragm seal with SS-316 capillary for corrosive/ viscous/ solid bearing or slurry type fluid applications
b) Snubbers for pulsating fluid applications
c) Siphons for steam and hot water services
d) Retention ring and screws for surface mounting
e) 1/2" NPT 2 Valve SS-316 barstock manifold
f) 1/2" NPT cable gland
16. Applications : During Detail Engineering on Owner's approval

3.02.00 DIFFERENTIAL PRESSURE SWITCH

1. Type : i. Piston for high pressure application
ii. Bellow / Diaphragm for low pressure application
2. Sensing element : SS-316.
material All other wetted part SS316
3. Case Material : SS
4. Setter Scale : Black graduation on white linear scale. Graduation 0-100% with red pointer for set points
5. Over range : 150 % of maximum pressure

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- | | | |
|-------------------------|---|--|
| 6. Adjustments | : | a) Internal Set Point |
| | : | b) Differential adjustment |
| 7. End Connection | : | 1/2" NPT bottom/ back connected |
| 8. Switch configuration | : | Two SPDT (240V, 5A AC/220V, 0.5A DC) |
| 9. Switch Type | : | Snap acting, shock & vibration proof |
| 10. Terminal Block | : | Suitable for full ring lugs |
| 11. Enclosure Class | : | IP-65 (Explosion proof for NEC Class-1, Division 1 area) |
| 12. Performance | : | a) Repeat accuracy $\pm 1.0\%$ |
| | | b) Accuracy of Setting Indication of $\pm 1.5\%$ |
| 13. Ambient temperature | : | 0 – 50 Deg.C |
| 14. Nameplate | : | Tag number, service engraved in SS tag plate |
| 15. Accessories | : | a) Silicon oil/ Fluorolub filled Remote diaphragm seal with SS-316 capillary Diaphragm seals for corrosive/ viscous/ solid bearing or slurry type fluid applications |
| | | b) Snubbers for pulsating fluid applications |
| | | c) Siphons for steam and hot water services |
| | | d) Retention ring and screws for surface mounting |
| | | e) 1/2" NPT 5 Valve SS-316 barstock manifold |
| | | f) 1/2" NPT cable gland |
| 16. Applications | : | During Detail Engineering on Owner's |

approval

3.03.00 LEVEL SWITCH

3.03.01 FLOAT OPERATED

1. Float material : SS-316
2. Wetted parts : SS-316
3. Float chamber : Stainless steel/Carbon steel, construction welded
4. Float chamber : Side mounted
mounting
5. Fluid connection : Side – Side
6. Fluid connection size : 1" ANSI RF Flange (rubber line, if required)
7. Drain : ½ inch NPT with Plug
8. Pressure rating of chamber : Minimum 1.5 times of design pressure
9. Repeatability : +/- 1.5 mm or better
10. Switch housing : Stainless Steel
11. Switch housing type : IP- 65
12. Type of switch : Snap acting magnetically operated hermetically sealed
13. Switch configuration : 2 SPDT (5A, 240 V AC, 0.5A, 220V DC)
14. Accessories :
 - a) Counter flange, nuts & bolts, suitable gasket etc.
 - b) Steel globe type drain valve
 - c) ½"NPT cable gland

d) Stainless steel nameplate with alpha-numeric engraved for service and tag

15. Application : During Detail Engineering on Owner's approval

3.04.00 FLOW SWITCH

1. Type : Paddle /Piston/Disk
2. Wetted part material : Stainless steel or Hastelloy for acidic application
3. End connection :
 - a) Threaded upto 1" line size with integral Tee
 - b) Flanged for line size > 1 ½"
4. Enclosure material : Stainless Steel
5. Enclosure class : IP 65
6. Switch configuration : 2 SPDT (5A, 240 V AC, 0.5A, 220V DC)
7. Repeatability : 2%
8. Cable connection : ½"NPTF
9. Accessories :
 - a) Tee, Counter flange, nuts & bolts, suitable gasket etc
 - b) ½"NPT cable gland
 - c) Stainless steel nameplate with alpha-numeric engraved for service and tag

3.05.00 RF LEVEL SWITCH

1. Type : RADIO FREQUENCY
Sensing probe
2. Material : SS-316
3. Mounting : Threaded
4. Application : 250°C (Max.)
Temperature
Electronic Controller
5. Input Supply Voltage : 240V AC $\pm$ 10%, 50 Hz.
6. Relay Output : 2 SPDT (240V AC, 5A)
7. Ambient Temperature : 50 °C
8. Enclosure Protection : IP-66
9. Enclosure Housing : SS
Normal Level
10. Local LED Indication : Power On
Alarm Level
Probe Healthy
11. Switching Repeatability : $\pm$ 0.5%
Co-axial cable for probe connection to
controller
12. Accessories : SS Tag plate
 $\frac{1}{2}$ " NPT Cable Glands
13. Application : Solid level

3.06.00 CONDUCTIVITY TYPE LEVEL SWITCH

1. Type : Conductivity discrimination
2. Probe MOC : SS-316
3. Mounting : Flanged on external cage
4. Application : 250°C (Max.)
Temperature
5. Test Pressure : Two times rated pressure

-
- | | | | |
|-----|----------------------|---|--|
| 6. | Input Supply Voltage | : | 240V AC $\pm$ 10%, 50 Hz.
Four independent channel with |
| 7. | Input | : | selectable switching threshold for water conductivity |
| 8. | Relay Output | : | 2 SPDT (240V AC, 5A) |
| 9. | Ambient Temperature | : | 50 °C |
| 10. | Enclosure Protection | : | IP-65 (Explosion proof for NEC Class-1, Division-1 area) |
| 11. | Enclosure Housing | : | SS
HI,LO, HIGH-HIGH, LOW-LOW |
| 12. | Local LED Indication | : | Power
Fault |
| 13. | Accessories | : | a) Interconnecting cable from probe to electronics
b) Mounting accessories
c) External cage
d) Washer & Gasket
e) ½" NPT Cable Glands
f) SS Tag Plate |
| 14. | Application | : | During Detail Engineering on Owner's approval |

3.07.00 TEMPERATURE SWITCH

- | | | | |
|----|-----------------------------|---|--------------------------|
| 1. | Type | : | Bimetallic or gas filled |
| 2. | Sensing Element
Material | : | SS-316 |
| 3. | Bulb Material | : | SS-316 |
| 4. | Capillary | : | Stainless Steel armored |

-
- | | | | |
|-----|-----------------------|---|--|
| 5. | Movement Material | : | Stainless Steel |
| 6. | Case material | : | Stainless Steel with neoprene gasket and clear glass where applicable cover conforming to IP-65. (Explosion proof for NEC Class-1, Division 1 area). |
| 7.. | Scale | : | Black graduation on white linear scale. Graduation 0-100% with red pointer for set points |
| 8. | Over range Protection | : | 120 % |
| 9. | Instrument connection | : | Bottom |
| 10. | Switch configuration | : | Two SPDT (240V, 5A AC/220V, 0.5A DC) |
| 11. | Switch type | : | Snap acting, shock and vibration-proof |
| 12. | Adjustability | : | Internal Set point adjustable over span range |
| 13. | Compensation | : | a) Capillary compensation with invar wire throughout the capillary length
b) Case compensation |
| 14. | Performance | : | |
| | a) Scale Accuracy | : | ±1.0 % of full scale |
| | b) Repeatability | : | < 0.5 % of full range |
| | c) Response time | : | Less than 40 seconds with thermowell |
| 15. | Capillary length | : | 5 meters (minimum) for local mounting/15 meters for local panel mounting |
| 16. | Nameplate | : | Tag number, service engraved in stainless steel tag plate |
| 17. | Accessories | : | Mounting accessories, ½" NPT cable gland |
| 18. | Applications | : | During Detail Engineering on Owner's |

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4.00.00 **LOCAL INSTRUMENTS**

4.01.00 PRESSURE GAUGE AND DIFFERENTIAL PRESSURE GAUGE

1. Type : Bourdon/Bellows/Diaphragm
2. Sensing & Socket : SS-316
3. Movement Material : SS-316
4. Case Material : Stainless steel. IP-65 (Explosion proof for NEC Class-1, Division 1 area)
5. Dial Size : Generally 150 mm
6. Scale : Black lettering on white in 270 O arc.
7. Window : Shatterproof glass
8. Range Selection : Normal process pressure: 50~70 % of range
9. Over-range Protection : 125% of maximum range by internal stop. External stop at zero
10. Adjustment : For Zero adjustment (Micrometer screw external)
For Range adjustment (Micrometer screw internal).
11. Element Connection : Argon welding
12. Process Connection : 1/2" NPT (M) Bottom for local, back for panel mounting
13. Performance : Accuracy of ± 1.0 % of span or better
14. Operating ambient : 0 - 50 °C
15. Safety Feature : Blow out disc /diaphragm at the back
16. Accessories : a) Snubbers for pulsating fluid application.discharge
b) Stainless steel Diaphragm seals

