


TTTD-106-1 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615
				Rev No. 01
				Page 1 of 30


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.


TECHNICAL SPECIFICATION
FOR
INERT GAS EXTINGUISHING SYSTEM


PROJECT : 3 x 800 MW NTPC PATRATU STPP
CUSTOMER : NTPC


		Revisions :	Prepared by:	Checked by:	Approved By:	Date
—	—		-SD-	-SD-	-SD-	
—	—	01	RAVITEJA JETTI	D V PRASHANT	P C SEKHAR	07/07/2021


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 2 of 30
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.		<p>1. INTENT OF SPECIFICATION:</p> <p>The intent of this document is to establish the minimum requirement of design, engineering, supply, selection, selection, manufacture, assembly, inspection, shop testing, shop painting, transportation and delivery at Patratu site in proper condition and supervision of Erection & Commissioning at site for the Inert Gas Extinguishing System, which forms part of this 3 x 800 MW NTPC Patratu project at Patratu, Jharkhand.</p> <p>The equipment and supply shall conform to high standard of engineering and applicable codes/standards and shall be capable of performing intended operation in a manner acceptable to the Purchaser and end customer</p> <p>2. SPECIAL NOTES TO BIDDERS</p> <p>2.1. This specification shall be read in conjunction with all its annexures listed later in this specification. In case of any discrepancy arising between this specification & its annexures, the most stringent of all (as determined by purchaser) shall be followed. Further, if a requirement in this specification or any of the annexures, calls for a decision from the Purchaser, it shall be bidder's sole responsibility to clearly bring out/highlight the same distinctively in his pre-bid queries (Annexure-7), so as to enable purchaser to furnish their decision/clarification. If such issues/requirements are not duly addressed by bidder during the pre-bid stage and if such issues/requirements are observed later during order execution stage, it shall be binding on the bidder to comply with the final decision made by the purchaser subsequently, without any cost, delivery, or any other commercial implications.</p> <p>2.2. All materials supplied under this contract shall be new and unused.</p> <p>2.3. All equipment/items as applicable, shall be UL/FM/VDs/LPCB approved.</p> <p>2.4. Any additional equipment, material, services etc., which are not specifically mentioned in this specification, but required to make the IGES complete in all respects, in accordance with the intent of this technical specification, contractual agreement, statutory requirements, relevant/applicable codes/standards, good engineering practices, and for safe and trouble-free operation, shall be deemed to be covered under the scope of this specification.</p> <p>2.5. All mounting hardware/ accessories/fittings etc. required for the erection of Inert gas Extinguishing System shall be included in the scope of bidder and the same shall be included in the base price even if such items are not explicitly mentioned in this specification.</p> <p>2.6. The Bidder shall accept full responsibility for the completeness and for the faultless working of all the equipments and the IGES system as a whole.</p>		
Ref. Doc				


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 3 of 30						
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.		<p>2.7. Bidder offer shall be strictly as per these specification requirements. Unsolicited or Alternate offers from the bidders will not be entertained.</p> <p>2.8. 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.</p> <p>3. PROJECT DESCRIPTION</p> <table border="1" data-bbox="416 689 1152 813"> <tr> <td>Owner</td> <td>Nation Thermal Power Corporation (NTPC)</td> </tr> <tr> <td>Project</td> <td>3 x 800 MW Patratu STPP</td> </tr> <tr> <td>Location</td> <td>Patratu, Jharkhand</td> </tr> </table> <p>4. GENERAL SYSTEM REQUIREMENT</p> <p>4.1. For the design of the plant, it is necessary not only to consider the requirements of operation, but also, by suitably planning the layout, the convenience of inspection, cleaning, maintenance and repair.</p> <p>4.2. In order to achieve the reliability, high efficiency and safe operation of the plant, it is also necessary to consider various precautions to safeguard the operating and maintenance personnel.</p> <p>4.3. After award of work, before finalizing especially the layout/Zones of system, pipe routes and other services, the bidder shall carry out a site survey to identify the location & details of existing facilities that may interfere with his proposed facilities. He shall suitably modify his layout/levels to prevent dislocation of existing facilities without any commercial implication to the purchaser.</p> <p>4.4. The dimensions of the cylinder rooms are (11.8m x 11.3m), (11.3m x 10.7m)(6.5m x 5m) and (4.5m x 5m) for each inert gas extinguishing system is already finalized and cannot be changed now. Bidder to select the system (as per NFPA-2001 guidelines) to which while meeting the intended requirement as per the specification and shall be properly housed in the inert gas cylinder room. Adequate space for Operation & Maintenance of cylinder shall also be considered while selecting the inert gas system.</p> <p>4.5. If during the execution of works it is found that there is interference with other facilities / structures, the Bidder shall revise his design/detailed drawings to clear the interference and shall provide all necessary measures for the safety of structures under construction. No claim in terms of cost or relaxation in time shall be entertained for any redesign, rework and for the safety measures provided.</p>			Owner	Nation Thermal Power Corporation (NTPC)	Project	3 x 800 MW Patratu STPP	Location	Patratu, Jharkhand
Owner	Nation Thermal Power Corporation (NTPC)									
Project	3 x 800 MW Patratu STPP									
Location	Patratu, Jharkhand									
Ref. Doc										


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 4 of 30
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.		<p>4.6. Bidder is also required to provide on the job training to Purchaser /End Customer's operation personnel by associating them in all the day to day pre-commissioning, commissioning and maintenance activities and process operations. The cost of all such training shall be deemed to be included in the price quoted by the bidder. Bidder shall not be eligible to raise any extra claim in this regard.</p> <p>5. APPLICABLE CODES & STANDARDS</p> <p>i. The design, engineering, installation, testing, commissioning of the package shall be as per all relevant & applicable codes/standards, however specifically the following :</p> <ul style="list-style-type: none"> ➤ NFPA 2001: National Fire Protection (Standard on Clean Agent Fire Extiguishing System) ➤ VDS – Flow calulations of the system ➤ UL/FM/LPCB/VdS approval for IGES equipment such as cylinders, contact gauges, pressure regulators etc. ➤ ASTM A 106 - Piping ➤ ASTM A 105, Grade WPB, ANSIB-16.9 for 65 NB & Above - Butt Weld Fittings ➤ ASTM A-105, ANSI B-16.11 for 50 NB & Below – Socket Weld Weld fittings ➤ ANSI B-16.5, Class 1500 # - Flanges ➤ IS 2932 : Enamel , synthetic , Exterior ➤ IS:1248(Part I)-1983 -Direct acting indicating analogue electrical measuring and their accessories: Part I General requirements(Second revision) ➤ IS:1248(Part II)-1983 -Direct acting indicating analogue electrical measuring instruments and their accessories: Part II Ammeters and Voltmeters (Second revision) ➤ IS:6236-1971-Direct recording electrical measuring instrument (Reaffirmed 1987) ➤ IS: 2419-1979 -Dimensions for Panel mounted indicating & recording electrical instruments (first revision) (with Amendment No.1.) ➤ IS:8573-1977 -Digital electronic DC voltmeters and DC electronic analogue-to-digital convertors(with Amendment No.1) (Reaffirmed1991) 		
Ref. Doc				


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 5 of 30
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.		<ul style="list-style-type: none"> ➤ ANSI B 16.5 - Pipe flanges and flanged fittings. ➤ SMPV rules , PESO Nagpur (For Storage Cylinders) ➤ Clean Agent Manufacturer’s recommendations ➤ VDE: 0150, protection against corrosion due to stray currents from DC installations. ➤ Statutory Requirements <p>ii. Requirements of the following local statutory authorities (as applicable) shall be taken into account for compliance:</p> <ul style="list-style-type: none"> a. VDE : 0150, protection against corrosion due to stray currents from DC installations. b. DIN : 30676 c. Requirement of Petroleum & Explosives Safety Organization (PESO), Nagpur, India. <p>iii. 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.</p> <p>iv. All addenda including the latest addenda to all the above codes and standards (latest editions) shall be followed by the bidder.</p> <p>v. All the legal formalities including preparation of documents, furnishing clarifications, information etc. as and when required, for obtaining any of the permissions and approvals related to the IGES will have to be done by the bidder.</p> <p>Note:</p> <p>Bidder to follow all other applicable statutory rules and regulations of India during manufacturing, procurement & transportation of the IGES components.</p> <p>6. BIDDER’S SCOPE OF WORK</p> <p>Separate Inert Gas Extinguishing System shall be provided for following buildings as mentioned below:-</p> <p>6.1. Unit – 1 TG Building</p> <ul style="list-style-type: none"> - Control room - Central Equipment Room (CER) - Computer room 		
Ref. Doc				

TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 6 of 30
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.		<div data-bbox="373 309 793 456"> <ul style="list-style-type: none"> - C&I Engg Room - Conference Room - Programmer Room - UPS Panel & Charger Room </div> <div data-bbox="229 501 576 535"> 6.2. Unit – 2 TG Building </div> <div data-bbox="373 580 842 846"> <ul style="list-style-type: none"> - Control room - Central Equipment Room (CER) - Computer room - C&I Engg Room - Conference Room - Programmer Room - UPS Panel & Charger Room </div> <div data-bbox="229 891 453 925"> 6.3. IT Building </div> <div data-bbox="373 969 604 1039"> <ul style="list-style-type: none"> - UPS Room - Server Room </div> <div data-bbox="229 1084 497 1117"> 6.4. Adim Building </div> <div data-bbox="373 1162 761 1276"> <ul style="list-style-type: none"> - Simulator Training Room - UPS Room - Programming Room </div> <div data-bbox="229 1321 1142 1355"> 6.5. Each IGES system should include the following minimum items: </div> <div data-bbox="309 1400 1500 1973"> <ol style="list-style-type: none"> a) One (01) Inert Gas Release Panel. b) 1 lot of Inert Gas Cylinders required for the system along with same no. of spare cylinders. Including solenoid valves, directional valves, pilot manifold etc. and shall be FM/UL/Vds/LPCB approved. c) 1 Lot of Piping & fittings, pressure gauges, nozzles, threadolets, weldolets, socketolets & all other equipment/accessories required for completion of system. d) One lot of Armoured cables including interface cables with Fire Alarm panel and related erection hardware. e) One lot of Inert gas Discharge Warning Signs f) One lot of gas discharge EPB & inhibitor unit </div>		
Ref. Doc				

TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 7 of 30
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.		<p>g) One lot of Pressure Operated Switches</p> <p>h) One lot of Pressure Relief Vents</p> <p>i) First Fill of consumables</p> <p>j) Erection & Commissioning spares</p> <p>k) One lot of erection hardware</p> <p>l) Special tools & tackles</p> <p>m) Mandatory spares</p> <p>n) Items like Trolleys, etc required for Refilling & Maintenance of Inert Gas cylinders.</p> <p>o) Other items not specified but required to complete the system in all respects.</p> <p>p) Engineering of Inert Gas Extinguishing System</p> <p>NOTE:</p> <ul style="list-style-type: none"> • The performance test of the system shall be carried out by releasing the agent gas in a selected area and design parameters shall be measured. All equipments, refilling of gas after test, instruments etc shall be provided by the bidder for the same. • The offered IGES shall be in designed as per NFPA-2001. • BOQ of inert gas pipes and cables shall be considered by considering welding allowances, cutting allowances etc. In addition to this, as inert gas extinguishing system is site intensive package, a margin of 10% shall be considered over total BOQ and shall be reflected in each layout drawing. • All erection hardware including structural steel, pipe fittings, brackets, U clamps, nuts & bolts, base plates, anchor fastners, cable clamps, conduits, cable ties (considering a margin of at least 10% over the total quantity, as inert gas extinguishing system is site intensive package) etc. that are required for the erection of inert gas extinguishing system (as per the scope of this bid) shall be included in the scope of bidder and the same shall be included in the base price. • Cables shall be as per annexure attached to this specification. 		
Ref. Doc				