		for corrosive/ viscous/ solid bearing or slurry type fluid applications
	c)	3-Way SS316 Gauge cock for pressure gauges
		5-valve SS316 manifold from
	d)	barstock for differential pressure gauge
	e)	Siphons for steam and hot water services
17. Nameplate	:	Tag number, service engraved in stainless steel tag plate
4.02.00	LEVEL INDICATOR (FLOAT & BOARD TYPE)	
1. Type	:	Float and Board
2. Float Material	:	SS-316
3. Float Cable	:	SS-316
4. Indicator Assembly	:	Epoxy painted Aluminium
5. Guide wire spring assembly	:	SS-316 (2 Nos.)
6. Guide Wire Anchor	:	SS-316
		Anodized Aluminium with engraved marking (Minimum graduation 10mm),
7. Scale Board	:	mounting brackets and suitable hardware required as per tank height
8. Elbow Assembly	:	Anodized Aluminium
9. Flanges	:	RF , ANSI 150 , SS (3 Nos.)
10. Accuracy	:	± 10 mm or better
11. Accessories	:	All mounting accessories including counter flange, nuts & bolts, suitable

gasket etc. as applicable, SS Tag plate

4.03.00 GAUGE GLASS

1. Type : Reflex /Transparent
2. Material :
Glass : Toughened borosilicate resistant to thermal shock
Body Material : ~~Carbon Steel~~ Stainless Steel
Enclosure : IP-65 (Explosion proof for NEC Class-1, Division 1 area)
3. Integral cocks & valves/Fittings :
i. SS 316
Rubber lined corrosion resistant
4. :
ii. stainless steel (for DM/RO service)
5. Vessel Connection : ANSI Flanged SS316
6. Accessories :
i. Integral cocks
ii. Drain Valves
iii. Companion Flanges, Bolts, nuts, gaskets, SS Tag plate
iv. Illuminating lamps, Mica shield as required
v. Calibrated scale
7. Pressure rating : Twice the maximum working pressure
8. Temperature : 300 ° C
For larger lengths (greater than 1200mm), additional gauge glasses
9. Other details : shall be provided with minimum of 50 mm overlap.

4.04.00	SLIGHT GLASS	
1.	Type	: Flap-type.
2.	End connection	: Screwed / Flanged
3.	Material	
	a) Body	: SS- 304
	b) Cover plate	: SS- 304
	c) Indicator	: SS- 316
4.	Sight Glass	: Toughened Borosilicate
5.	Gasket	: Neoprene
6.	Bolts & Nuts	: High tensile steel.
7.	Hydraulic Test Pressure	: 1.5 times maximum working pressure
8.	Accessories	: Companion Flanges, Bolts, nuts, gaskets as required, SS Tag plate.
4.05.00	ROTAMETER	
1.	Type	: ON-LINE for line upto and including 50 mm NB. : Borosilicate BY-PASS for line size above 50 NB
2.	Metering tube	: Toughened Borosilicate
3.	Float	: SS-316
4.	End fittings	: SS-316
5.	Packing material	: Teflon / PTFE
6.	Casing	: Stainless Steel
7.	Gland Rings /Followers/ Other wetted parts	: Stainless Steel
8.	Orifice Plate	: Stainless Steel (for bypass type)
9.	Operating Temperature	: 0-50 Deg. c

- | | | |
|------------------------|---|--|
| 10. Test Pressure | : | 200% of maximum operating pressure |
| 11. Scale | : | 250 mm nominal length |
| 12. Graduation | : | Direct reading |
| 13. Process Connection | : | Flanged (RF) to line size as per ANSI standards (150#) |
| 14. Tapping | : | D & D/2 |
| 15. Accuracy | : | +/- 2% of full scale reading |
| 16. Reproducibility | : | Within 0.5% of instantaneous reading |
| 17. Accessories | : | SS Tag Plate, orifice plate |

5.00.00 **TEMPERATURE ELEMENTS & ACCESSORIES**

5.01.00 RESISTANCE TEMPERATURE DETECTOR

- | | | |
|----------------------------------|---|--|
| 1. Type | : | Platinum (Duplex), Ungrounded |
| 2. Platinum (Duplex), Ungrounded | : | 100 ohm at 0 °C |
| 3. Base | : | Wound on ceramic (anti-inductive) |
| 4. Wiring | : | 3 Wire |
| 5. Protecting Tube | | |
| a) O.D. | : | 6 mm |
| b) Material | : | SS-316, Seamless |
| c) Filling | : | Magnesium oxide (Purity above 99.4%). |
| 6. Response time | : | a) 15 sec. (bare).
b) 30 sec. (with thermowell) |
| 7. Calibration | : | DIN 43760 |
| 8. Accuracy | : | ± 0.5% |
| 9. Head | | |
| a) Type | : | IP-65 universal screwed type |

-
- b) Material : Stainless Steel
- c) Terminal blocks : Nickel plated Brass-screw type / silver plated
- d) Cable connection : ½" NPT gland and grommet
- e) Others : Terminal head cover with SS chain and suitable gasket.
- Head of TE to be provided with sufficient space and arrangement to mount head mounted temperature transmitter (as applicable).
- Adjustable nipple-union-nipple [1/2" Sch 80 X ½" NPT] with thermowell connection
10. Accessories : a)
- b) Compression fittings/unions
- Flanges etc. (for flanged connections only)
- c)
- Thermowell (As specified below)
- d)
11. Thermowell connection : ½" NPT (M) or 150 RF Flanged
- Tag number, service engraved in
12. Nameplate : stainless steel tag plate

Note: The specifications for RTDs of winding/ bearing of motor/pump, can be as per their manufacturer standards. The manufacturer shall submit the adequate supporting documents for establishing their standard practice. However, the type of RTD shall be Pt-100.

5.02.00 THERMOCOUPLES

1. Type :
 - a) 16 SWG wire of Chromel Alumel) (Type-K)
 - b) Duplex
 - c) Ungrounded
2. Protecting Tube
 - a) O.D. : 6 mm
 - b) Material : SS-316, Seamless
 - c) Filling : Magnesium oxide (Purity above 99.4%).
3. Response time :
 - a) < 20 seconds for measurement
 - b) < 10 seconds for control
4. Accuracy : $\pm 1.1^{\circ}\text{C}$ up to 300°C & 0.4% of measured temperature range above 300°C
5. Head
 - a) Type : IP-65 universal screwed type
 - b) Material : Stainless Steel
 - c) Terminal blocks : Nickel plated Brass-screw type / silver plated
 - d) Cable connection : $\frac{1}{2}$ " NPT gland and grommet
6. Others : Terminal head cover with SS chain and suitable gasket.

Head of TE to be provided with sufficient space and arrangement to mount head mounted temperature transmitter (as applicable).

7. Accessories :
 - a) Adjustable nipple-union-nipple [1/2" Sch 80 X 1/2" NPT] with thermowell connection
 - b) Compression fittings/unions
 - c) Flanges etc. (for flanged connections only)
 - d) Thermowell (As specified below)
8. Thermowell connection : 1/2" NPT (M) or 150 RF Flanged
9. Nameplate : Tag number, service engraved in stainless steel tag plate

5.03.00 TEMPERATURE GAUGE

1. Type : Expansion type (Liquid filled system)
2. Sensing Element : Bourdon – SS-316
3. Bulb and Capillary Material : SS-316
4. Capillary Tubing : Inner sheath - solid drawn Material
copper tube
Outer sheath - PVC tube
5. Movement Materials : Stainless Steel / Direct Bourdon tip connection to pointer spindle
6. Case Material : Stainless Steel stove enameled, black finish, threaded bezel ring, clear glass

		cover conforming to IP 65.
7.	Dial size	: 150 mm
8.	Scale	: Black lettering on white background in 270 Deg.C arc
9.	Over range protection	: 125 percent of FSD
10.	Capillary Glanding	: 1/2" NPT(M) x compression fitting (SS) to suit capillary
11.	Instrument Connection	: Bottom connection for local mounting, back connection for panel mounting
12.	Process Connection	: 1/2" NPT (M) or 150 RF Flanged
13.	Extension Neck Length	: 50 mm
14.	Compensation	: a) Capillary compensation
15.		: b) Case compensation
16.	Performance	: a) Accuracy : + /- 1.0 percent of full scale Deflection
		: b) Repeatability : Less than 0.5 percent of full range
		: c) Response time: 15 seconds (max.).
17.	Capillary length	: 3.0 meters (local) / 15.0 metres (local panel)
18.	Other features	: Shatter proof glass
19.	Nameplate	: Tag number, service engraved in stainless steel tag plate
20.	Accessories	: SS316 Thermowell
5.04.00	THERMOWELL	
1.	Material	: SS-316
2.	Manufacture	: Drilled from bar stock, Hex Head, Tapered design (As per ASME PTC 19.3)

3. Process connection : M33x2
4. Certification : Not applicable
5. Bore concentricity : +5% of wall thickness
6. Identification mark : Tag number punched on head
7. Surface treatment : Polish after machining
8. Element connection : ½" NPT (M) or 150 RF Flanged
9. Head : Hex
10. Length of the hex head : 31.75 mm (min.)
11. Accessories : SS Plug and chain for test thermo wells
SS Nameplate, Flange with companion
flange & all required accessories for
flanged connections.

Note: Wake frequency calculations shall be furnished for all thermowells for approval.

Thermowells shall be designed such that the resonant frequency is above the exciting frequencies generated by vortex shedding in the process fluid.

5.05.00 METAL TEMPERATURE THERMOCOUPLE

1. Measuring medium : Metal temperature
2. Type : Chromel Alumel (Type-K)
Duplex, Ungrounded
3. Insulation : Mineral Insulation Magnesium Oxide
4. Wire gauge : 16 AWG
5. Protective sheath : SS
6. Protective sheath :
diameter 8 mm O.D.
7. Characteristics : Special limits of error as in ANSI
thermocouple MC 96.01
8. Accessories : ½" BSP SS sliding end connector, weld
pad, clamps of heat resistant steel

- | | | |
|----------------------------|---|--|
| 9. Cold end sealing | : | SS pot weal with colour coded PTFE headed sleeve insulated flexible tails.
Sealing compound Epoxy resin |
| 10. Minimum bending radius | : | 30 mm |
| 11. Length of T/C | : | 30 Mtr. (minimum) |

Notes:

The specification for thermocouples of bearings metal temp measurements can be as per their manufacturer standards. The manufacturer shall submit the adequate supporting documents for establishing their standard practice. However, type of thermocouples shall be K-type.

6.00.00 **FLOW ELEMENTS**

6.01.00 ORIFICE PLATE

6.01.01 The orifice plate shall be either concentric square edge type or segmental bored type as per type of process .

6.01.02 Manufacturing, installation and use will be in accordance to the standard BS1042.

6.01.03 Orifice plates will be made of type 316 stainless steel.

6.01.04 The plate thickness of the orifice shall be 3 mm minimum. However the orifice thickness shall be determined by the actual process parameter.

ORIFICE FLANGE

6.01.05 Orifice flange rating will be the same as the piping class.

6.01.06 Flange shall be Standard / Slip on / socket weld/ weld neck raised face as per ANSI B 16.5

6.01.07 Gasket shall be CAF type depend on application.

CARRIER RING

6.01.08 Male female carrier ring of SS316 material shall be provided.

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- 6.01.09 Beyond line size 500 mm, disc type orifice plate will be used.

PRESSURE TAP
- 6.01.10 Corner taps with Annular Grooves on Carrier Rings as per BS 1042
- 6.01.11 Numbers of tappings as per approved P&IDs of size ½" NPT shall be provided. However, one pair spare tapping shall also be provided with each orifice.

VENT HOLE/ DRAIN HOLE
- 6.01.12 Suitable Vent hole for water service shall be provided.

BETA RATIO
- 6.01.13 The ratio of throat diameter to inlet diameter (beta ratio) of the Orifice will be limited between 0.30 and 0.70.

ACCURACY
- 6.01.13 Accuracy (uncertainties on discharge coefficient 'c') of flow measurement shall be +/-1% for orifice plates according to BS 1042 except for critical measurement (performance calculation).

ISOLATION VALVES
- 6.01.14 Each tapping point shall be equipped with one primary isolating valve for low pressure and two primary isolating valves for high pressure installations (greater than 40 bar and/or 450 deg c).
- 6.01.15 Material of isolating valve shall be SS316
- 6.01.16 ½ inch NPT (M) SS316 Nipples shall be used to interface valve with orifice.

NUTS/BOLTS/ GASKETS
- 6.01.17 Jack bolt shall be provided for easier removal.
- 6.01.18 Studs and nuts material shall be ASTM A193 Gr. B7 / A194 Gr. 2H

TAGGING
- 6.01.19 Orifice plate will be provided with a Handle. Tag number, orifice plate material, measured bore and id of the pipe will be stamped or deep engraved on the upstream face of the Handle.

-
- 6.02.00 FLOW NOZZLE
- 6.02.01 The Flow Nozzle shall be ASME long radius type.
- 6.02.02 Manufacturing, installation and use will be in accordance to the standard ASME PTC CODE 19.5.
- 6.02.03 Nozzle shall be made of Forged 316 stainless steel.
- 6.02.04 Nozzle shall be machined on latest CNC machines to ensure accuracy.
- END CONNECTION
- 6.02.05 End connection shall be Butt Welded.
- BRANCH PIPE
- 6.02.06 Branch pipe material shall be of same process pipe material.
- 6.02.07 Length of the branch pipe shall be minm. 4D upstream and 2D downstream.
- 6.02.08 Branch pipe assemblies shall be properly machined to acquire required smoothness
- TAPPINGS
- 6.02.09 D & D/2 tapping on pipe shall be provided.
- 6.02.10 Tapping size shall be of 15 NB and number of tappings shall be as per approved PID. However, one pair of spare tapping for each element shall also be provided for each nozzle.
- BETA RATIO
- 6.02.11 Beta ratio shall be limited between 0.30 and 0.70.
- ACCURACY
- 6.02.12 Accuracy (uncertainties on discharge coefficient) of measuring flow measurement shall be equal or better +/-2 % except for critical measurement (Performance calculation)
- ISOLATION VALVES

-
- 6.02.13 Each tapping point shall be equipped with one primary isolating valve for low pressure and two primary isolating valves for high pressure installations (greater than 40 bar and/or 450 deg c).
- 6.02.14 Material and size of SW isolating valve shall be SS316 and 15 NB respectively.
- 6.02.15 Suitable Nipples and adaptors shall be used to interface valve with Flow Nozzle .
- TAGGING
- 6.02.16 Nozzle tag no. , material, id , Flow direction will be stamped
- TEST & EXAMINATION
- 6.02.17 All orifices and Flow Nozzles shall be tested in accordance with the quality assurance programme, which shall meet the requirements of applicable codes.
- 6.02.18 Instruments offered shall be of type tested and proven type. Type test certificates for test conducted earlier on similar product shall be furnished. Routine tests, Acceptance tests and all special tests (if any) shall be carried out for all the instruments as per quality plan and applicable standards.
- 6.02.19 Calibration shall be done in reputed laboratory like IIT.
- 6.02.20 IBR certification shall be provided wherever the process pipes come under IBR regulation.
- 6.02.21 The type, routine & acceptance tests shall be witnessed by Inspection agency as per requirements given by the quality plan. Contractors shall give at least 15 days advance notice for witnessing the test. Copies of the certified reports of all tests carried out at the works should be furnished. The equipments shall be dispatched from works, only after receipt of purchasers' written approval of the test reports.
- Certified reports of all the tests carried out at the works shall be furnished for approval of Owner. Test reports shall be completed with all details and also contain specified limiting values, wherever applicable, to facilitate review. The instruments shall be dispatched from works only after receiving the owner's approval of the test reports. The bidders shall have to carry out all the tests within his quoted price and no extra payment can be claimed by bidders.
- 6.03.00 AEROFOIL

- 6.03.01 For airflow measurement, flow sensing element shall be aerofoil (steel) with ½" tappings.

7.00.00 **CHP RELATED SPECIAL INSTRUMENTS**

Technical specifications for some of the special instruments required for Coal Handling Plant are enumerated below.

7.01.00 **ZERO SPEED SWITCHES**

It shall be provided for all belt drives or indirectly driven equipment and shall be two-wire, inductive, proximity type. The probe housed in robust stainless steel enclosure of protection class IP 65 shall be installed either radially or axially. Sensing distance range shall be 1 to 25mm. The converter unit shall be dust & water tight, corrosion resistant and shall be mounted separately. The interconnecting cable length shall not be less than 3 meters. Following features shall be provided.

- | | | |
|---------------------------|---|------------------------------------|
| a) Speed setting accuracy | : | Within $\pm 2\%$ of desired value. |
| b) Repeatability | : | Within $\pm 0.1\%$. |
| c) Differential | : | Within $\pm 5\%$ of set value |
| d) Contacts | : | 2 C/O |
| e) Preferred features | : | (i) Red LED for "Supply On" |
| | | (ii) Green LED for "Relay On" |
| | | (iii) Display of present speed |
| | | (iv) Display of speed set |
| | | (v) Alarm facility with |
| indication | | (vi) Initial bypass time delay |

7.02.00 **BELT SWAY SWITCHES**

Auto reset type in IP 65 class enclosure shall be provided (in pairs) for protecting all non-self-aligning conveyor belts and can be installed in vertical or horizontal position at no more than 30 Mtr. Intervals. For any conveyor, however, minimum two pairs of switches shall be provided.

These switches shall be placed not more than 15 M from either end of conveyor. Operating lever shall actuate micro switches with movement of 45° on either side. Contact available shall be 2 NO + 2 NC. Contact roller support bearing shall be with high relative lubrication & low coefficient of friction. Local indicating lamp as a special feature is envisaged.

7.03.00 PULL CORD SWITCHES

- a) Pull cord Switches in IP 65 class enclosure shall be provided for manual safety stopping of conveyors. Pull chord wire rope shall pass through cradle of switch. Movement of lever (45° on either side) shall actuate the pull chord switch. It shall be provided at every 30 m distance on both sides along the belt conveyors and shall only be manually reset locally. The operating handle shall be fitted with spring steel rings at both ends. For conveyors trip indication shall be provided in the control room to identify exactly the switch that has operated.
- b) Adequate length of PVC coated wire rope and all accessories shall be furnished. From either end of conveyor pull cord switches should not be more than 15M. A special canopy made of 5mm M.S. plate shall be provided over the lever of each pull cord switch so that spilled over coal lumps do not trip the belt by actuating the lever. Also a local trip indication (Cluster of LEDs) shall be provided with each pull cord switch.
- c) Area alarm horns/hooters shall be provided at various strategic plant locations, which shall sound first, continuously for sufficient time to alert personnel nearby to move clear, before the device or sequence can be started.

7.04.00 PULL CORD & BELT SWAY INDICATION SYSTEM

Pull cord and Belt sway switches of all conveyors shall be continuously monitored through "Pull Cord & Belt sway Indication System". System shall display the exact location and number of safety switches operated in a pull cord and Belt sway loop of a conveyor. System shall consist of sensor, indicator & transmitter units. Units will be installed at respective RIO location. There shall be analog 4-20 mA DC or soft communication link with the Main CHP PLC system for remote monitoring of the switch status in the operator station. System shall have the diagnostic to detect faulty switch and damaged cable.