TD-106-2 Rev No. 5 Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615																									
			Rev No. 01																									
			Page 8 of 30																									
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.	<ul style="list-style-type: none"> The input drawings are furnished along with the specification. The same may also be used for estimation of cables. Further, for quoting purpose bidder to consider a cable distance of 150 mtrs between Gas Release panel and Fire Alarm panel. 																											
	6.6. Camlock coupling along with SS flexible Hoses:																											
	<table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Item Description</th> <th>End Connection Type</th> <th>Main Quantity (Nos.)</th> <th>Spare Quantity (Nos.)</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>SS 304 Flexible Hose 100NB x 25 M Long</td> <td>Both end flanged. Flanged as per ANSI B 16.5</td> <td>4</td> <td>1</td> </tr> <tr> <td>2.</td> <td>SS 304 Flexible Hose 25NB x 25 M Long</td> <td>Both end flanged. Flanged as per ANSI B 16.5</td> <td>4</td> <td>1</td> </tr> <tr> <td>3.</td> <td>SS 304 Flexible Hose 150NB x 25 M Long</td> <td>One end Flanged as per ANSI B 16.5 Other end male CAM coupler.</td> <td>2</td> <td>1</td> </tr> <tr> <td>4.</td> <td>Matching (Hose End Coupling) Camlock Coupling (SS 304) With One End Flanged (150 NB Size)</td> <td>One end Flanged as per ANSI B 16.5 Other end female CAM coupler (matching with flexible hose mentioned at sl. no. 3)</td> <td>30</td> <td>0</td> </tr> </tbody> </table>				Sl. No.	Item Description	End Connection Type	Main Quantity (Nos.)	Spare Quantity (Nos.)	1.	SS 304 Flexible Hose 100NB x 25 M Long	Both end flanged. Flanged as per ANSI B 16.5	4	1	2.	SS 304 Flexible Hose 25NB x 25 M Long	Both end flanged. Flanged as per ANSI B 16.5	4	1	3.	SS 304 Flexible Hose 150NB x 25 M Long	One end Flanged as per ANSI B 16.5 Other end male CAM coupler.	2	1	4.	Matching (Hose End Coupling) Camlock Coupling (SS 304) With One End Flanged (150 NB Size)	One end Flanged as per ANSI B 16.5 Other end female CAM coupler (matching with flexible hose mentioned at sl. no. 3)	30
Sl. No.	Item Description	End Connection Type	Main Quantity (Nos.)	Spare Quantity (Nos.)																								
1.	SS 304 Flexible Hose 100NB x 25 M Long	Both end flanged. Flanged as per ANSI B 16.5	4	1																								
2.	SS 304 Flexible Hose 25NB x 25 M Long	Both end flanged. Flanged as per ANSI B 16.5	4	1																								
3.	SS 304 Flexible Hose 150NB x 25 M Long	One end Flanged as per ANSI B 16.5 Other end male CAM coupler.	2	1																								
4.	Matching (Hose End Coupling) Camlock Coupling (SS 304) With One End Flanged (150 NB Size)	One end Flanged as per ANSI B 16.5 Other end female CAM coupler (matching with flexible hose mentioned at sl. no. 3)	30	0																								
<p>Note: -</p> <ul style="list-style-type: none"> All above items shall be as per BS 6501 Please refer Annexure-16 for details QAP for camlock coupling & hoses shall be submitted separately during detail engineering 																												
6.7. Special tools and tackles:																												
a) The bidder shall furnish the following special tools required for operation and maintenance of the system supplied, as a part of scope of supply:																												
<table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Multimeter</td> <td>1 no.</td> </tr> <tr> <td>2.</td> <td>Hand drilling machine with complete set drill bit</td> <td>1 set</td> </tr> <tr> <td>3.</td> <td>Hammer</td> <td>1 no.</td> </tr> <tr> <td>4.</td> <td>Hexaframe</td> <td>1 no.</td> </tr> <tr> <td>5.</td> <td>Instrument Box</td> <td>1 no.</td> </tr> </tbody> </table>				Sl. No.	Description	Quantity	1.	Multimeter	1 no.	2.	Hand drilling machine with complete set drill bit	1 set	3.	Hammer	1 no.	4.	Hexaframe	1 no.	5.	Instrument Box	1 no.							
Sl. No.	Description	Quantity																										
1.	Multimeter	1 no.																										
2.	Hand drilling machine with complete set drill bit	1 set																										
3.	Hammer	1 no.																										
4.	Hexaframe	1 no.																										
5.	Instrument Box	1 no.																										
Ref. Doc																												

TD-106-2 Rev No. 5 Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615																											
			Rev No. 01																											
			Page 9 of 30																											
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	<table border="1"> <tr> <td>6.</td> <td>Insulation Pliers</td> <td>1 no.</td> </tr> <tr> <td>7.</td> <td>Nose Pliers</td> <td>1 no.</td> </tr> <tr> <td>8.</td> <td>Screw Driver</td> <td>1 no.</td> </tr> <tr> <td>9.</td> <td>First Aid Box</td> <td>1 no.</td> </tr> </table> <p>Any other tools required for repairs and maintenance but not mentioned above shall be supplied by the bidder.</p> <p>b) All special tools and tackles which are necessary or convenient for erection and commissioning of the Inert Gas Extinguishing System shall be supplied at site by bidder. Price of these items shall be construed to be included in the main package price. No separate price for the same shall be offered</p> <p>c) All the special tools and tackles shall be shipped in separate heavily constructed wooden boxes.</p> <p><u>Notes:</u></p> <ul style="list-style-type: none"> All Tools and tackles required for dismantling, maintenance, adjustment, and calibration of the all the equipments that form part of Inert Gas Extinguishing System shall be supplied. Bidder shall provide all equipment like trolleys, etc. required for Refilling & Maintenance of Inert Gas cylinders. Bidder to note that if at a later stage the requirement of any other special tool & tackles is required for the Package, same has to be supplied by bidder without any delivery or commercial implication. Decision of the Purchaser regarding the requirement of any additional tools and tackles will be final and binding on the Purchaser. All special tools and tackles shall be handed over purchaser, prior to the issuance of the PROVISIONAL ACCEPTANCE CERTIFICATE for the IGES. <p>6.8. Mandatory Spares for IGES:</p> <p>The following specified spare parts shall be supplied. The price for each listed special spare part shall be quoted individually in the Price Bid Format, the total price is included in the total contract price.</p> <table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Nozzles</td> <td>2 Nos. of each size/type</td> </tr> <tr> <td>2.</td> <td>Automatic & Manual release system</td> <td>1 No. of each size/type</td> </tr> <tr> <td>3.</td> <td>Cylinder valve with safety pressure relief device</td> <td>1 No. of each size/type</td> </tr> <tr> <td>4.</td> <td>Flexible hoses</td> <td>5 Nos. of each size/type</td> </tr> </tbody> </table>			6.	Insulation Pliers	1 no.	7.	Nose Pliers	1 no.	8.	Screw Driver	1 no.	9.	First Aid Box	1 no.	Sl. No.	Description	Quantity	1.	Nozzles	2 Nos. of each size/type	2.	Automatic & Manual release system	1 No. of each size/type	3.	Cylinder valve with safety pressure relief device	1 No. of each size/type	4.	Flexible hoses	5 Nos. of each size/type
	6.	Insulation Pliers	1 no.																											
7.	Nose Pliers	1 no.																												
8.	Screw Driver	1 no.																												
9.	First Aid Box	1 no.																												
Sl. No.	Description	Quantity																												
1.	Nozzles	2 Nos. of each size/type																												
2.	Automatic & Manual release system	1 No. of each size/type																												
3.	Cylinder valve with safety pressure relief device	1 No. of each size/type																												
4.	Flexible hoses	5 Nos. of each size/type																												
Ref. Doc																														

TD-106-2 Rev No. 5 Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615
			Rev No. 01
			Page 10 of 30


5.	Solenoid coils	2 Nos. of each size/type
----	----------------	--------------------------


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.


7. PRODUCT DESCRIPTION


7.1. Gas release panel:


- a) This Panel shall be designed and manufactured keeping in mind the ease of installation. Operating and maintenance of the panel and the associated system accessories. The design shall be totally modular in concept and in the unlikely even of any fault developing in the panel; the system can be brought back on line by simply replacing the faulty PCB module.
- b) Panel shall be located in inert gas cylinder room.
- c) The panel shall be provided with automatic Electronic battery charger unit, which will keep the backup batteries fully charged. The panel has various input/output modules. Each indication and control is labeled with easy to understand making it very simple to understand.
- d) 230V AC, 1 phase, 50Hz shall be provided at one point for Gas release panel. Further distribution if needed shall be in bidder's scope.
- e) Gas Release Panel shall be provided with battery backup of 24 hours in normal condition and 0.5 hours in alarm condition. The panel shall also have the capability for both trickle and boost charging of the batteries.
- f) The control panel consists of a lockable front door fitted with a 3 mm thick acrylic sheet, enabling visualizes the various indications and controls within the housing. The unit shall be designed in such a way so as to facilitate servicing. Cable entry shall from Bottom and removable plate shall be provided for cable entry.
- g) Its use ability to utilize conventional devices any make, MCP and potential free contact shall be read from other panel. It shall be the most flexible and reliable system in the life safety field. Panel shall be capable of monitor each zone cable and DV, Cylinder sol. valve.
- h) Suitable selector switches shall be provided for "Main/Standby" cylinder bank supply selection.
- i) Facility for manual release of gas/manual abort of gas release through push buttons shall be provided. along with selection facility of "Auto/Manual" from the panel.
- j) Following are the minimum signals required through potential free contacts of gas release panel:


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 11 of 30
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.		<ul style="list-style-type: none"> • Pre-Discharge (one each for each zone) • Gas Discharged (one each for each zone) <p>Any other signals for which potential free contacts are required shall be finalized during detailed engineering.</p> <p>7.2. Inert Gas Cylinders:</p> <ol style="list-style-type: none"> 2 sets of inert gas cylinder (one working + one standby) banks for each of the IGES shall be provided in a separate Clean Agent Room and securely installed with a provision for convenient individual servicing. The design pressure for storage cylinders shall be suitable for the maximum pressure developed at 550C and shall be designed to meet the requirements in NFPA-2001. All cylinders shall bear the marking as detailed out in NFPA - 2001 and shall be duly listed by UL / FM / VDS / LPCB in addition to approval by CHIEF CONTROLLER OF EXPLOSIVES – INDIA (PESO). The storage cylinders shall have accessories such as contact gauges/pressure gauges/switches, liquid level indicators (if applicable), refilling connections, relief devices (if applicable) etc. A reliable means of indication shall be provided to determine the pressure in cylinders. All the contact gauges/pressure gauges/switches, manifold connections etc. shall be easily removable for servicing/maintenance without any loss of gas. Automatic means such as check valves shall be provided to prevent gas loss, if the system is operated, when any containers are removed for maintenance. The storage containers shall not be charged to a fill density or super pressurization level different from the manufacturer's listing. All the inert gas agent cylinders shall have a permanent nameplate or permanent marking to indicate details as mentoned in Cl. 4.1.4.2 of NFPA – 2001. <p>7.3. Pipes, Fittings & other Operating devices:</p> <ol style="list-style-type: none"> Piping shall be of noncombustible material. The selection of the pipe shall be as per NFPA-2001. Pipe joints other than threaded, welded, brazed, flared, compression, or flanged type shall be listed or approved. 		
Ref. Doc				


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 12 of 30
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.		<p>c) The fittings shall withstand a minimum rated working pressure as mentioned in NFPA-2001. The selection of the fittings shall also be inline with requirements of NFPA-2001.</p> <p>d) The pressure relieving device (if any) shall be designed for the maximum design pressure of the system and shall conform to the requirements of NFPA-2001 or as specified by listing authorities.</p> <p>7.4. Valves:</p> <p>a) All valves shall be listed or approved for the intended use.</p> <p>b) All gaskets, O-rings, sealants, and other valve components shall be constructed of materials that are compatible with the agent. Valves shall be protected against mechanical, chemical, or other damage.</p> <p>c) Special corrosion-resistant materials or coatings shall be used in severely corrosive atmospheres.</p> <p>d) Where directional valves are used for multihazard protection, the directional valves shall be listed or approved for use with the installed suppression system.</p> <p>e) Where directional valves are used for multihazard protection, the control equipment shall be specifically listed for the number, type, and operation of those valves.</p> <p>7.5. Nozzles:</p> <p>a) Discharge nozzles along with deflector shields shall be listed and quantity & design shall be such that complete quantity of gas is uniformly distributed throughout the hazard volume within the specified discharge time without disturbing the ceilings, lighting fixtures etc.</p> <p>b) Discharge nozzles shall conform to NFPA 2001 and shall be FM/UL/LCPB/Vds approved.</p> <p>c) Discharge nozzles used in the system shall be listed for the use intended for discharge characteristics.</p> <p>d) Listing criteria shall include flow characteristics, area coverage, height limits, and minimum pressures. Discharge orifices and discharge orifice plates and inserts shall be of a material that is corrosion resistant to the agent used and the atmosphere in the intended application.</p> <p>e) Special corrosion-resistant materials or coatings shall be required in severely corrosive atmospheres.</p>		
	Ref. Doc			