7.05.00 BUNKER LEVEL INDICATION SYSTEM

7.05.01 GENERAL TECHNICAL REQUIREMENTS

Coal bunker level measurement shall be provided through 3D Level Scanner type level indication system employing 3D representation of the stored contents for display on a remote PC based workstation.

The system shall consist, but not limited to, the following major components.

7.05.02 3D LEVEL SCANNER

- | | | | |
|-----------------------------|---|---|---|
| 1. Type | : | 3D Non contact, dust penetrating type | |
| 2. Operating Principle | : | Multiple Point, low frequency measurement (time/distance) | |
| 3. Mounting | : | Top | |
| 4. Supply Voltage | : | 24V DC | |
| 5. Signal Output | : | RS 485 | |
| 6. Local Display | : | LCD Display | |
| 7. Operating Temperature | : | -40°C to +85°C | |
| 8. Temperature Compensation | : | In-built | |
| 9. Accuracy | : | ±0.5% | |
| 10. Housing | : | Die-cast Aluminium / SS | |
| 11. Antenna | : | Die-cast Aluminium (minimum 3 nos./scanner) | 3 |
| 12. Protection | : | IP-67 | |
| 13. Process Connection | : | SS Flange with matching flange | |
| 14. Cable Entry | : | 2 x 1½" NPT | |

7.05.03 3D LEVEL MAPPING SOFTWARE

This module shall have the functions/feature, but not limited to the following.

- Basic display including sensor connection status, information such as tag nos, model nos. polling address, communication traffic load etc.
- Measurements of parameters such as sensor-material distance, level, volume, mass, temperature, Signal to Noise Ratio (SNR) etc.
- Multiple scanner connection with pre-set unique polling address
- False echo mapping
- Measurements of advanced parameters such as output damping time, material slope, offset, minimal SNR, false echo sensitivity, restrain co-efficient, side margins, bottom margins, top dead

band, historic log sampling period, activate extrapolation, maximum emptying rate etc.

- Log viewer (single & multiple mode)
- Generation & display of 3 dimensional graphical representation of the visual mapping contour as scanned by the 3D Level Scanners
- Selection of different signal types downloaded from the scanner at a preferred time resolution and analysis of selected signals for each scan

7.05.04 REMOTE DISPLAY UNIT

Remote Display Unit shall be provided with PC, 24" colour TFT LCD monitor, keyboard, mouse & colour laser jet printer and shall be located in the CHP Control Room. The PC shall include the following minimum specification.

Pentium latest, minimum Intel core 5 Processor, 800x600 Graphic resolution, 4GB RAM, 500 GB SATA, DVD ROM, latest Windows operating systems, communication ports: 2 nos. minimum Ethernet (1000 MBPS) & 4 nos. minimum USB ports.

The PC shall be interfaced with CHP PLC located in the CHP Control Room through redundant OPC connectivity. The system shall also be time synchronized with GPS Master Clock. 4~20 mA DC isolated outputs shall also be connected to CHP PLC and DDCMIS.

Bidder shall also refer to the relevant sections of Volume II-E of this specification for technical requirements of different hardwares such as monitor, printer and interface cables & accessories.

7.05.05 BUNKER WEIGHT MEASUREMENT

Bunker weight measurement with strain gauge shall also to be included.

7.05.06 Bidder's scope shall also include 3D acoustic stockpile level detection system along with PC based monitoring unit, printer etc. this shall also provide mass volume & mass profile of the stock pile. System shall be provided with suitable interfaces with Stacker Reclaimer PLC, CHP PLC and Plant DDCMIS.

7.06.00 BELT WEIGHING SYSTEM

- a) It shall be microprocessor based and shall have its own local panel.

Belt weigh scale shall be provided with four idler weighbridges. The local panel shall provide:

- i) Local flow rate indication
 - ii) Integrated flow indication
 - iii) System alarm annunciation
 - iv) Local calibration facility
 - v) Power On/Off
 - vi) Start & stop command
- b) Local displays shall be digital with six digits for Rate of flow and totalized flow; battery backup shall be provided.
- c) PLC interface shall be provided for the following;
- i) Remote totalizer pulse signal
 - ii) Remote flow rate indication
- d) Accessories shall include special cables, cabinets, indicators etc. as required to make the system complete.
- e) Load sensing sensor shall be hermetically sealed Strain Gauge type having resistance bridge sensor with temperature effect on zero & span less than $\pm 0.015\%$ / 10 K. Single load sensor with four idler mounting shall be used. The accuracy shall be better than $\pm 0.25\%$ through out its range.
- f) Speed sensor shall be Tacho-generator /Encoder. Signal outputs shall be provided for speed and computed flow rate. The overall accuracy shall be better than 0.5% FS range.
- g) Inclinator shall be used along with Belt weighing system for the boom conveyor of Stacker Reclaimer. Belt weigher provided on Stacker Reclaimer Boom Conveyor shall have accuracy (in the horizontal position of the Boom) of $\pm 1\%$ for the range of 20% to 120% of Boom conveyor rated capacity.
- h) Two (2) in motion weighbridge on either side of Track hopper & One (1) integral weighbridge below each Wagon Tippler Platform for measurement of gross weight for each wagon shall be provided for the Track Hopper complex. Each weighbridge shall have built in diagnostics, computer with necessary weight management software, explosion protection device & lightning protection system. A central Weighbridge terminal complete with its computer, printer etc. shall be provided. This weighbridge terminal shall be suitably connected to

individual weighbridge terminals located at Track Hopper complex. The quantity & location however shall be decided during detail engineering stage. The accuracy of weighing shall fall within $\pm 0.25\%$.

7.07.00 **ANEMOMETER** shall be provided on the stacker & re-claimer to measure the wind velocity and direction of wind. Instrument shall comprise of sensors, control unit and display unit. Interface with PLC shall be furnished for alarm.

8.00.00 DEW POINT METER

1. Type : Direct Mounting Capacitance type with change in output proportional to moisture present.
2. Sensing Element : Ceramic / Aluminum Oxide sensor
3. Service : Dry Air
4. Range : -90 Deg.C to 10 Deg.C Dew Point Temperature
5. Sensor Accuracy : ± 2 Deg. C Dew Point
6. Repeatability : 0.5 Deg. C Dew Point
7. Operating Ambient Temperature : -40 Deg C to 50 Deg C
8. Operating Pressure : 0- 10 kg/ Sq. cm
9. Display : Combined enclosure with 5 Digit seven segments LED display.
10. Element Filter : 80 micron sintered stainless steel
11. Output : 4- 20 mA DC Loop powered
12. Power Supply : 24 VDC nominal
13. Enclosure class : IP 65
14. Interchangeability : Fully Interchangeable transmitters
15. Accessories : Sampling system, cables, sensor holder, desiccant chambers, double compression fittings, $\frac{3}{4}$ " Cable gland, mounting fixture etc.

16. Application : Compressed Air system

9.00.00 **WATER SYSTEM RELATED SPECIAL INSTRUMENTS**

9.01.00 ANALYSERS

For Analysers please refer Section-VI of this volume of the specification.

9.02.00 PARSHALL FLUME

9.02.01 Bidder shall include in his scope complete equipment for flow measurement through Parshall flumes. Measurement shall be carried out by Ultrasonic Level measurement principle. Bidder shall provide primary sensors, transmitters, flow indicator & totalizer & shall include all required accessories. System shall be of reputed make and acceptable to Owner / Engineer.

The general components of this system are as follows.

9.02.02 Level Transmitter shall have 2 wire along output of 4 – 20 mA DC (600Ω load impedance) in direct proportion to level with an accuracy of + / - 0.16 % or better. The transmitter shall be SMART type with interface with HART management system. The flow compensation is to be implemented in the transmitter itself.

9.02.03 Flow signal from the system shall be in the form of analog output of 4 – 20 mA DC with an accuracy of + / - 1 % or better.

9.02.04 Field mounted local flow indication facility shall also be provided.

9.02.05 All necessary liberalization circuits must be integral to the field transmitter and the enclosure should conform to IP-65 and corrosion resistant.

9.03.00 CHLORINE LEAK DETECTOR

1. Type : Electrochemical
2. Resolution : 0.1 ppm
3. Response Time : Less than 1 second
4. Operating Temperature : 0 - 45 ° C
5. Display Type : Digital Indicating meter

- | | | | |
|-----|----------------|---|------------------------------------|
| 6. | Alarm Contacts | : | Dual Alarm setpoints (240V AC, 5A) |
| 7. | Protection | : | IP 65 |
| 8. | Mounting | : | Wall Mounting |
| 9. | Power Supply | : | 240 V AC |
| 10. | Output | : | 4~20 mA DC |
| 11. | Load | : | 600Ω |

9.04.00 RESIDUAL CHLORINE ANALYZER

- | | | | |
|-----|--------------------|---|---|
| 1. | Type: | : | Amperometric |
| 2. | Electrode | : | Platinum / Gold and copper electrode
shall be provide with cell cleaning
system |
| 3. | Indication | : | LCD in analyzer panel |
| 4. | Range | : | 0 to 20.0 mg / L (ppm) |
| 5. | Accuracy | : | 2% or better |
| 6. | Sensitivity | : | 0.01 mg / L |
| 7. | Output signal | : | 4-20 mA DC (isolated) into 600 ohms |
| 8. | Alarm annunciation | : | Dual Alarm setpoints (240V AC, 5A)
(Field adjustable) |
| 9. | Calibration | : | Zero and span adjustment
Final calibration / adjustment of
analyzer to be done at site and duly
verified by titration. |
| 10. | Temp. Compensation | : | 0-50 °C |
| 11. | Sample drain | : | Yes |
| 12. | Enclosure | : | Stainless Steel (IP-65) |
| 13. | Power supply | : | 240 V AC, 50 Hz, 1 Phase (through
UPS) |
| 14. | Accessories | : | Chemical Reagents |

9.05.00 DENSITY INDICATOR

1. Type : Hydrometer Type
2. Mounting : On line
3. Accuracy : +/- 2% of range
4. Scale : Black letter on white scale
5. End connection : PVC flange

9.06.00 DENSITY/ CONCENTRATION METER

1. Wetted Part : Stainless Steel
2. Enclosure : Stainless Steel (IP-65)
3. Power Supply : 24 V DC
4. Output signal : 4-20 mA DC (isolated) into 600 ohms
5. Accuracy : ±0.001 g/cc
6. Indication : LCD display
7. Temp. Compensation : Integral
8. Accessories : Mounting hardware, integral amplifier (if required), cable glands, tag plate etc.

10.00.00 SOLENOID VALVES

1. Operating Principle : Electromagnetic (noiseless)
2. Coil voltage rating : 240 V AC /24 V DC (as required)
3. Ways : 2/3/4 way
4. Port size : 1/4" NPT all ports
5. Body : SS bar stock
- Trim : SS-316
6. Duty : Suitable for continuous energization
7. Sealing : Airtight and leak proof
8. Ambient Temperature : 0 - 50 ° C

-
- | | | | |
|-----|-------------------|---|--|
| 9. | Fluid Temperature | : | 0-150 ° C (approx.) |
| 10. | Coil Enclosure | : | Stainless Steel |
| 11. | Insulation | : | Class-H |
| 12. | Coil Casing | : | IP-65 (Explosion proof for NEC Class-1, Division-1 area) |
| 13. | Mounting | : | On pipe or on panel |
| 14. | Cable Connection | : | ½" NPT |
| 15. | Accessories | : | Cable glands, SS Tag plate |

ANNEXURE-7

AIR RELEASE VALVE

- | | | |
|------------------------------|---|--|
| 1. Application | : | Wet Riser in Hydrant System |
| 2. Location | : | At the top of wet riser |
| 3. Type | : | Single Ball Small orifice type |
| 4. Fluid Handled | : | Fire Water |
| 5. Material of construction | | |
| a) Top | : | Gun metal IS:318, Gr LTB 2 |
| b) Ball/ Float | : | Rubber coated |
| c) O Ring | : | Rubber |
| d) End Connection | : | Screwed |
| e) Air Vent Body | : | Gun metal IS:318, Gr LTB 2 |
| 6. Hydrostatic Test Pressure | : | 21 kg/cm ² |
| 7. Working Pressure | : | 2 kg/cm ² to 9 kg/cm ² |
| 8. Size | : | 25 mm |
| 9. List of accessories | : | Not applicable |
| 10. Standard | : | IS 14845: 2000 |
| 11 Pressure Rating | : | PN 16 |

BASKET STRAINER

1. Service : Fire Water
2. Type : Simplex Basket Type
3. Size : As per Approved Drawing
4. Flow Rate : 820 m³/hr
5. Working Pressure : 11.5 Kg/cm² (g)
6. Design Pressure : 12 Kg/cm²(g)
7. Design Temperature : 50° C
8. Design Code : ASME, Sec-VIII
9. Screen area ratio : 4:1
10. Max. Permissible Pr. Drop
 - a) 100 % Clean condition : 1.5 mwc
 - b) 50% Clogged Condition : 2.5 mwc
11. Material of construction
 - a) Body : MS Fabricated, IS 2062
 - b) Nozzle : IS 2062
 - c) Filter medium : SS-316, 30 Mesh, 30 SWG(Approx.)
 - d) Reinforceent Jacket : SS-304, 6 mm(Approx.) Hole Perforated Sheet
 - e) Bolts, Nuts : IS:1367
 - f) Gaskets : Rubber
12. End Connection : Flanged to ANSI B16.5, 150#, FF
13. Hydrostatic Test Pressure : 18.0 Kg/cm²(g)

BRANCH PIPE WITH NOZZLE

1. Standard : IS:952 for Fog Nozzles & IS:2871 for Branch Pipe
2. Application : Fire Fighting
3. Size : 63 mm dia male instantaneous inlet with 20 mm nozzle (as per IS:903)
4. Material of Construction
 - a) Branch Pipe : IS:3444, Gr 1 (SS 304)
 - b) Nozzle : IS:3444, Gr 1 (SS 304)
 - c) Diffuser : SS-304 & Construction as per IS-2871
 - d) Fog Nozzle : SS-304 & Construction as per IS-952
 - e) Washer : Rubber as per IS:937 Type-B
 - f) Finish : Machined finished & Polish
5. Hydraulic Test Pressure
 - a) Branch Pipe : 21 kgf/cm² for 2 ½ min
 - b) Nozzle : 21 kgf/cm² for 2 ½ min
6. Working Pressure : 3.5 kg/cm² (Min) and 7 kg/cm² (Max)
7. Type : Tripple purpose solid jet & fog type
8. End connection : Instantaneous male coupling type of size 63mm
9. Length of Branch Pipe : 200 ± 0.5 mm
10. Length of Nozzle : 100 ± 1 mm

HOSE BOX

1. Application : Hydrant System
2. Size : 750 x 600 x 250 mm (for accomodating Two hose 63mmX15 m long, one branch pipe with nozzle, spanner etc.)
3. Body / Door Frame : M.S. Sheet, 16 SWG
4. Front : Double Glass Panel (3 mm thk.) fronted with lock and two keys
5. Painting : Fire red paint as per IS:5, shade 536
(Two coats of redoxide primer followed by two coats of sythetic enamel)
6. Marking : Word "Fire" in red colour to be marked permanently on door glass panel
7. Lock with Keys : Inbuilt with door
8. Mounting : Wall/Column mounting Type
9. Accessories : Hammer and chain
10. Approval : Not applicable (Hose box does not required any approval)
11. Inspection & Testing : Visual inspection & Test certificate.

HOSE PIPE WITH HOSE COUPLING

1. Code & Standard	: Rubber impregnated woven jacketed type confirming to IS 636 Type II
2. Application	: Hydrant System
3. Size & Length	: 63 mm x 15 mts length
4. Working Pressure	: 14 kg/cm ²
5. Test Pressure	: 22 kg/cm ²
6. Burst Pressure	: 40 kg/cm ²
7. End Fitting / Material	: Instantaneous spring lock type male/female coupling of SS 304 construction at both sides to IS:903
8. Mass of hose per meter	: 425 gm/m
9. Coil Diameter	: Not more than 44 Cm. (for 30 M Long)
10 Type of Coupling	: SS (304) Instantaneous type IS: 903Marked Coupling

FIRST AID HOSE REEL

- | | |
|----------------------|---|
| 1. Type | : Swinging Type |
| 2. Standard | : As per IS:884 |
| 3. Operation | : Manual |
| 4. Size of Hose | : 19 mm internal bore, 40 m long |
| 5. Mounting | : Wall / Coloumn mounted |
| 6. Hose Reel Tubing | : Reinforced (cotton) rubber hose pipe |
| 7. Wall Bracket | : M.S |
| 8. Nozzle | : S.S 304 / IS:3444 Gr 1 |
| 9. Hub | : M.S IS:513 |
| 10. Sides | : M.S IS:513 |
| 11. Swivel Joint | : S.S 304 |
| 12. Hydraulic Test | : 21 kg/cm ² |
| 13. Painting | : Fire red paint as per shande 536 of IS:5 |
| 14. Working pressure | : 7 kg/cm ² to 12 kg/cm ² |
| 15. Burst Pressure | : 30 kg/cm ² |

Note:

Hose reels shall comprise of one no. SS (AISI- 304) isolation valve, reinforced (cotton) rubber hose pipe and one no. SS (AISI-304) nozzle (with isolation arrangement) duly mounted on a swing type (90 deg. min) hose reel.