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 13 of 30
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.		<p>f) The selection of nozzle orifice shall be such discharge time required to achieve 95% of the minimum design concentration for flame extinguishment based on 35% safety factor shall not exceed 120 seconds for the inert gas selected as per NFPA 2001.</p> <p>g) Each nozzle shall be permanently marked to identify the manufacturer as well as type and size of orifice.</p> <p>h) Where clogging by external foreign materials is likely, discharge nozzles shall be provided with frangible discs, blowoff caps, or other suitable devices. These devices shall provide an unobstructed opening upon system operation and shall be located so they will not injure personnel.</p> <p>7.6. Warning Signs:</p> <p>a) Alarms or indicators or both shall be used to indicate the operation of the system, hazards to personnel, or failure of any supervised device.</p> <p>b) Audio and visual pre-discharge alarms shall be provided within the protected area to give positive warning of impending discharge.</p> <p>c) The operation of the warning devices shall continue after agent discharge until positive action has been taken to acknowledge the alarm.</p> <p>d) Alarms indicating failure of supervised devices or equipment shall give prompt and positive indication of any failure and shall be distinctive from alarms indicating operation or hazardous conditions.</p> <p>e) Warning and instruction signs shall be provided at the entrances to and inside the protected areas.</p> <p>f) The safety sign format and color and the letter style of the signal words shall be in accordance with ANSI Z535.</p> <p>g) Abort switches shall be located within the protected area and shall be located near the means of egress for the area. The abort switch shall be of a type that requires constant manual pressure to cause abort. In all cases, the normal manual control and the manual emergency control shall override the abort function. Operation of the abort function shall result in both audible and distinct visual indication of system impairment. The abort switch shall be clearly recognizable for the purpose intended.</p> <p>7.7. Operating Devices:</p> <p>a) Operating devices shall include agent-releasing devices or valves, discharge controls, and shutdown equipment necessary for successful performance of the system.</p>		
Ref. Doc				


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 14 of 30
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.		<ul style="list-style-type: none"> b) Operation shall be by listed mechanical, electrical, or pneumatic means. An adequate and reliable source of energy shall be used. c) All devices shall be designed for the service they will encounter and shall not readily be rendered inoperative or susceptible to accidental operation. Devices normally shall be designed to function properly from –20°F to 130°F (–29°C to 54°C) or marked to indicate temperature limitations. d) All devices shall be located, installed, or suitably protected so that they are not subject to mechanical, chemical, or other damage that would render them inoperative. e) A means of manual release of the system shall be provided. Manual release shall be accomplished by a mechanical manual release or by an electrical manual release when the control equipment monitors the battery voltage level of the standby battery supply and provides a low-battery signal. The release shall cause simultaneous operation of automatically operated valves controlling agent release and distribution. f) A discharge pressure switch shall be required where mechanical system actuation is possible. g) The discharge pressure switch shall provide an alarm initiating signal to the releasing panel. h) The normal manual control(s) for actuation shall be located for easy accessibility at all times, including at the time of a fire. i) The manual control(s) shall be of distinct appearance and clearly recognizable for the purpose intended. j) Operation of any manual control shall cause the complete system to operate as designed. k) Manual controls shall not require a pull of more than 40 lb (178 N) nor a movement of more than 14 in. (356 mm) to secure operation. At least one manual control for activation shall be located not more than 4 ft (1.2 m) above the floor. l) Where gas pressure from the system or pilot containers is used as a means for releasing the remaining containers, the supply and discharge rate shall be designed for releasing all the remaining containers. m) All devices for shutting down supplementary equipment shall be considered integral parts of the system and shall function with the system operation. 		
Ref. Doc				


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 15 of 30
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.		<p>n) All manual operating devices shall be identified as to the hazard they protect.</p> <p>7.8. Pressure Relief Vents:</p> <p>a) Pressure relief vent area, or equivalent leakage area, shall be calculated and provided for the protected enclosure to prevent development, during system discharge, of a pressure difference across the enclosure boundaries that exceeds a specified enclosure pressure limit.</p> <p>7.9. First Fill of Consumable:</p> <p>a) All the first fill consumables like gas etc. and replacements, if any, are in bidder scope till successful handing over of plant to BHEL after successful completion of erection and commissioning and /or site performance test.</p> <p>b) Price of these items shall be construed to be included in the main package price. No separate price for the same shall be offered.</p> <p>i. Refilling of Inert Gas Cylinders after Dump test</p> <p>7.10. Erection & Commissioning Spares</p> <p>a) All commissioning spares as required during erection and commissioning of the Inert Gas Extinguishing system is included in bidder's scope.</p> <p>b) Bidder to ensure that all the spares are procured from the original equipment manufacturers (as per their recommendation) and shall make them available at site well before the start of commissioning activities.</p> <p>c) Bidder shall also ensure supply of all erection & commissioning spares along with main equipment as per his experience, for replacement of damaged or unserviceable ones during the execution of the project by bidder at site, to avoid delay in the project schedule.</p> <p>d) Price of all the above items shall be construed to be included in the main package price. No separate price for the same shall be offered.</p> <p>8. BIDDER'S SCOPE OF SERVICES</p> <p>8.1. Supervision of erection & commissioning</p> <p>a) The performance test of the system shall be carried out by releasing the agent gas in a selected area and design parameters shall be measured. All equipments, refilling of gas after test, instruments etc shall be provided by the bidder for the same.</p>		
Ref. Doc				


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 16 of 30
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.		<p>b) Supervision of erection, commissioning & performance testing at site for the supplied system shall be included in bidder's scope of service.</p> <p>c) Bidder to note that the supervision charges for erection & commissioning shall consists of the following:</p> <ul style="list-style-type: none"> • Per day supervision charges of an Engineer including all other expenses like boarding, lodging, local travel, insurance etc. • Travel expenses (inclusive of any clearance charges like Visa fee etc, insurance) from / to vendor works to site. <p>d) Per diem charges shall be applicable from the day bidder's person reaches site, up to the day he leaves the site.</p> <p>e) All payments towards supervision of E&C shall be made only after BHEL-site supervision.</p> <p>f) 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.</p> <p>g) Bidder to quote supervision of erection and commissioning activities strictly as per BHEL's price format (Annexure-1).</p> <p>h) Engineering of cables, cable routing and cable scheduling within Inert Gas extinguishing system.</p> <p>i) Engineering of cables, cable routing and cable scheduling between Gas release panel and Fire Alarm Panel.</p> <p>9. DESIGN OF IGES SYSTEM</p> <p>9.1. General</p> <p>a) Complete design and all the system components/equipment or major system components (as applicable for approving/listing agencies) shall be approved and listed by UL/FM/VdS/LPCB and shall also be approved by TAC/TAC accredited professional (s) before installation.</p> <p>b) The IGES shall be a total flooding centralized system with directional valves and have 100% standby cylinders.</p>		
Ref. Doc				


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 17 of 30
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.		<p>c) The system shall be centralized for all the rooms protected, and shall be designed as total flooding for the single largest room volume (ceiling void + room void + floor void) of control room. The areas to be protected by inert gas extinguishing system shall be divided into the zones as mentioned in cl. No. 6.0 above.</p> <p>d) The clean agent piping and nozzles shall have to planned clearing following facilities coming on its route , in the areas where protection is being envisaged:</p> <ul style="list-style-type: none"> • The beam and ribs which criss-cross the ceiling • Path of AC ducts • Cabling in false flooring • Light fitting, detectors etc. <p>e) System design, specifications, working plans, flow calculations etc. shall be prepared in line with NFPA-2001 or as specified by listing authorities and shall be approved by Owner.</p> <p>f) IGES system shall be interconnected with FDA system of the plant.</p> <p>9.2. Design Concentration, Quantity & Discharge Time</p> <p>a) Minimum design concentration of INERT gas fire extinguishing system shall be as per NFPA-2001. However higher concentration may be used, if it is specified by the agent manufacturer/system supplier (OEM) for the area protected.</p> <p>b) Bidder shall design the system to meet the minimum requirements of Clean Agent System as per NFPA-2001 and having design concentration as specified at 70 Deg. F (21 Deg. C) for the single largest risk zone to be protected.</p> <p>c) The complete volume of the rooms including the above false ceiling and below false flooring shall be considered for estimation of quantity of gas and containers.</p> <p>d) When determining the gas quantity, the minor leakage losses through window and door opening have been considered however it is necessary that all the opening should be minimised in order to retain concentration of Inergen agent for 10 minutes after discharge to prevent reflash/reignition for effective extinguishment.</p> <p>e) Further volume of re-circulating type air conditioning system & its duct work (at least upto the automatic fire dampers of the ducts) shall be considered as a part of the total volume so that the design concentration is achieved throughout the hazard area. Further gas quantity will be adjusted for ambient pressure & temperature conditions.</p> <p>f) To provide primary supply of gas & its cylinders, along with 100% (one hundred percent) standby/reserve gas quantity and cylinders for single largest hazard being protected (as per NFPA 2001).</p>		
	Ref. Doc			


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 18 of 30
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.		<p>g) The discharge time period shall be such that 95% of the minimum design concentration for flame extinguishment based on 35% safety factor is achieved within 120 seconds. The flow calculations shall establish this criterion.</p> <p>h) The quality of gas shall conform to relevant design standard such as NFPA-2001 or as specified by listing authorities.</p> <p>i) Calculation shall be provided by the designer to prove that the area is not pressurised and extinguishing capability is not affected due to provided ventilation of that area. Pressure vent shall be provided for each protected area as per system requirement.</p> <p>9.3. System Flow Calculation</p> <p>a) System flow calculation shall be performed using a calculation method listed or approved by the authority having jurisdiction (i.e. UL/FM/Vds/LPCB) and shall be approved by TAC accredited agency. The system design shall be within the manufacturers listed limitations.</p> <p>b) Approval certificate of software from UL/FM/Vds/LPCB etc. shall be submitted along with the offer.</p> <p>c) Bidder shall also provide sufficient safety facilities (like properly designed louvers etc.) in the risk areas to dissipate over pressurisation due to release of Clean Agent and also provide calculation in support of same for each protected area.</p> <p>9.4. Clean Agent Quantity</p> <p>a) Minimum design concentration of Clean Agent gas shall be as per NFPA-2001 at 70 deg F by volume for clean agent fire extinguishing system based on approved/listed flow calculation method.</p> <p>b) Clean agent concentration requirement shall be computed considering the volume of the hazard as specified. In addition to the concentration requirement as specified, 20% of the gas quantity as computed above, shall be added to compensate for leakages and extinguishing efficiency. The bidder, as per NFPA-2001, shall work out the quantity of clean agent. However, bidder drawing shall quote minimum quantity of agent for volume as given in the scope.</p> <p>9.5. The principle of operation shall be as follows</p> <p>a) Whenever there is a fire in any of the rooms protected, the same will be detected by the automatic fire detector. It will in turn annunciate a fire signal in the MFAP. The first detection signal will actuate the hooters in the room and warning lights, so as to</p>		
Ref. Doc				


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 19 of 30
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.		<p>warn the people to evacuate and prevent people from entering the room. When, at least another automatic fire detector in the room registers a fire condition, the necessary fire dampers in the AC / Ventilation system will get closed (from their respective panel/s based upon confirmed fire signal from the MFAP), the clean agent extinguishing system will get actuated and the time delay for the release starts (normally 10 seconds however shall be based on the recommendation of the bidder). After the time delay elapses, the clean agent is released. The release mechanism operates by opening the electrical actuator of the pilot cylinder, which then in turn open the quick opening valve of the designated slave cylinders, and thus releasing the gas in the manifold. The gas then is carried through piping to the room in fire and released through the nozzles located strategically in the room. The gas is maintained in the room for a specified period of time (about 10 min. however shall be based on the recommendation of the bidder), during which the fire is extinguished.</p> <p>b) In case, it gets known during the time delay period before release, that there is no fire but the alarm is false alarm, the gas release can be aborted by pressing the abort switch. Also, if due to any reason it is found that the gas is not getting released even after the time delay period, a manual release can be initiated by pressing the manual release button.</p> <p>c) The system shall be designed based on the single largest risk area of the control room to be protected. However, the grouping of cylinders shall be made in such a way that discharge takes place corresponding to the volume of the risk under fire.</p> <p>d) The system shall include electrically actuated automatic Clean Agent Fire Extinguishing System complete with filled up Clean Agent cylinders cylinder rack, manifolds, Pressure reducing devices, cylinder valves, pipes, discharge nozzles, bracket support, hangers, and such other fittings as necessary for complete installation of the system, including chipping of existing RCC/brick walls/cutting of steel plates etc. or removal & re-fixing of false ceiling and floor of risk areas, fixing fasteners and other activities required to install the system.</p> <p>e) The system shall also comprise of the different modes of operation, actuation and cancellation facility etc. with necessary local control panel mentioned elsewhere in this specification.</p> <p>f) Operating devices and Local control panels shall be provided for this system. The bidder shall have to offer 100% Clean Agent filled standby cylinders. (i.e. A reserve clean agent filled cylinders with manifold , directional valves and automatic change over to any of the two banks after actuation of main cylinders to be provided in each risk area i.e. 100% reserve).</p> <p>9.6. System Operation</p>		
Ref. Doc				


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 20 of 30
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.		<p>a) System operation shall be possible by the following means:</p> <ul style="list-style-type: none"> Automatically due to fire detection in protected area Operation of manual release push button located adjacent to protected area. By operating manual lever provided on electrical/manual control head on pilot cylinder By push button actuation at Clean Agent Control panel , in manual mode <p>b) The clean agent shall be discharged /actuated automatically after an adjustable time delay based on the detection signal received. The delay shall be minimum 30 sec.; however it shall be adjustable from 30 to 120 sec. In the local control panel of clean agent system, there shall be one hooter, which shall operate once the gas is released. During time delay, there shall be a pre-discharge alarm (audio+visual). Hooter shall follow the alarm once the gas is discharged.</p> <p>9.7. Clean Agent Gas & Its Grouping/Distribution</p> <p>a) The quantity of clean agent gas provided shall be sufficient to protect the single largest risk with 100% standby. The system for every individual risk shall have its own distribution piping, nozzles, alarms and actuation system etc.</p> <p>b) Suitable combination of cylinders shall be made to cater to all the risk areas individually.</p> <p>c) Both primary and standby cylinders shall be permanently connected to distribution piping through manifold and arranged for easy and automatic changeover. Suitable selector switches be provided for "Normal/ Standby" supply selection.</p> <p>d) Since the system is designed for the largest risk and there are several risk areas varying in size in a particular building, the system shall permit the use of required no of cylinders for any individual risk involved so that the concentration of gas in that risk area does not exceed the NOAEL as per NFPA-2001.</p> <p>9.8. Gas properties and its discharge characteristics</p> <p>a) Physical properties of Inert gas agent shall be as per NFPA-2001 latest edition.</p> <p>b) The agent container pressure shall be as recommended in NFPA 2001.</p> <p>c) The agent discharge shall be substantially completed in a nominal 120 sec.</p> <p>d) For inert gases the measured discharge time is considered to be the time when the measuring device starts to record reduction of oxygen until the design oxygen reduction level is achieved.</p>		
Ref. Doc				


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 21 of 30
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.		<p>e) The min. O₂ concentration shall be as per NFPA-2001</p> <p>10. INSPECTION, TESTING, APPROVAL & COMMISSIONING</p> <p>10.1. Final Inspection including document verification as per approved QAP shall be carried out by CUSTOMER /CONSULTANT/ CUSTOMER's Third Inspection Agency & BHEL/BHEL's Third Party Inspection Agency at vendor works.</p> <p>10.2. Inspection at Vendor works – by BHEL + VENDOR + END USER as per approved QAP.</p> <p>10.3. Site Acceptance Test at site - by BHEL + VENDOR + END USER as per approved procedure</p> <p>10.4. Bidder after satisfying that all inspection requirements as per approved Inspection Testing Plan (ITP) and applicable specifications / documents have been taken care by Third Party Inspection Agency (TPIA), shall submit copy of the Inspection Certificate and all Quality control records to Purchaser in requisite copies along with Statutory Certificates if any, such as IBR, CCE etc. duly endorsed by their Quality Control Manager.</p> <p>10.5. Purchaser and / or End customer reserve the right to carry out surprise checks on all material either at manufacturer's works or at site. In case of any rejection at site, the whole lot will be rejected and bidder shall get the entire lot replaced without any time or delivery implication to the purchaser.</p> <p>10.6. TPIA shall check the calibration status and traceability of all instruments used by the supplier, for testing. In case, TPIA uses their own instruments for testing purposes, similar certification shall be ensured.</p> <p>10.7. In case any non-conformity is noticed, 100% of the lot shall be checked by TPIA and all non-conforming material shall be replaced by the bidder.</p> <p>10.8. Testing</p> <p>a) After installation, the complete system shall be inspected and tested as per relevant clauses of NFPA-2001. Wherever testing is mentioned at a regular frequency in these chapters, the bidder shall carry out initial testing and records shall be presented to Owner for approval of the installation.</p> <p>b) Prior to handing over of the system to Employer, the supplier shall provide operational training to Employer's operating personnel which shall consist of control system operation, trouble procedures, emergency procedures, safety requirements etc.</p>		
Ref. Doc		<p>c) The performance test of the system shall be carried out by releasing the agent gas in a smallest zone of each system and design parameters shall be measured. All</p>		


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 22 of 30
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.		<p>equipments, refilling of gas after test, instruments etc shall be provided by bidder for the same.</p> <p>11. MARKING, PACKING AND DISPATCH</p> <p>11.1. All items shall be marked (stamped/etched) in accordance with the applicable code/standard/specification. In addition, the item code, if available, shall also be marked.</p> <p>11.2. For ease of identification, the color of painted strip (wherever required) shall be as per the applicable standard.</p> <p>11.3. Part number/Dispatch link-up of all the equipment's/items supplied and also their correlation with system/drawing/approved BOQ.</p> <p>11.4. Paint or ink for marking shall not contain any harmful metal or metal salts which can cause corrosive attack either ordinarily or in service. Special items/smaller items shall have attached corrosion resistant tag providing salient features.</p> <p>11.5. The equipment shall be transported to site by the vendor in fully assembled condition. However, in case some components are liable to be damaged during transit, the same shall be dismantled and supplied separately, to be reassembled at site the vendor. Assembly of the item supplied loose at site and repairing of any item damaged during transport shall be in the vendor's scope. The vendor shall send each consignment to site with a detailed packing list.</p> <p>11.6. All the equipment shall be divided into several sections for protection and ease of handling during transportation. The equipment shall be properly packed for transportation by ship/rail or trailer. The equipment shall be wrapped in polythene sheets before being placed in crates/cases to prevent damage to the finish. Crates/cases shall have skid bottom for handling.</p> <p>11.7. Special notations such as 'Fragile', 'This side up', 'Center of gravity', 'Weight', 'Owner's particulars', 'PO Nos.' etc. shall be clearly marked on the package together with other details as per purchaser order.</p> <p>11.8. The equipment/items may be stored outdoors for long periods before installation. The packing shall be completely suitable for outdoor storage in areas with heavy rains/high ambient temperature, unless otherwise agreed.</p> <p>11.9. All items shall be dry, clean and free from moisture, dirt and loose foreign material of all kinds.</p>		
Ref. Doc				


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 23 of 30
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.		<p>11.10.All items shall be protected from rust, corrosion, and mechanical damage during transportation and handling.</p> <p>11.11.Each variety and size of item shall be supplied in separate packaging marked with the purchase order no., item code (if available), and the salient specifications.</p> <p>11.12.All electrical, instrumentation etc., shall be properly packed to prevent damage during transport, storage, handling at site.</p> <p>11.13.All the items which the Bidders considered liable to be damaged during shipment or storage, shall be packaged for separate shipment. If instruments are removed from the panel, they and their connection shall be suitably tagged to ensure simple re installation at the job site. Each instrument shall be sealed in plastic bags containing moisture absorbing dessicants.</p> <p>11.14.It shall be bidder's sole responsibility to protect all the material during period of dispatch, storage and erection against corrosion, incidental damage due to vermin, sunlight, rain, high temperature, humid atmosphere, rough handling in transit and including delays in transit.</p> <p>11.15.Mandatory Spare parts shall be packaged separately and clearly marked as 'Mandatory Spares'.</p> <p>11.16.Commissioning spares, Tools & tackles to be packed separately & suitably tagged.</p> <p>11.17.If mandatory spare items are ordered, same shall be sent in pre-decided lots in containers /secure boxes distinctly marked in GREEN color with boldly written "S "mark on each face of the containers /secure boxes</p> <p>11.18.Loose vendor items sent by vendor to sites shall be quantified/numbered/tagged and not merely mentioned as ONE lot of loose items.</p> <p>11.19.A packing list covering items having shelf life are to be intimated to site. Also, shelf life items shall be packed separately in BLACK color painted box for easy identification at site.</p> <p>11.20.Loose vendor items sent to sites shall be quantified/numbered/tagged and not merely mentioned as ONE lot of loose items.</p> <p>12. DOCUMENTATION</p> <p>12.1. Vendor shall make the offer in detail, with respect to every item of the Purchaser's specifications. Any offer not conforming to the following requirements shall be summarily rejected.</p>		
Ref. Doc				


TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 24 of 30
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.		<div data-bbox="261 309 1500 613"> <ul style="list-style-type: none"> a) Duly filled & Signed copy of Check list b) Deviation list, if any (as per “No deviation format” given in this specification). If there are no deviations, bidders shall submit “Deviation format” by mentioning deviations “Nil”. c) Unpriced price schedule (To be submitted compulsorily without fail) d) Bill of materials </div> <div data-bbox="236 658 798 689"> <p>12.2. Documentation after P.O. Placement</p> </div> <div data-bbox="261 734 1500 1778"> <ul style="list-style-type: none"> a) Submission of documents as per “Master documents schedule” (which will be finalized in Kick-off meeting after award of the contract) within 2 weeks of placement of LOI (for approval by BHEL and / or BHEL’s customer in 4 sets) b) All vendor documents of Inert Gas Extinguishing System and its sub-items shall be submitted to End user for approval during order execution. Any comment furnished by End user / BHEL shall be taken care by vendor during ordering execution. c) Further BHEL will provide comments on vendor submitted document within 25 working days for revision & resubmission. Vendor shall follow up with BHEL for non-receipt of comments/approvals. d) Revised drawings / Documents shall be submitted by Bidder in 07 days of receipt of comments / observations from BHEL. BHEL shall revert within 25 days on receipt of these revised documents / drawings from vendor for approvals. e) All the approvals required for manufacturing shall be completed with 3 months from P.O to meet the P.O delivery schedule. Accordingly vendor shall ensure the submission of approval category documents (which are required for manufacturing) and obtain their approvals. f) Vendor shall obtain final approvals on all technical + quality aspect documents before inspection dates. g) It is vendor’s responsibility to obtain approvals from BHEL as earliest as possible to meet PO delivery schedules. Accordingly vendor to plan and execute the supplies in time. </div> <div data-bbox="236 1845 1500 1957"> <p>12.3. Documents to be submitted during final shop testing and before equipment dispatch. (Note: submission of these documents are commercially linked) - all in 16 sets (2 sets to be included with item dispatch and balance to BHEL purchase department).</p> </div>		
Ref. Doc		<ul style="list-style-type: none"> a) Complete O&M manual. 		

TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 25 of 30																																
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.		<p>b) Approved Engg documents, As-Shipped documents, As-Built documents</p> <p>c) Guarantee and all test certificates for review and acceptance by BHEL and / or BHEL's Customer</p> <p>d) 6 sets of CD-ROM – containing O&M manual and Engineering documents (1 set to be included with item dispatch and balance to BHEL purchase department).</p> <p>e) Following may be noted wrt the drawing submission schedule:</p> <table border="1" data-bbox="320 730 1434 1912"> <thead> <tr> <th>SL NO.</th> <th>DESCRIPTION</th> <th>NUMBER OF COPIES TO BE SUBMITTED</th> <th>WHEN TO SUBMIT</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Initial drawings / documents under approval and information category.</td> <td>2</td> <td>As per approved Master document list</td> </tr> <tr> <td>2.</td> <td>Revised drawings / documents incorporating BHEL's comments.</td> <td>-</td> <td>Within 1 weeks of receipt of commented drawings from BHEL</td> </tr> <tr> <td>3.</td> <td>Final Drawings / documents</td> <td>6</td> <td>Within 2 months of placement of order.</td> </tr> <tr> <td>4.</td> <td>Erection Documentation</td> <td>8</td> <td>1 Month before dispatch of equipment, The list of documents identified under master document list for erection to be furnished in 5 nos. of folders.</td> </tr> <tr> <td>5.</td> <td>Draft O & M Manuals with out test certificates</td> <td>2</td> <td>2 months before the delivery date of equipment</td> </tr> <tr> <td>6.</td> <td>Revised O & M Manuals with Test Certificates to be submitted to BHEL (Hyderabad)</td> <td>8</td> <td>Within one month after dispatch of equipment</td> </tr> <tr> <td>7.</td> <td>Final O&M Manuals in a CD</td> <td>3</td> <td>Within one month after dispatch of equipment</td> </tr> </tbody> </table>			SL NO.	DESCRIPTION	NUMBER OF COPIES TO BE SUBMITTED	WHEN TO SUBMIT	1.	Initial drawings / documents under approval and information category.	2	As per approved Master document list	2.	Revised drawings / documents incorporating BHEL's comments.	-	Within 1 weeks of receipt of commented drawings from BHEL	3.	Final Drawings / documents	6	Within 2 months of placement of order.	4.	Erection Documentation	8	1 Month before dispatch of equipment, The list of documents identified under master document list for erection to be furnished in 5 nos. of folders.	5.	Draft O & M Manuals with out test certificates	2	2 months before the delivery date of equipment	6.	Revised O & M Manuals with Test Certificates to be submitted to BHEL (Hyderabad)	8	Within one month after dispatch of equipment	7.	Final O&M Manuals in a CD	3	Within one month after dispatch of equipment
SL NO.	DESCRIPTION	NUMBER OF COPIES TO BE SUBMITTED	WHEN TO SUBMIT																																	
1.	Initial drawings / documents under approval and information category.	2	As per approved Master document list																																	
2.	Revised drawings / documents incorporating BHEL's comments.	-	Within 1 weeks of receipt of commented drawings from BHEL																																	
3.	Final Drawings / documents	6	Within 2 months of placement of order.																																	
4.	Erection Documentation	8	1 Month before dispatch of equipment, The list of documents identified under master document list for erection to be furnished in 5 nos. of folders.																																	
5.	Draft O & M Manuals with out test certificates	2	2 months before the delivery date of equipment																																	
6.	Revised O & M Manuals with Test Certificates to be submitted to BHEL (Hyderabad)	8	Within one month after dispatch of equipment																																	
7.	Final O&M Manuals in a CD	3	Within one month after dispatch of equipment																																	
Ref. Doc	12.4. Input drawings																																			

TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 26 of 30
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.		<p>a) List of inputs as envisaged by purchaser is attached in annexure-8.</p> <p>b) On receipt of order, it shall be solely the bidder's responsibility to spell out the requirement of the base engineering drawings/documents (required by him over and above the data furnished along with this specification) to go ahead with the engineering of the package within a week, and shall not expect the Purchaser to automatically supply the same after order placement. Any ultimate delay arising out of the delay by the successful bidder in putting up such a requisition shall solely be to the bidder's account.</p> <p>c) List of major inputs required for engineering of the system shall be prepared during kick off meeting or 15 days after the award of contract. It is bidder's responsibility to list out all the major inputs required for engineering. The required base drawings/documents shall be furnished to the Bidder within one week of receipt of such requisition from Bidder.</p> <p>d) Drawings attached with this specification are preliminary in nature & are not exhaustive. These drawings may get revised and /or new drawings will be furnished to bidder during detail engineering.</p> <p>12.5. Review meetings & kick off meeting</p> <p>a) As and when required, the bidder will be called upon to attend design co-ordination meeting / review meeting with the end customer/BHEL during the period of the Contract. The Contractor shall attend such meetings at his own cost at venues decided by BHEL.</p> <p>b) A kick off meeting shall be held at Purchaser's office, preferably within 2 weeks of order.</p> <p>c) An agenda shall be prepared for this meeting and would include the following points related to technical aspects.</p> <ul style="list-style-type: none"> • Any clarifications required by the Bidder on purchaser's order. • Bidder Data Index & Schedule. • Bidder Data Review/approval modalities. • Sub-Bidder lists proposed by Bidder. • Utility requirements. • List of input drawings required from BHEL • Preliminary General Arrangement & layout drawings <p>13. PRICE BID FORMAT</p>		
Ref. Doc				

TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 27 of 30
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.		<p>13.1. Price bid format is enclosed as Annexure-1, bidder to furnish the offer in line with the same.</p> <p>13.2. Inert Gas Extinguishing System as envisaged in this bid document shall be quoted by the bidder on Lump sum Turnkeybasis.</p> <p>13.3. 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.</p> <p>13.4. Prices quoted by the bidder shall remain firm till the successful handing over of the Fire Protection plant to end customer. Any request for upward revision of price during any intermediate stage before handing over the plant to end customer will be summarily rejected by BHEL.</p> <p>13.5. Bidder to quote only base rates for all the items, Applicable taxes and duties shall be indicated separately.</p> <p>13.6. The Priced Bid shall be submitted in Original (without any copy) duly signed and stamped on each page in a separate sealed envelope super scribing “Price Bid –Do not Open” This shall not contain any condition whatsoever failing which the Bids shall be liable to be rejected. In case of any correction, the bidder shall put its signature and its stamp. Eraser fluid will not be allowed for making any correction.</p> <p>13.7. Bidder shall confirm to the unpriced bid as part of their offer.</p> <p>13.8. 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.</p> <p>14. SUB VENDOR LIST</p> <p>14.1. All the equipment shall be sourced from recommended Bidders only as specified Annexure-12.</p> <p>14.2. Further the supplied model shall be under regular manufacturing range and have Proven Track Record (PTR). (Bidder / sub-Bidder shall have supplied minimum 2 no. in last 7 years, out of which at least one shall be in satisfactory operation for minimum 8000 hours).</p> <p>14.3. Bidder to comply with sub-vendor list enclosed with the specification. The sub-vendors for any item that is not appearing in the sub-vendor list (annexure-12) may be proposed</p>		
	Ref. Doc			

TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 28 of 30																											
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.		<p>for BHEL's approval. Non-acceptance of any sub-vendor by BHEL / customer shall not have any commercial & delivery implication. While submitting sub-vendors for approval of BHEL, bidder shall furnish following documents :</p> <p>a) ISO certificate of Sub-vendors</p> <p>b) Proven track record & references for makes and models supplied earlier.</p> <p>Note:</p> <p>Bidder to note that all IGES equipment such as cylinders, contact gauges, pressure regulators, Gas release Panel etc. shall be UL/FM/LPCB/VdS approved. Cylinders shall also have PESO , Nagpur approval certificate.</p> <p>15. DOCUMENTS ALONG WITH BID</p> <p>15.1. The following documents shall be submitted by bidder and the bidder's offer shall be evaluated on the following:</p> <p>a) Duly filled & Signed copy of Check list</p> <p>b) No Deviation Format</p> <p>c) Unpriced price schedule (To be submitted compulsorily without fail)</p> <p>Note:</p> <p>Evaluation shall be done on No Deviation schedule. Even if no deviations are there, bidder shall submit, signed copy of No deviation format. Technical evaluation of offer shall be done based on no deviation schedule only. Any other document submitted along with the offer shall be retained for information only.</p> <p>16. LIST OF ANNEXURES</p> <table border="1" data-bbox="338 1626 1489 2029"> <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>Master Document List</td> <td>Annexure – 2</td> </tr> <tr> <td>3.</td> <td>Standard Manufacturing Quality Plan (for reference)</td> <td>Annexure – 3</td> </tr> <tr> <td>4.</td> <td>Guidelines for QA QC plan</td> <td>Annexure – 4</td> </tr> <tr> <td>5.</td> <td>Format for Despatch details</td> <td>Annexure – 5</td> </tr> <tr> <td>6.</td> <td>Typical BBU for IGES system</td> <td>Annexure – 6</td> </tr> <tr> <td>7.</td> <td>Pre Bid Query Format</td> <td>Annexure – 7</td> </tr> </tbody> </table>			LIST OF ANNEXURES			Sl. No	Drawings/Documents	Drg/Doc no	1.	Price Bid Format	Annexure – 1	2.	Master Document List	Annexure – 2	3.	Standard Manufacturing Quality Plan (for reference)	Annexure – 3	4.	Guidelines for QA QC plan	Annexure – 4	5.	Format for Despatch details	Annexure – 5	6.	Typical BBU for IGES system	Annexure – 6	7.	Pre Bid Query Format	Annexure – 7
LIST OF ANNEXURES																															
Sl. No	Drawings/Documents	Drg/Doc no																													
1.	Price Bid Format	Annexure – 1																													
2.	Master Document List	Annexure – 2																													
3.	Standard Manufacturing Quality Plan (for reference)	Annexure – 3																													
4.	Guidelines for QA QC plan	Annexure – 4																													
5.	Format for Despatch details	Annexure – 5																													
6.	Typical BBU for IGES system	Annexure – 6																													
7.	Pre Bid Query Format	Annexure – 7																													
Ref. Doc																															

TD-106-2 Rev No. 5	Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.	PY51615 Rev No. 01 Page 29 of 30																											
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" data-bbox="339 302 1489 705"> <tr> <td>8.</td> <td>Input Doc. List</td> <td>Annexure – 8</td> </tr> <tr> <td>9.</td> <td>Deviation Format</td> <td>Annexure – 9</td> </tr> <tr> <td>10.</td> <td>Tender purpose Drawings</td> <td>Annexure – 10</td> </tr> <tr> <td>11.</td> <td>Check List</td> <td>Annexure – 11</td> </tr> <tr> <td>12.</td> <td>Sub-Vendor List</td> <td>Annexure – 12</td> </tr> <tr> <td>13.</td> <td>Typical BOQ Format</td> <td>Annexure – 13</td> </tr> <tr> <td>14.</td> <td>Specification for Cables</td> <td>Annexure – 14</td> </tr> <tr> <td>15.</td> <td>Painting Specification</td> <td>Annexure – 15</td> </tr> <tr> <td>16.</td> <td>Datasheet of CamLock Coupling with SS flexible hose</td> <td>Annexure – 16</td> </tr> </table> <p data-bbox="268 750 347 784">NOTE:</p> <p data-bbox="328 824 1497 936">Bidder to note that the above annexures are preliminary in nature .These annexures may get revised and /or new annexures will be furnished to bidder. Bidder to however note that they will not be eligible to raise any extra charges on account of this.</p>			8.	Input Doc. List	Annexure – 8	9.	Deviation Format	Annexure – 9	10.	Tender purpose Drawings	Annexure – 10	11.	Check List	Annexure – 11	12.	Sub-Vendor List	Annexure – 12	13.	Typical BOQ Format	Annexure – 13	14.	Specification for Cables	Annexure – 14	15.	Painting Specification	Annexure – 15	16.	Datasheet of CamLock Coupling with SS flexible hose	Annexure – 16
8.	Input Doc. List	Annexure – 8																													
9.	Deviation Format	Annexure – 9																													
10.	Tender purpose Drawings	Annexure – 10																													
11.	Check List	Annexure – 11																													
12.	Sub-Vendor List	Annexure – 12																													
13.	Typical BOQ Format	Annexure – 13																													
14.	Specification for Cables	Annexure – 14																													
15.	Painting Specification	Annexure – 15																													
16.	Datasheet of CamLock Coupling with SS flexible hose	Annexure – 16																													
Ref. Doc																															

TD-106-3 Rev No. 5 Form No.		<div><div>बी एच ई एल</div><div>BHEL</div></div>		PRODUCT STANDARD BHEL, HYDERABAD –32. PROJECT ENGINEERING – MECHANICAL		PY51615 Rev No. 01 Page 30 of 30		
<div>drawCOPYRIGHT AND CONFIDENTIAL</div> <div>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.</div>		RECORD OF REVISIONS						
		Rev. No.	Date	Revision Details	Prepared By	Checked By	Approved By	
		00	04/02/2020	Original Issue	--	--	P C Sekhar	
		01	07/07/2021	Revised to incorporate Camlock coupling details	Raviteja J	DV Prashant	P C Sekhar	
		Ref.						