HYDRANT VALVE

1. Standard : IS:5290 Type-A
2. Type : 63 mm, Female oblique type with outlets angled towards ground
3. Flow test : 900 LPM at minimum 7kg/cm^2
4. Material of Construction
 - a) Body : IS:3444, Gr.1 (SS 304)
(Fire red colour as per IS:5 Shade 536)
 - b) Spindle : SS IS:6603 (SS 304)
 - c) Bonnet : IS:3444, Gr.1 (SS 304)
 - d) Gland Bush : IS:3444, Gr.1 (SS 304)
 - e) Gland Packing : Asbestos Rope
 - f) Gland Nut : IS:3444, Gr.1 (SS 304)
 - g) Check Nut (Spindle) : IS:3444, Gr.1 (SS 304)
 - h) Seat Washer : Rubber IS:937, Type-A
 - i) Stop Valve : IS:3444, Gr.1 (SS 304)
 - j) Seat Check Nut : IS:3444, Gr.1 (SS 304)
 - k) Hex. Nut : M.S
 - l) Hand Wheel : C.I, IS:210 FG 200
 - m) Female Outlet : IS:3444, Gr.1 (SS 304)
 - n) Lower Lug : IS:3444, Gr.1 (SS 304)
 - o) Upper Lug : IS:3444, Gr.1 (SS 304)
 - p) Blank Cap : SS
 - q) Rubber Ring : Rubber to IS:937
 - r) Cam Tooth : IS:3444, Gr.1 (SS 304)
 - s) Spring : SS, IS:6528 (SS 304)
 - t) Chain : SS
 - u) End Connection : As per ANSI B 16.5 150#
5. Hydraulic Test Pressure
 - a) Body : 21 kg/cm^2
 - b) Seat : 14 kg/cm^2
6. Working Pressure : 3.5 kg/cm^2 (min.) and 7 kg/cm^2 (max.)
7. Operation : Manual
8. Water tightness pressure : 14 Kg/cm^2 (g) (for 2.5 Minutes)
9. Stem type : Rubber of IS: 937
10. End Connection
 - a) Inlet connection : 75mm N.B. FLANGE (DRILLING AS PER IS: 1538)
 - b) Outlet connection : Instantaneous spring lock type coupling of size 63mm as per IS: 5290 with cap and chain

DATASHEET OF LEVEL INDICATOR

1. Type : Float and Board
2. Float Material : SS316
3. Float Cable : SS316
4. Indicator Assembly : Epoxy painted Aluminium
5. Guide wire spring assembly : SS-316 (2 Nos.)
6. Guide Wire Anchor : SS-316
7. Scale Board : Anodized Aluminium with engraved marking (Minimum graduation 10mm), mounting brackets and suitable hardware required as per tank height
8. Elbow Assembly : Anodized Aluminium
 - a. Flanges : RF , ANSI 150 , SS (3 Nos.)
9. Accuracy : + 10 mm or better
10. Glass tube : All mounting accessories including counter flange, nuts & bolts, suitable gasket etc. as applicable, SS Tag plate

PRESSURE GAUGE

1. Range : 0 – 16 Kg/Cm²
2. Service : Fire Water
3. Dial Size : 150 mm
4. Scale : Black lettering on white in 270 O arc.
5. Window : Shatterproof glass
6. Type : Bourdon/Bellows/Diaphragm
Bourdon type pressure guage for pressure above 1kg/cm2
7. Sensing & Socket : SS 316
8. Movement Material : SS 316
9. Case Material : Stainless steel. IP-65 (Explosion proof for NEC Class-1, Division 1 area)
10. Range Selection : Normal process pressure: 50~70 % of range
11. Over-range Protection : 125% of maximum range by internal stop. External stop at zero
12. Adjustment : For Zero adjustment (Micrometer screw external)
For Range adjustment (Micrometer screw internal).
13. Element Connection : Argon welding
14. Process Connection : 1/2" NPT (M) Bottom for local, back for panel mounting
15. Performance : Accuracy of ± 1.0 % of span or better
16. Operating ambient : 0 - 50 °C
17. Safety Feature : Blow out disc /diaphragm at the back
18. Nameplate : Tag number, service engraved in SS 304 tag plate
19. Accessories : 3-Way SS316 Gauge cock

PRESSURE SWITCH

- | | | |
|--------------------------|---|---|
| 1. Range | : | 1.6-16 Kg/cm ² |
| 2. Application | : | Fire Protection system |
| 3. Type | | Bellow / Diaphragm type |
| 4. Over range | | 150 % of maximum pressure |
| 5. Adjustments | | a) Internal Set Point
b) Differential adjustment |
| 6. Set point | : | Black graduation on white linear scale
Graduation 0-100% with red pointer for set points |
| 7. Sensing Element | : | SS316 |
| 8. Wetted Parts | : | SS316 |
| 9. Process connection | : | 1/2" NPT (M) bottom connected |
| 10. Enclosure Material | : | Die Cast Aluminium |
| 11. Enclosure Protection | : | IP-65 (Explosion proof for NEC Class-1, Division 1 area) |
| 12. Cable Entry | : | ¾"ET |
| 13. Switch Type | : | Snap acting, shock & vibration proof |
| 14. Switch configuration | : | Two SPDT (240V, 5A AC/220V, 0.5A DC) |
| 15. Terminal Block | : | Suitable for full ring lugs |
| 16. Performance | : | a) Repeat accuracy ± 1.0%
b) Accuracy of Setting Indication of +/- 1.5% |
| 17. Ambient temperature | : | 0 – 50 Deg.C |
| 18. Nameplate | : | Tag number, service engraved in SS tag plate |
| 19. Accessories | : | <div style="display: inline-block; text-align: center; vertical-align: middle;">  </div> 1/2" NPT 2 Valve SS-316 barstock manifold |

DATASHEET OF SOLENOID VALVE

1. Type : 2/2 way pilot operated, Normally closed
2. Duty : Suitable for continuous energization
3. Sealing : Airtight and leak proof
4. Ambient Temperature : 0 - 50 °C
5. Coil insulation class : Class-H
6. Coil voltage : 24V DC
7. End connection : ½"NPT(F)
8. Cable Entry : ½"NPT(F)
9. Coil enclosure : Stainless Steel
10. Coil Casing : IP-65 (Explosion proof for NEC Class-1, Division-1 area)
11. Body material : SS bar stock
12. Trim : SS316
13. Qty. : As per approved drawing
14. Accessories : Cable glands, SS Tag plate

DATASHEET OF WATER MONITOR

1. Type : Fixed Type
2. Size : 80 mm
3. Flange inlet size : 100 NB (Drilled to ANSI B16.5, 150# RF)
4. Reference Standard : IS:8442
5. Min. Flow at 7.0 Kg/cm² : 2500-2700 lpm
6. Min. Nozzle Dia : 38 mm
7. Horizontal water jet : 60mtrs. (At 30° nozzle elevation at 7.0kg/cm² Nozzle pressure in still air condition)
25 - 30 M in vertical throw of water monitor
8. Rotation
 - a. Horizontal : 360°
 - b. Vertical : +80°, -45°
9. Hydrotest Pressure : 23 kg/cm² (for 5 minutes)
10. Material of Construction
 - a. Base Flange : M.S. conforming to IS: 6392
 - b. Reducer : M.S. conforming to IS: 1239 Part-II
 - c. Swivel joints Vert. & Hor. Rotation: GM to IS: 318 LTB-II
 - d. Elbow : CS Seamless to IS: 11428 Sch.40
 - e. Handle : M.S to IS: 1732
 - f. Water Barrel : M.S. conforming to IS: 1239 Part-I
 - g. Nozzle : SS304
 - h. Lock Ver. & Hor. Rotation : Brass To IS: 291
 - i. Drain Valve : Copper alloy to IS: 778
11. Painting : Paint to IS: 2932, Fire Red, Shade-536, IS: 5
12. Marking : Each Branch pipe shall be clearly permanently marked
: Manufacture's name or trade mark.
: Year of manufacture
: Size & model
: Flow & pressure
13. Test & Inspection : As per Approved QAP

DATASHEET OF WRAPPING & COATING MATERIAL

1. Type : Pypkote tape
2. Thickness of tape : 4 mm (2 layers x 2mm thk.)
3. Width of tape : 150 mm
4. Confirming to standard : AWWA C 203 / IS :15337.
5. Inspection : As per approved ICL
6. Application : For buried pipes
7. **Details of Tape**
 - a. Length : 20 meters
 - b. Softening point : 65-121⁰ C
 - c. Penetration at 25^u C : 3 to 20 dmm
 - d. Filler Percentage : 20-30%
 - e. Tensile Strength (N/5cm) : 300 (Min.) - Length wise & 100 - Cross wise
 - f. Holiday Test : As per AWWA C 203
 - g. Impact Test : As per AWWA C 203
 - h. Adhesion Test : As per AWWA C 203
8. **Details of the Primer :**
 - Type : Synthetic Chlorinated primer
 - Viscosity at 23^u C : 35-60 sec
 - Volatile Matter : < 75%
 - Drying Time : Minimum 15 minutes
 - Flash Point : > 23⁰ C
 - Coverage on Metal (Practical) @ : 6 m²/liter/coat
 - Specific Gravity : 0.9 to 0.95
 - DFT : 80-100 Micron

DATASHEET OF AIR COMPRESSOR

A. General

- | | |
|---|--|
| 1. Rated capacity (FAD) | : 25 m ³ /hr |
| 2. Discharge pressure, Kg/cm ² (g) | : 12.5 |
| 3. Quantity | : 2 Nos. (1w+1s) |
| 4. Type | : Aircooled or Water cooled, Non-Lubricated, Rotary Screw type |

B. Design & Construction Features

- | | |
|--|--|
| 1. Drive | : Electric Motor and V-Belt Driven |
| 2. Compressor duty
(Continuous/ intermittent) | : Intermittent from Receiver Pressure |
| 3. Location | : Inside Fire Water Pump House (Indoor) |
| 4. Type of cooling | : Air Cooled or water cooled |
| 5. Service | : Pressurisation of Hydro-pneumatic Tank |

C. Accessories

The package air compressor and drive shall be supplied complete with the following instrumentation and

1. Discharge Air Pressure Gauge
2. Pressure Switch to Control Actuation
3. Starter for Drive Motor
4. Pressure Relief Valve
5. Drain Valve
6. Delivery Valve

D. Notes:

1. Air Compressors shall be designed for intermittent operation with high efficiency to satisfy above Requirements
2. Compressor shall be mounted on an air receiver of ample size so that delivery air pressure is kept within (+/-) 5% of rated without excessive start-stop operations in the working cycle.
3. Drive motor shall meet the requirement mentioned in Annexure-10 (Specification for AC DC Motors)