ANNEXURE – 1 for PY51615

**PRICE BID FORMAT FOR
IGES – LUMP SUM TURNKEY
PROJECT- 3 x 800 MW SUPER THERMAL POWER PROJECT, PATRATU**

Sl. No.	Description	Qty.	Unit	PRICE in INR (Refer notes below)		Weightage
				Unit Price (INR)	Total Price (INR)	
1.	Supply of Inert Gas Extinguishing System	1	Lot			95.79%
2.	Mandatory Spares Of Inert Gas Extinguishing System	1	Lot			0.53%
3.	Supervision of erection, testing, commissioning & performance testing for Inert Gas Extinguishing System	50	Days			1.67%
4.	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 erection & commissioning of Inert Gas Extinguishing System	3	Visits			0.07%
5.	Supply Of Cam Couplers & Flexible Hoses	1	Lot			1.64%
6.	Mandatory Spares Of Cam Couplers & Flexible Hoses	1	Lot			0.31%
	Grand Total					100.00%

Notes:

1. This document details the price schedule format for the enquiry. No other format will be entertained. Applicable taxes and duties shall be indicated separately in commercial offer.
2. Duly signed & stamped un-priced price schedule format shall be submitted by vendor in the technical offer as a token of concurrence that price schedule would be submitted in this format. Any tampering / modification / additions, etc. are NOT allowed and not considered binding and is liable for rejection of the offer.
3. Unit rates of components (Annexure –1A) would be used for effecting required additions/deletions of main equipment during order execution. These would include the cost up to engineering, installation of the item, wiring up in the panel and seamless integration with main system at works/site without any cost implications. All accessories required for this purpose shall be included in the price quoted.
4. As the dimensions of the room are not finalized, for addition/reduction of quantity, unit rate quoted in the present offer shall be considered during ordering and shall be valid up to execution of the contract to the extent of (-)20% to (+)10% of order Value. These would include the cost up to engineering, installation of the item, wiring up in the panel and seamless integration with main system at works/site without any cost implications. All accessories required for this purpose shall be included in the price quoted.

ANNEXURE – 1 for PY51615

5. In case of deletion of Inert gas extinguishing system, unit rates as indicated in (Annexure –1A) shall be used for deletion.
6. All the inert gas cylinders shall be supplied in filled condition to site.
7. For the purpose of tender total no of 50 man days to be covered in 3 visits have been considered. However, either or both of the number of man days or number of visits may change on either side based on the actual site requirement. Bidder to note that payment against Sl. No. 3 & 4 above shall be made as per the total number of visits and man days required for the supervision of the complete E&C activities.
8. Offer will be evaluated based on total price for Sl. No. 1, 2,3,4, 5 & 6 of price format.
9. Bidder to quote the base rates only. Applicable taxes and duties to be indicated separately.

BIDDER'S SIGNATURE
NAME:
DATE
COMPANY SEAL

ANNEXURE – 1A for PY51615

UNIT PRICES

S. No	Item Description	Unit Rate (Rs.)	REMARKS
1.	Supply of IGES package for TG Building Unit - 1		Note-3, 4 & 5 of Annexure – 1
2.	Supply of IGES package for TG Building Unit – 2&3		
3.	Supply of IGES package for IT Building		
4.	Supply of IGES package for Admin Building		
5.	1 no. of Inert Gas Cylinder and hooking up to Manifold		
6.	Electromagnetic release device for Master cylinder		
7.	Discharge Nozzles		
8.	Additional cost of selector valve, pilot manifold with fittings like SOV, pressure switch, etc. for addition of 1 no. of zone		
9.	Pressure relief vent		
10.	Gas inhibitor switch		
11.	Manual release switch		
12.	Discharge indicator		
13.	Pre-discharge indicator		
14.	Warning sign		
15.	10 metres of pipe(downstream of direction valve) along with associated fittings like elbows, tees, etc.		
16.	Pilot Manifold		
17.	Gas Release Panel		
18.	Selector Valve		
19.	SS Flexible Hose 100NB x 25 M Long		
20.	SS Flexible Hose 25NB x 25 M Long		
21.	SS Flexible Hose 150NB x 25 M Long		
22.	Matching (Hose End Coupling) Camlock Coupling With One End Flanged (150 NB Size)		

ANNEXURE - 2

3 x 800 MW SUPER THERMAL POWER PROJECT, PATRATU- INERT GAS EXTINGUISHING SYSTEM - BIDDER DWGS/DOCS SCHEDULE												
1	LIST OF SUPERCIDED 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	7-Jul-21		NOT APPROVED & COMMENTS AS MARKED				3
4	LIST OF BHEL APPROVED DRAWINGS				ADS			RETAINED FOR INFORMATION				4
									A		1	
1	Drawings & Documents Pending with BIDDER								A	P-BIDDER	2	
2	Drawings & Documents Pending with BHEL								A	P-BHEL	3	
3	Drawings & Documents Approved by BHEL								A	ADS	4	
4	Supercided Drawings.								A	S		
S. NO	DRAWING/ DOCUMENTS	DWG. NO.	APPR (A/I)	SCHEDULE OF SUBMISSION	REV	SENT BY BIDDER (SOFT COPY)	HARD COPY RECEIVED FROM BIDDER	COMMENTS SEND TO BIDDER	STS	PEND	BHEL APP STATU S	REMARKS
	A) MECHANICAL											
A.01	P&I Diagram for IGES for Unit-1 TG Building		A	14 days from P.O Placement	0				UP	P-BIDDER		
A.02	P&I Diagram for IGES for Unit-2 TG Building		A	14 days from P.O Placement	0				UP	P-BIDDER		
A.03	P&I Diagram for IGES for IT Building		A	14 days from P.O Placement	0				UP	P-BIDDER		
A.04	P&I Diagram for IGES for Admin Building		A	14 days from P.O Placement	0				UP	P-BIDDER		
A.05	Design Philosphy & Write-up		A	14 days from P.O Placement	0				UP	P-BIDDER		
A.06	Layout of IGES for Unit-1 TG Building		A	30 days from P.O Placement	0				UP	P-BIDDER		
A.07	Layout of IGES for Unit-2 TG Building		A	30 days from P.O Placement	0				UP	P-BIDDER		
A.08	Layout of IGES for IT Building		A	30 days from P.O Placement	0				UP	P-BIDDER		
A.09	Layout of IGES for Admin Building		A	30 days from P.O Placement	0				UP	P-BIDDER		
A.10	Isometric View of IGES Piping system for Unit-1 TG Building		A	30 days from P.O Placement	0				UP	P-BIDDER		
A.11	Isometric View of IGES Piping system for Unit-2 TG Building		A	30 days from P.O Placement	0				UP	P-BIDDER		

3 x 800 MW SUPER THERMAL POWER PROJECT, PATRATU- INERT GAS EXTINGUISHING SYSTEM - BIDDER DWGS/DOCS SCHEDULE												
1	LIST OF SUPERCIDED 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	7-Jul-21		NOT APPROVED & COMMENTS AS MARKED				3
4	LIST OF BHEL APPROVED DRAWINGS				ADS			RETAINED FOR INFORMATION				4
									A		1	
1	Drawings & Documents Pending with BIDDER								A	P-BIDDER	2	
2	Drawings & Documents Pending with BHEL								A	P-BHEL	3	
3	Drawings & Documents Approved by BHEL								A	ADS	4	
4	Supercided Drawings.								A	S		
S. NO	DRAWING/ DOCUMENTS	DWG. NO.	APPR (A/I)	SCHEDULE OF SUBMISSION	REV	SENT BY BIDDER (SOFT COPY)	HARD COPY RECEIVED FROM BIDDER	COMMENTS SEND TO BIDDER	STS	PEND	BHEL APP STATUS	REMARKS
A.12	Isometric View of IGES Piping system for IT Building		A	30 days from P.O Placement	0				UP	P-BIDDER		
A.13	Isometric View of IGES Piping system for Admin Building		A	30 days from P.O Placement	0				UP	P-BIDDER		
A.14	Equipment Layout of Inert Gas Cylinder Room		A	30 days from P.O Placement	0				UP	P-BIDDER		
A.15	Clamping Arrangement of Inert Gas Cylinders		A	30 days from P.O Placement	0				UP	P-BIDDER		
A.16	GA of Cylinder Manifold		A	30 days from P.O Placement	0				UP	P-BIDDER		
A.17	GA of DV Pilot Manifold		A	30 days from P.O Placement	0				UP	P-BIDDER		
A.18	Control Logic Diagram		A	30 days from P.O Placement	0				UP	P-BIDDER		
A.19	Pressure Relief Vents G.A & location layout		A	30 days from P.O Placement	0				UP	P-BIDDER		
	B) ELECTRICAL											
B.01	GA & Data Sheet of EPB Inhibitor Unit		A	14 days from placement of P.O	0				UP	P-BIDDER		
B.02	GA & Data Sheet of Gas Release Panel		A	14 days from placement of P.O	0				UP	P-BIDDER		
B.03	Circuit Diagrams		A	14 days from placement of P.O	0				UP	P-BIDDER		
B.04	G.A of Junction Box		A	14 days from placement of P.O	0				UP	P-BIDDER		

3 x 800 MW SUPER THERMAL POWER PROJECT, PATRATU- INERT GAS EXTINGUISHING SYSTEM - BIDDER DWGS/DOCS SCHEDULE													
1	LIST OF SUPERCIDED 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	7-Jul-21		NOT APPROVED & COMMENTS AS MARKED			3	
4	LIST OF BHEL APPROVED DRAWINGS				ADS			RETAINED FOR INFORMATION				4	
									A		1		
1	Drawings & Documents Pending with BIDDER								A	P-BIDDER	2		
2	Drawings & Documents Pending with BHEL								A	P-BHEL	3		
3	Drawings & Documents Approved by BHEL								A	ADS	4		
4	Supercided Drawings.								A	S			
S. NO	DRAWING/ DOCUMENTS		DWG. NO.	APPR (A/I)	SCHEDULE OF SUBMISSION	REV	SENT BY BIDDER (SOFT COPY)	HARD COPY RECEIVED FROM BIDDER	COMMENTS SEND TO BIDDER	STS	PEND	BHEL APP STATU S	REMARKS
B.05	Cable Schedule			A	14 days from placement of P.O	0				UP	P-BIDDER		
	C) QUALITY												
C.01	Quality Assurance Plan			A	14 days from placement of P.O	0				UP	P-BIDDER		
	D) PROCEDURE												
D.01	System Write-Up			I	14 days from placement of P.O	0				UP	P-BIDDER		
D.02	Bill of Materials			A	30 days from placement of P.O	0				UP	P-BIDDER		
D.03	Testing & Commisioning Procedure			A	14 days from placement of P.O	0				UP	P-BIDDER		
D.04	Pre-Commissioning Procedure			I	14 days from placement of P.O	0				UP	P-BIDDER		
D.05	Job Procedure / Installation Procedure			I	14 days from placement of P.O	0				UP	P-BIDDER		
	E) OTHERS												
E.01	Flow calculations			I	30 days from placement of P.O	0				UP	P-BIDDER		
	F) APPROVALS												
F.01	LPCB Approvals of IGES Components			I	14 days from placement of P.O	0				UP	P-BIDDER		