HYDRO PNEUMATIC TANK

1.	Manufacturer	: As per Approved Vendor List
2	Type	: Vertical Cylindrical Type
3	Application	: For maintaining the pressure in Hydrant & Spray header
4	Capacity	: Min. 18.0 m ³
5	Water Space	: Min. 12 m ³
6	Working Pressure	: Discharge Pressure of Compressor (12.5Kg/cm ²)
7	Installation	: Outdoor
8	Design & Testing Code	: IS:2825/ASME, SEC-VIII Div. I
9	Construction	: Welded, fabricated at shop
10	Steel	: As per IS 2002 Gr.2A
11	Corrosion Allowance	: 2.0 mm (Min.)
12	Joint Efficiency Factor	: 0.85
13	Design Pressure	: 15 kg/cm ² (g) + 5% Margin
14	Design Temp	: 10°C higher than the maximum temperature that any part of the vessel is likely to attain in course of operation.
15	Surface Preparation and Internl & External Painting	: As per Approved Paint Schedule during
16	Paint Shade	: Fire Red
17	Inspection & Testing	: As per Approved QAP
18	Nozzle Schedule	: Refer Annexure-8 (P&ID of FWPH) for tentative nozzle schedule. Final Nozzle schedule shall be as per approved GA drg.
19	Level Indicator	: Float & Board type (As per annexure-7 (Datasheet)

20 Tank Connection & Accessories:

- a All flanged connections should be supplied complete with matching counter flanges, nuts, bolts and gasket materials
- b Bolts and nuts shall be of hexagonal head conforming to IS-1367 or equal shall be in bidder's scope of supply.
- c Gaskets shall be full-face type.
- d Level gauge with isolating valve shall be provided by bidder.
- e All instrument as indicated in Annexure-8 (pressure gauge, pressure Transmitters, level Transmitter, Solenoid valve, Safety relief valve, Level indicator, etc.) shall be in the bidder's scope.
- f Manholes/inspection hole shall be provided in the tank for providing easy access into the same by bidder.
- g Suitable ladders attached to the tank shall be provided by bidder for easy access to various instruments mounted there on .

Notes:

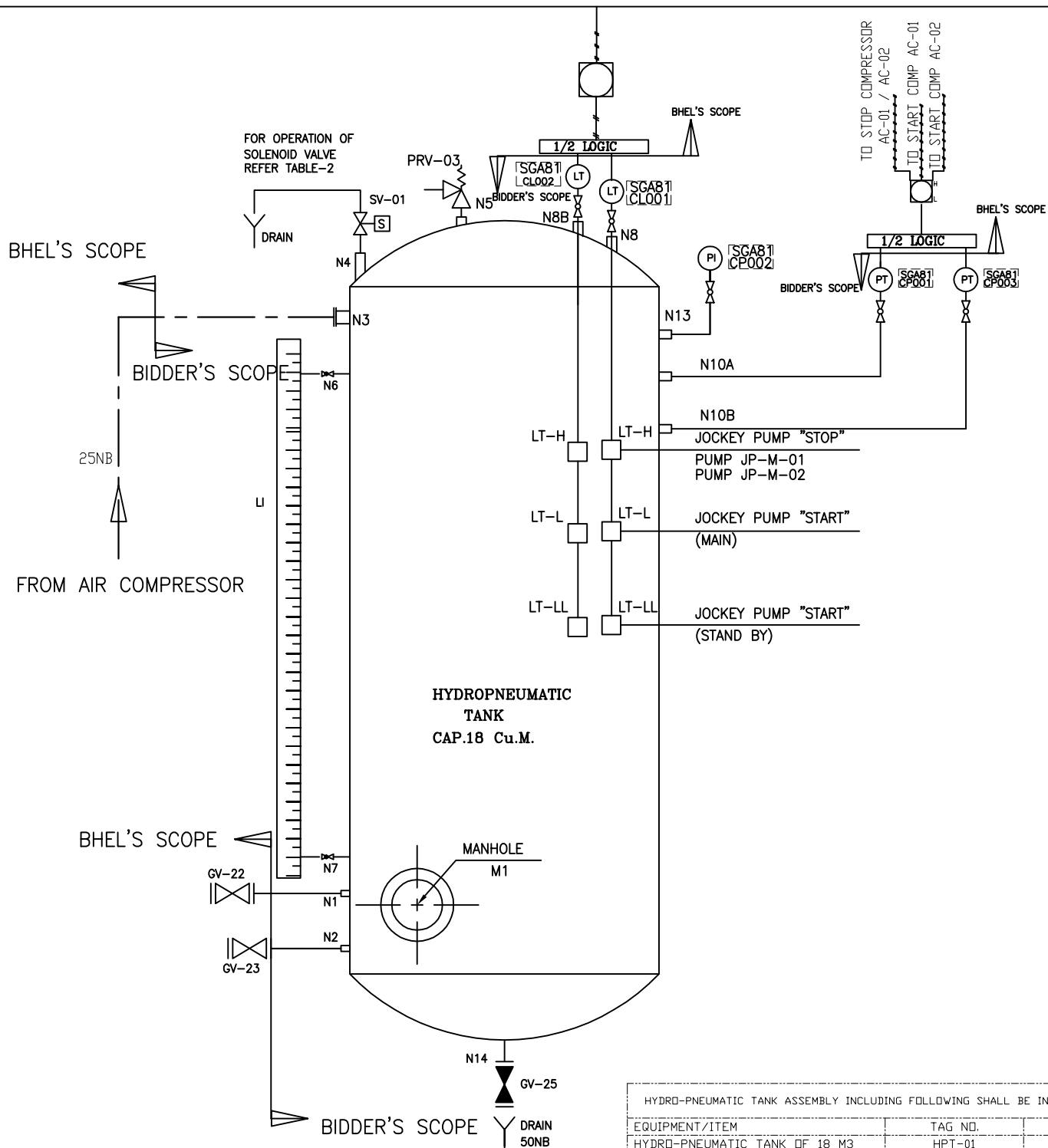
- 1 Corrosion allowance of 2 mm (minimum) on shell and dished ends shall be considered while designing the tank. Suitable mill-allowance shall also be considered for shell and dished ends. Thinning/scaling allowance of 2 mm (minimum) shall be considered for dished ends.
- 2 Bidder to indicate plate thickness after giving back-up calculation as per ASME SEC.VIII DIV.-I, Boiler & PV Code.

SAFETY RELIEF VALVE

1. Service : One (1) for Air (Pop Type - To be used in Hydro pneumatic tank)
Two (2) nos. for Fire water.
2. Code/Standard : API 520
3. Size : To be decided by bidder
5. Set Pressure : 12.5 Kg/cm² (g) for safety relief Valve in HPT
and 15 kg /cm²(g) for safety relief valve for fire water line
6. Outlet Pressure : 1 Kg/cm²(g)
7. Design Temperature : 50° C
8. Material of construction
 - a) Body : ASTM A182 Gr. F316
 - b) Inlet Seat : ASTM A182 Gr. F316
 - c) Bonnet : ASTM A182 Gr. F316
 - d) Disc : SS-316
 - e) Bolts, Nuts : IS:1367
 - f) Spring : Steel
 - g) Gasket : Teflon
9. End Connection : Screwed End, (NPT)
10. Hydrostatic Test Pressure (Body) : 30.0 Kg/cm²(g)

Notes:

- 1 Safety/Relief valves shall be of direct spring loaded type and shall have a tight, positive and precision closing.
- 2 All safety valves shall be provided with manual lifting lever.
- 3 Valves used for air and any other compressive fluid shall be of pop type
- 4 Safety/Relief valves shall be constructed and adjusted to permit the fluid to escape without increasing the pressure beyond 10% above the set blow off pressure. Valve shall reset at a pressure not less than 2.5% and more than 5% of the set pressure.
- 5 Releasing capacity of the safety/relief valves shall be as per the applicable codes and standards and shall be subject to the approval of the Engineer.



HYDRO-PNEUMATIC TANK ASSEMBLY INCLUDING FOLLOWING SHALL BE IN BIDDER'S SCOPE		
EQUIPMENT/ITEM	TAG NO.	QTY
HYDRO-PNEUMATIC TANK OF 18 M3	HPT-01	1 NO.
PRESSURE TRANSMITTERS	SGA81CP001,003	2 NOS.
LEVEL TRANSMITTER	SGA81CL001, 002	2 NOS.
SOLENOID OPERATED VALVE	SV-01	1 NO.
PRESSURE SAFETY VALVE	PRV-03	1 NO.
PRESSURE GAUGE	SGA81CP002	1 NO.
LEVEL INDICATOR	LI	1 NO.
MANHOLE	-	1 NO.
LADDER	-	1 NO.