3 x 800 MW SUPER THERMAL POWER PROJECT, PATRATU- INERT GAS EXTINGUISHING SYSTEM - BIDDER DWGS/DOCS SCHEDULE													
1	LIST OF SUPERCIDED 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	7-Jul-21		NOT APPROVED & COMMENTS AS MARKED			3	
4	LIST OF BHEL APPROVED DRAWINGS				ADS			RETAINED FOR INFORMATION				4	
									A		1		
1	Drawings & Documents Pending with BIDDER								A	P-BIDDER	2		
2	Drawings & Documents Pending with BHEL								A	P-BHEL	3		
3	Drawings & Documents Approved by BHEL								A	ADS	4		
4	Supercided Drawings.								A	S			
S. NO	DRAWING/ DOCUMENTS		DWG. NO.	APPR (A/I)	SCHEDULE OF SUBMISSION	REV	SENT BY BIDDER (SOFT COPY)	HARD COPY RECEIVED FROM BIDDER	COMMENTS SEND TO BIDDER	STS	PEND	BHEL APP STATUS	REMARKS
	6) DATA SHEETS												
G.01	Inert Gas Cylinder			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.02	Pneumatic IGES Valve			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.03	Release Unit With Solenoid			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.04	Contact Guage Unit			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.05	Discharge Hose			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.06	Check Valve			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.07	Leak / Bleeder Unit			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.08	Hi- Flex Hose			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.09	Pressure Relief Device			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.10	Non Return Valve for Pilot Line			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.11	Nozzle Assembly			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.12	Pressure Regulator			A	14 days from placement of P.O	0				UP	P-BIDDER		

3 x 800 MW SUPER THERMAL POWER PROJECT, PATRATU- INERT GAS EXTINGUISHING SYSTEM - BIDDER DWGS/DOCS SCHEDULE													
1	LIST OF SUPERCIDED 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	7-Jul-21		NOT APPROVED & COMMENTS AS MARKED			3	
4	LIST OF BHEL APPROVED DRAWINGS				ADS			RETAINED FOR INFORMATION				4	
									A		1		
1	Drawings & Documents Pending with BIDDER								A	P-BIDDER	2		
2	Drawings & Documents Pending with BHEL								A	P-BHEL	3		
3	Drawings & Documents Approved by BHEL								A	ADS	4		
4	Supercided Drawings.								A	S			
S. NO	DRAWING/ DOCUMENTS		DWG. NO.	APPR (A/I)	SCHEDULE OF SUBMISSION	REV	SENT BY BIDDER (SOFT COPY)	HARD COPY RECEIVED FROM BIDDER	COMMENTS SEND TO BIDDER	STS	PEND	BHEL APP STATUS	REMARKS
G.13	Ball Valve WITH Pneumatic Actuator			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.14	Pressure Guage			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.15	Restrictor			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.16	Solenoid Valves			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.17	Warning Signs			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.18	Pressure Operated Switch			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.19	Pipes & Fittings			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.20	Cables			A	14 days from placement of P.O	0				UP	P-BIDDER		
G.21	Camcoupler & Hoses			A	14 days from placement of P.O	0				UP	P-BIDDER		
	H) CALCULATIONS & OTHER GENERAL ITEMS												
H.01	Battery Sizing Calculations			I	30 days from P.O Placement	0				UP	P-BIDDER		
H.02	Electrical Load List			I	14 days from P.O Placement	0				UP	P-BIDDER		
H.03	List of Bought out Items			I	14 days from P.O Placement	0				UP	P-BIDDER		


3 x 800 MW SUPER THERMAL POWER PROJECT, PATRATU- INERT GAS EXTINGUISHING SYSTEM - BIDDER DWGS/DOCS SCHEDULE												
1	LIST OF SUPERCIDED 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	7-Jul-21		NOT APPROVED & COMMENTS AS MARKED				3
4	LIST OF BHEL APPROVED DRAWINGS				ADS			RETAINED FOR INFORMATION				4
									A			1
1	Drawings & Documents Pending with BIDDER								A	P-BIDDER		2
2	Drawings & Documents Pending with BHEL								A	P-BHEL		3
3	Drawings & Documents Approved by BHEL								A	ADS		4
4	Supercided Drawings.								A	S		
S. NO	DRAWING/ DOCUMENTS	DWG. NO.	APPR (A/I)	SCHEDULE OF SUBMISSION	REV	SENT BY BIDDER (SOFT COPY)	HARD COPY RECEIVED FROM BIDDER	COMMENTS SEND TO BIDDER	STS	PEND	BHEL APP STATUS	REMARKS
H.04	Storage Procedures		I	14 days from placement of P.O	0				UP	P-BIDDER		
H.05	List of Tag Numbers		I	14 days from placement of P.O	0				UP	P-BIDDER		
H.06	O & M Manuals / Procedure		I	30 days from P.O Placement	0				UP	P-BIDDER		
H.07	Field Quality Plan		I	30 days from P.O Placement	0				UP	P-BIDDER		
	6) INTERFACE DRAWINGS											
6.01	Interface between Fire Alarm Panel & Gas Release Panel		I	14 days from P.O Placement	0				UP	P-BIDDER		

ANNEXURE-3


VENDOR'S NAME & ADDRESS:			MANUFACTURING QUALITY PLAN						QP. NO.:				
			CUSTOMER: BHEL, HYDERABAD – 32.			BHEL P.O.NO.:			REV NO:		DATE:		
			PROJECT:			P.O.DATE:							
			PRODUCT:			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			REMARKS
										P	W	V	
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

		TYPICAL MANUFACTURING QUALITY PLAN							MQP. NO.:				
									REV NO:		DATE:		
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032					PRODUCT: SOLENOID VALVE			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												
		VISUAL & DIMENSION CHECK	Major	Visual	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	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.

		TYPICAL MANUFACTURING QUALITY PLAN							MQP. NO.:				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT:SOLENOID VALVE			REV NO:		DATE:		
									PAGE 2 OF 2				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTU M 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 & Measur ement	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	

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.:				
									REV NO:		DATE:		
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032					PRODUCT: PRESSURE SWITCH			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												
	RAW MATERIAL	Chemical, Physical	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
2.0	INPROCESS INSPECTION												
		RAW MATERIAL	Major	Visual	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
		PROCESS CONNECTION	Major	Visual	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
		CABLE ENTRY	Major	Visual	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
		MOUNTING	Major	Visual	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
		WORKMANSHIP(Cleanliness, Neatness of wiring)	Major	Visual		Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
3.0	FINAL INSPECTION & TESTING												
		DIMENSION,VISUAL	Major	Visual	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	
		PERFORMANCE TEST INCLUDING SET POINT CALIBRATION,REPEATABILITY,SWITCH DIFFERENTIAL & OVER RANGE I.R TEST ON ASSEMBLY	Major	Functional	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	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.

		TYPICAL MANUFACTURING QUALITY PLAN							MQP. NO.:				
									REV NO:		DATE:		
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032					PRODUCT: PRESSURE SWITCH			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	
		IBR certificate	Major	Functional	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2		1	*if applicable
		Certificate of statutory approval authority like CCOE/PESO	Major	Functional	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2		1	
		I.P certificate review	Major	Functional	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	
	Packing	Soundness of packing	Major	Verification	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	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.


		TYPICAL MANUFACTURING QUALITY PLAN							MQP. NO.:				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PRODUCT: Forged, Seamless & Welded Fittings			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												
	Billets, Rounds, Pipes, Coil, Plate s, etc.	Chemical, Physical	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	Lab. /Supp. Certificate	√	2	2	1	
2.0	INPROCESS INSPECTION												
	Cleaning & Finishing	Blast Cleaning	Major	Cleaning	100%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IIR	√	2	2	1	
	Finishing	Galvanizing	Major	Chemical	100%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IIR	√	2	2	1	
3.0	FINAL INSPECTION & TESTING												
		NDT	Major	NDT	10%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IR	√	2	1	-	
		Size, Thickness, Dimension	Major	Visual	10%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IR	√	2	1	-	
		Surface Quality, Marking, Color coding, etc	Major	Visual	10%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IR	√	2	1	-	
		PMI(Final inspected Fittings)	Major	PMI	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	-	


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: Forged, Seamless & Welded Fittings				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	
	Packing	Soundness of packing	Major	Verification	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	2	1	

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.

TD-201 Rev No. 00 Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE-4
			Rev No. 00
			Page 1 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.	<div>QAP GUIDELINES & FORMAT</div> <div>(ANNEXURE-4 TO SPECIFICATION)</div> <p>The QAP format and Guidelines for filling up the format shall be used by vendor for preparation and submission of QAP after order placement.</p>		

Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE-4
			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.		<p align="center"><u>GUIDELINES TO VENDORS FOR PREPARATION OF QUALITY ASSURANCE PLAN</u></p> <ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> 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	

Form No.	 HYDERABAD	<p align="center">PRODUCT STANDARD</p> <p align="center">PROJECT ENGINEERING & SYSTEMS DIVISION</p> <p align="center">HYDERABAD</p>	ANNEXURE-4 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.		<p>11. 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) 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.</p> <p>12. Under 'D' please put (<input type="checkbox"/> Tick) against each characteristic where vendor proposes to submit test certificate/report etc. OR as required as per BHEL Specification.</p> <p>13. Vendor's signature & stamp should be available on each page of QAP.</p> <p>14. Vendor should read the BHEL Product Standard thoroughly and QAP should be made only inline and relevant to the Specification & Approved Drawings.</p> <p>15.The following operations/characteristics/check points may be included (AS APPROPRIATE)</p> <ul style="list-style-type: none"> 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.
			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

MFGR.'s LOGO	MANUFACTURER'S NAME AND ADDRESS	MANUFACTURING QUALITY PLAN		PROJECT :
		ITEM :	QP NO.: REV.NO.: DATE: PAGE: OF....	PACKAGE : CONTRACT NO. : MAIN-SUPPLIER:
		SUB-SYSTEM:		

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	CLASS TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D*	** 10			11

		LEGEND: * RECORDS, IDENTIFIED WITH “TICK” () SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: MANUFACTURER/SUB-SUPPLIER C: MAIN SUPPLIER, N: NTPC P: PERFORM W: WITNESS AND V: VERIFICATION. AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUM “N” AS ‘ W”	 FOR NTPC USE	DOC. NO.:		REV..... CAT.....	
MANUFACTURER/ SUB-SUPPLIER	MAIN-SUPPLIER						
SIGNATURE					REVIEWED BY	APPROVED BY	APPROVAL SEAL

**PROJECT ENGINEERING & SYSTEMS DIVISION****RC PURAM, HYDERABAD.****QUALITY & BUSINESS EXCELLENCE****INSPECTION / TC REVIEW FORMAT**

1	Vendor's Name:		5	Applicable BHEL Spec No:	
2	Project:		6	Approved Drawing No:	
3	PO No:		7	Approved Data Sheet No:	
4	Item Description:		8	Approved QAP No:	

OFFER LIST

S.No	BBU/ PO Sr. No.	Item Description	Total Qty as per PO/BBU	Qty. already accepted	Qty offered for TC review	Cumulative Qty	Balance Qty
A							
B							
C							
D							

TC REVIEW REQUISITION

BBU / PO Sr. No.	QAP Clause No.	Format of Record	Certificate No. & Date	Page No.	REMARKS
---------------------	-------------------	---------------------	------------------------	-------------	---------

A. Item Description:

B. Item Description:

C. Item Description:

D. Item Description:

E. Item Description:

SUPPLIER / VENDOR SIGNATURE WITH SEAL**BHEL/ BHEL's TPIA SIGNATURE WITH SEAL****Dt:****Dt:**

(NOTE: ASSEMBLED UNITS AND ALL LOOSE DESPATCHABLE ITEMS IDENTIFIED IN THIS BOM)