HYDRO-PNEUMATIC TANK ASSEMBLY

ANNEXURE-8

ANNEXURE-9

TABLE-1

PRESSURE TRANSMITTER SCHEDULE FOR MAIN PUMPS & JOCKEY PUMPS

Sr. No.	PUMP TAG No.	START SIGNAL	PUMP RUNNING	PUMP FAILS TO START
		Pt. TRANSMITTER SETTING TAG No. Kg/cm ² (g)	Pt. TRANSMITTER SETTING TAG No. Kg/cm ² (g)	Pt. TRANSMITTER SETTING TAG No. Kg/cm ² (g)
1	SGA10AP001	SGA10CP002 10.0	SGA10CP002 3.0	SGA10CP001 10.0
2	SGA20AP001	SGA20CP002 9.0	SGA20CP002 3.0	SGA20CP001 9.0
3	SGA70AP001	SGA70CP002 8.0	SGA70CP002 3.0	SGA70CP001 8.0
4	SGA30AP001	SGA30CP002 7.0	SGA30CP002 3.0	SGA30CP001 7.0
5	SGA40AP001	SGA40CP002 6.0	SGA40CP002 3.0	SGA40CP001 6.0
6	SGC20AP001	SGC20CP002 10.0	SGC20CP002 3.0	SGC20CP001 10.0
7	SGC30AP001	SGC30CP002 9.0	SGC30CP002 3.0	SGC30CP001 9.0
8	SGC10AP001	SGC10CP002 8.0	SGC10CP002 3.0	SGC10CP001 8.0
9	SGA50AP001	SGA50CP002 3.0	SGA50CP002 3.0	SGA50CP002 9.0
10	SGA60AP001	SGA60CP002 3.0	SGA60CP002 3.0	SGA60CP002 9.0

The Fail to Start Annunciation for Fire Pumps is derived from Pressure TRANSMITTER placed on common PUMP delivery header with a Suitable Time Delay and for Jockey Pumps is derived from Pressure TRANSMITTER on upstream of NRV with a Suitable Time Delay.

VALVE SCHEDULE

SL. NO.	TYPE OF ITEM	TAG NOS.	QTY.	UNUSED TAG NO.
1.	GATE VALVE	GV-01 TO GV-33	29	28,29,30,31
2.	NRV	NRV-01 TO NRV-15	15	---

TABLE-2

PRESSURE TRANSMITTER/LEVEL TRANSMITTER SETTING SCHEDULE FOR AIR COMPRESSORS & HP TANK

Sr. No.	EQUIP. NAME	PT. TRANSMITTER TAG No.	LEVEL TRANSMITTER TAG No.	SETTING (MM)	SIGNAL
1	AIR COMPRESSOR #1&2	SGA81CP001	---	---	AC-01/AC-02 STOP
2	JOCKEY PUMP# 01	SGA50AP001	SGA70CL001	AT 2/3 HT OF HP TANK (LVLL-H)	STOP
3	JOCKEY PUMP# 02	SGA50AP001	SGA70CL001	500MM LESS THEN THE LV. OF "H"(LVLL-L)	START
4	JOCKEY PUMP# 01	SGA50AP001	SGA50CP002	---	RUNNING, FAIL TO START.
5	JOCKEY PUMP# 02	SGA50AP001	SGA70CL001	500MM LESS THEN THE LV. OF "L"(LVLL-L)	START
6	JOCKEY PUMP# 02	SGA60AP001	SGA60CP002	---	RUNNING, FAIL TO START.
7	HYDRO PNEUMATIC	HPT-01	SGA81CP001	12.0	HP TANK AIR PRESSURE HIGH/ SOLENOID VALVE OPEN
8	DPS	SGC11AT001/SGC11AT002	SGC11CP006	0.5	---

TABLE-3

PRESSURE TRANSMITTER/LEVEL TRANSMITTER SETTING SCHEDULE FOR HYDRANT/SPRAY HEADER AND SOLENOID VALVE

Sr. No.	EQUIPMENT DETAILS	PT. TRANSMITTER TAG No.	LEVEL TRANSMITTER TAG No.	SETTING (MM)	SIGNAL
1	HYDRANT HEADER PRESSURE	SGA11CP004	---	---	LOW
2	SPRAY HEADER PRESSURE	SGC11CP004	---	---	LOW
3	SOLENOID VALVE FOR HPT	SGA70CP001	---	---	OPEN

EQUIPMENT DATA

SL. NO.	TAG NO.	EQUIPMENT DESCRIPTION	QTY	CAPACITY (M ³ /Hr)	HEAD (TDH)
1	SGA10AP001	MOTOR DRIVEN HYDRANT MAIN PUMP# 01	01	410	115
2	SGA20AP001	MOTOR DRIVEN HYDRANT MAIN PUMP# 02	01	410	115
3	SGA70AP001	MOTOR DRIVEN HYDRANT MAIN PUMP# 03	01	410	115
4	SGA30AP001	DIESEL ENGINE HYDRANT STANDBY PUMP# 01	01	410	115
5	SGA40AP001	DIESEL ENGINE HYDRANT STANDBY PUMP# 02	01	410	115
6	SGC10AP001	DIESEL ENGINE SPRAY STANDBY PUMP# 01	01	410	115
7	SGC20AP001	MOTOR DRIVEN SPRAY MAIN PUMP# 01	01	410	115
8	SGC30AP001	MOTOR DRIVEN SPRAY MAIN PUMP# 02	01	410	115
9	SGA50AP001	MOTOR DRIVEN JOCKEY MAIN PUMP# 01	01	40	120
10	SGA60AP001	MOTOR DRIVEN JOCKEY STANDBY PUMP	01	40	120
11	SGA80AN001	AIR COMPRESSOR (WORKING)	01	25	12.5
12	SGA80AN002	AIR COMPRESSOR (STANDBY)	01	25	12.5

NOTE: PUMP HEAD IS REVISED AS PER HYDRAULIC CAL OF HYDRANT AND SPRAY NETWORK.



SCHEDULE OF INSTRUMENTS

SL. NO.	TYPE OF INSTRUMENTS	DESCRIPTION	QTY
1	PRESSURE TRANSMITTER (PT)	---	20
2	PRESSURE INDICATOR (PI)	---	15
3	LEVEL TRANSMITTER (LT)	---	05
4	DIFFERENTIAL PRESSURE SWITCH (DPS)	DPS-01	01
5	DIFFERENTIAL PRESSURE GAUGE (DPG)	DPG-01	01
6	PRESSURE RELIEF VALVE (PRV)	PRV-01 TO PRV-03	03
7	SOLENOID VALVE (SV)	SV-01	01

EQUIPMENT DATA

SL. NO.	DESCRIPTION	CAPACITY (M ³ /Hr)	NO. OF PUMPS	VELOCITY	DIA.	EQUI. DIA.
1	OUTLET PIPE OF EACH HYDANT PUMP	410	01	03	220	250
2	OUTLET PIPE OF EACH SPRAY PUMP	410	01	03	220	250
3	OUTLET PIPE OF EACH JOCKEY PUMP	40	01	03	68.7	80
4	COMMON DELIVERY HYDRANT HEADER	410	03	4.8	301	400
5	COMMON DELIVERY SPRAY HEADER	410	02	4.8	246	250

NOTE:

- ALL PUMPS SHALL HAVE MAUNAL STARTING IN ADDITION TO AUTO START
- SUBSEQUENT PUMPS SHALL START AFTER A TIME DELAY OF 10 SEC UPON INITIATING SIGNAL FROM RESPECTIVE PRESSURE TRANSMITTER
- MAIN PUMP SHALL BE STOPPED BY MANUAL OPERATION ONLY
- EXHAUST OF ENGINES SHALL BE ROUTED AT SAFE ELEVATIONS OUTSIDE THE PUMP HOUSE
- CONTROL AND MONITORING OF ALL EQUIPMENTS OF FWPH SHALL BE FROM THE PROGRAMMABLE LOGIC CONTROL (PLC) LOCATED IN THE FIRE PUMP HOUSE
- MAX. PRESSURE DROP IN BASKET STRAINER IS 0.5 KG/CM²
- COOLING WATER CIRCUIT AND DIESEL TANK WITH ALL ASSOCIATED ACCESSORIES SHALL BE IN PACKAGE VENDOR SCOPE.

CUSTOMER: TELANGA STATE POWER GENERATION CORPORATION LTD.

CLIENT: DESEIN PRIVATE LIMITED.

PROJECT: BHADRADI TPS, UNITS # 1 TO 4 (4X270 MW), MANUGURU

KHAMMAM DISTRICT, TELANGANA.

Bharat Heavy Electricals Ltd. HYDERABAD

PROJECT ENGS & SYSTEMS DIVISION

DEPT. PE & SD

UNITS, DMS, C/W/P

SCALE N.A.

WEIGHT (KG) N.A.

REF. TO ASSY. Dwg. N.A.

ITEM NO. N.A.

REV. 05

SHEET 1 OF 1

SIZE-A1

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

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

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ANNEXURE-10

CHECKLIST FOR HYDRANT BASED COMPONENTS PACKAGE
PROJECT- 4 x 270 MW BHADRADRI TPS,
SPEC NO: PY51276 Rev 00

Description	Enclosed (Yes/ No)
Bidder to confirm to the scope of supply as per Cl. No. 4.0 as per Specification No. PY51276 Rev R0.	
Bidder to confirm the list of special tools & tackles (Refer Cl. No. 4.2 of Specification No. PY51276 Rev R0)	
Bidder's confirmation required for furnishing a list of 2 year recommended spares in their offer separately with optional price. (Refer Cl. No. 4.3.1 of Specification No. PY51276 Rev R0)	
Bidder to furnish a list of Start-up Commissioning Spares (Refer Cl. No. 4.3.2 of Specification No. PY51276 Rev R0)	
Bidder to confirm the list of documents shall be provided as per the master document list (Annexure-3).	
Bidder to quote as per BHEL price format only. Price quoted as per the price bid format, clearly indicating all the applicable items are quoted, and not applicable items are clearly highlighted. Un priced copy of the same is enclosed. [Refer Annexure-1]	
Confirm that all Inspection & acceptance, type Tests as required for each equipment, as per specification (Refer Cl. No. 8 of Specification No. PY51276 Rev R0) and Codes attached.	

DATE: _____

SIGNATURE:
NAME:
DESIGNATION:
COMPANY: _____