ANNEXURE-6


Client: Bharat Heavy Electricals Limited

System: INERT GAS EXTINGUISHUING SYSTEM

TYPICAL BILLING BREAK UP SCHEDULE

Sl. No.	Item Description	Unit	Total Qty.	Supply		Freight & Insurance	
				Rate Rs	Amount Rs.	Rate Rs	Amount Rs.
(A)	(B)	(C)	(D)	(E)	(F)	(E)	(F)
1.0	Argonite Cylinder,with Pneumatic valve	Nos.					
2.0	Discharge Hose	Nos.					
3.0	Check Valve	Nos.					
4.0	Contact Pressure Gauge Unit	Nos.					
5.0	Release Unit with Solenoid, CPG & Actuator	Nos.					
6.0	Leak / Bleeder unit	Nos.					
7.0	Non Return Valve	Nos.					
8.0	Hi-flex hoses	Nos.					
9.0	Ball Valve with dual action pneumatic actuator	Nos.					
10.0	Pressure Relief device	Nos.					
11.0	Pressure Gauge	Nos.					
12.0	Argonite Discharge Nozzles						
13.0	Pressure Regulator	Nos.					
14.0	Solenoid valve	Nos.					
15.0	Restrictor	Nos.					
16.0	T-Piece for Pilot Line	Nos.					
17.0	Cros for Pilot Line	Nos.					
18.0	Pipes & Fittings	Lot					
19.0	Manifolds	Lot					
20.0	Pilot Line Manifold	No.					
21.0	Structural Steel for Cyl. Mounting Frame Bracket	Lot					
22.0	Gas Release Panel with Nicd Batteries	Set					
23.0	Pressure Operated Switch	Nos.					
24.0	Pressure Relief Vent	Nos.					
25.0	Gas Discharge EPB & Inhibitor unit	Nos.					
26.0	Argonite Warning sign	Nos.					
27.0	Junction box	Nos.					
28.0	Flame Retardent Cu. Conductor Control Flexible Wire, Cable and Conduit	Lot					
	Total						

ANNEXURE-7

TD-106-2	Rev. No. 5 Form No.		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, HYDERABAD –32.	PESD/HYD-776
				Rev No.: 00
				Page 1 of 1

<p style="text-align: center;">COPYRIGHT AND CONFIDENTIAL</p> <p>The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED .</p> <p>It must not be used directly or indirectly in any way detrimental to the interest of the company.</p>		<p style="text-align: center;"><u>PRE-BID QUERRIES FROM SPECIFICATION</u></p> <p>If the proposal submitted has got any Queries from the technical stipulations in the bidding document, the Bidder shall tabulate below the full particulars of such Queries and shall sign below. Additional sheets may be enclosed, if necessary. Queries are to be furnished with mention of specific clause numbers. Technical and commercial Queries to scope of supply and services shall be indicated separately.</p> <table border="1" data-bbox="292 714 1469 1396"> <thead> <tr> <th data-bbox="292 714 527 787">SL.No.</th><th data-bbox="527 714 852 787">Clause No.</th><th data-bbox="852 714 1226 787">Description as per specification</th><th data-bbox="1226 714 1469 787">Queries by Bidder</th></tr> </thead> <tbody> <tr> <td colspan="4" data-bbox="292 787 527 1396" style="height: 250px;"></td></tr> </tbody> </table> <p>We confirm that all the Pre-Bid Queries to the Technical Specification, Job Specification and enclosures including reference documents attached are listed in this Annexure only. No other Pre-Bid Queries even if mentioned elsewhere shall be considered for any technical/ commercial evaluation or for ordering.</p> <p>Bidder's Signature.....</p> <p>Date:.....</p>	SL.No.	Clause No.	Description as per specification	Queries by Bidder				
SL.No.	Clause No.	Description as per specification	Queries by Bidder							

ANNEXURE - 8

Package Name : Inert Gas Extinguishing system
Project : 3 x 800 MW STPP, PATRATU

INPUT DRAWING LIST

SL NO.	Title of the Drawing (to be filled by Bidder)	INPUT DRG. NO. (to be filled by BHEL)	Rev. no.	DATE OF FURNISHING BY BHEL	Reference E Mail (to be filled by BHEL)	Drawing Type (to be filled by BHEL)	Remarks
1	Administration Building Architectural Drawing Conceptual Ground Floor Plan El. 0.0 M	PE-DG-434-641-C002	03	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
2	Administration Building Architectural Drawing Conceptual First Floor Plan El. 4.5 M	PE-DG-434-641-C003	03	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
3	Administration Building Architectural Drawing Conceptual Second Floor Plan El. 9.0 M	PE-DG-434-641-C004	03	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
4	Administration Building Architectural Drawing Conceptual Third Floor Plan El. 13.5 M	PE-DG-434-641-C005	03	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
5	Administration Building Architectural Drawing Conceptual Terrace Floor Plan El. 18.0 M	PE-DG-434-641-C006	03	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
6	IT Building Architectural Drawing Conceptual Ground Floor Plan El. 0.0 M	PE-DG-434-641-C038	02	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
7	IT Building Architectural Drawing Conceptual First Floor Plan El. 4.5 M	PE-DG-434-641-C038	02	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
8	IT Building Architectural Drawing Conceptual Terrace Floor Plan El. 9.0 M	PE-DG-434-641-C038	02	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
9	CCR/EER/Computer Room Layout Unit - 1	PE-DG-434-145-I401	02	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
10	CCR/EER/Computer Room Layout Unit - 2 & 3	PE-DG-434-145-I401	02	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
11	Power House Building Architectural & Finishing Schedule El. 9.0 M Unit - 1	PE-DG-434-611-C041	01	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
12	Power House Building Architectural & Finishing Schedule El. 9.0 M Unit - 2	PE-DG-434-611-C042	00	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
13	Power House Building Architectural & Finishing Schedule El. 0.0 M Unit - 1	PE-DG-434-611-C037	00	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
14	Power House Building Architectural & Finishing Schedule El. 0.0 M Unit - 2	PE-DG-434-611-C038	01	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
15	AC Duct Layout & AHU Room for Main Power House at El. 18.0 M Unit-1	-	00	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
16	AC Duct Layout & AHU Room for Main Power House at El. 18.0 M Unit-2	-	00	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
17	Operating Floor False Ceiling Details	PE-DG-434-611-C057	00	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
18							
19							
20							

ANNEXURE - 9						
LIST OF DEVIATIONS						
Project: IGES SYSTEM FOR 3 x 800 MW STPP, PATRATU						
Sl. No.	Part No./ Volume	Page no.	Clause No.	Subject	Deviation/Clarification	Reason for Deviation
1						
2						
3						
4						
5						
6						

NOTES:

1. Deviations, if any, shall be clearly brought out only in this format. Deviations mentioned / taken elsewhere or in any other format will be ignored.
2. Additional sheets in the same format can be attached by the vendor, if necessary.
3. Nature of Deviations shall only be of Design / Manufacturing constraints and non-availability of items / components / makes in market.
4. No price implications shall be entertained for deviations withdrawn during the technical scrutiny. If any deviations are accepted by BHEL during technical scrutiny then also there will be no price implication. Hence, in no case there will be consideration of Price implications.
5. Reasons for the deviations shall be specified in the Remarks column.
6. If there are no deviations from the specifications, bidder still has to submit the signed copy of this format by writing "NO Deviations" on this format.
7. If the "Deviation Schedule" is not submitted along with the offer, the bidder's offer is likely to be rejected without any further interaction with the bidder. Only the accepted deviations in conjunction with the original tender shall constitute the contract document for the award of job to the bidder


ANNEXURE - 11		
CHECK LIST FOR OFFER SUBMISSION		
SL No	Description	Bidder's Confirmation
1	Bidder to confirm to the scope of supply and scope of services as per BHEL spec: PY51615, Rev-00	
2	Bidder to submit the No Deviation letter w.r.t. BHEL spec: PY51615, Rev-00 along with offer.	
3	Bidder to quote as per BHEL price format only. Bidder to attached unpriced bid format along with Annexure-A by indicating "QUOTED" against each item in the technical offer.	
4	For addition/reduction of quantity, unit rate quoted in the present offer shall be considered during ordering and shall be valid up to execution of the contract to the extent of (-)20% to (+) 10% of order Value.	
5	In case of deviation, vendor to confirm that these are technically not feasible deviations and same are submitted in BHEL format. In case technically feasible deviations are proposed by the bidder and subsequently withdrawn, no commercial implications can be claimed by the bidder	
6	It shall be bidder's responsibility to get all his queries and deviations addressed by the purchaser during the pre-bid stage itself. No queries / deviations shall be accepted by purchaser from the bidder after the closure of pre-bid.	
7	Bidder to agree that Bill of materials / list of equipment furnished in the offer is only for information; Vendor shall supply all the material to meet the performance, sizing & technical requirement as per specification & its Annexures, scope matrix etc.	
8	Confirm that the quote includes training, commissioning spares, special tool & tackles, mounting hardware/ accessories, terminations, etc. as required for commissioning activities.	
9	All the equipments / items supplied by bidder are having valid statutory approval certificates and same will be produced at any stage of contract execution to BHEL. The same were eligible to take local statutory regulatory body approval during commissioning of the system	


BIDDER'S SIGNATURE:


NAME:


DATE:

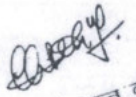
COMPANY SEAL:

	Project : Patratu STPP 3X800 MW		Sub-Vendor List for controlled items		Doc No	QA-Mech-FDPS-01
	Package : FDPS Package				Rev No	2
	Main Contractor: BHEL, PE&SD/Hyd		Mechanical Items		Date	26.09.2019
	Contract No. : CS-9585-001-2					
SL.NO.	ITEM	QP/INSPN CAT	ACCEPTABLE SUPPLIER AS PER THE PRESENT DATABASE	PLACE OF MANUFACTURING	Approval Cat	Remarks
1	HORIZONTAL CENTRIFUGAL PUMPS	I	KSB	PUNE/NASHIK	A	
			WILO M&P	PUNE/ KOLHAPUR	A	
			VOLTAS	MUMBAI	DR	
			BEST AND CROMPTON	CHENNAI	A	
			FLOWMORE	GHAZIABAD	A	
			WORTHINGTON	GHAZIABAD	DR	
			SAM TURBO	COIMBATORE	A	UP TO 1500 CUM/HR
			SULZAR	MUMBAI	DR	
			KISHORE PUMP	PUNE	A	UP TO 500 CUM/HR
			KBL	KIRLOSKARWADI	A	
						HORIZONTAL UP TO 30 KW (FOR APPLICATIONS WHERE NPSH IS NOT REQUIRED)
			GRUNDFOS	CHENNAI	A	
			WILO MATHER AND PLATT PUMPS	SECUNDERABAD	DR	
			JYOTI LIMITED	VADODRA	A	
2	DIESEL ENGINE	I	WPII LIMITED	GHAZIABAD	A	
			GREAVES COTTON (R & H)	PUNE	A	
			CUMMINS	KOTHRUD/VIMAN NAGAR	A	
			CATERPILLAR	USA	A	
			ASHOK LEYLAND	CHENNAI	A	FOR BOOSTER PUMP
3	HYDRANT VALVE (SS)	I	KOEL	PUNE	A	FOR BOOSTER PUMP
			SUKAN	AHMEDABAD	A	
			SHAH BHOGILAL	AHMEDABAD	A	
4	SAFETY RELIEF VALVE	III	NEW AGE INDUSTRIES	SURENDRA NAGAR	A	
			LEADER	JULLANDHER	MAIN CONTRACTOR APPROVED SOURCES ACCEPTABLE	
			SPIRAX MARSHALL	PUNE		
			FISHER SANMAR	CHENNAI		
			BLISS ANAND PVT. LTD.,	HARYANA		
			INSTRUMENTATION LTD	PALAKKAD		
			WEIR BDK VALVES	HUBLI		
			FORBES MARSHALL LTD.,	PUNE		
			FAINGER LESER VALVES PVT. LTD.	MUMBAI		
			ANDERSON GREENWOOD CROSBY	CHENNAI		



 सी.एच. प्रशान्त कुमार
 CH Prashanth Kumar
 Dy Manager / Contracts Management / PE&SD
 बी.एच.एल. हाइड्रो, BHEL-HYD-32



 03/10/19
 (Kamlesh Singh)
 PUNL

	Project : Patratu STPP 3X800 MW				Doc No	QA-Mech-FDPS-01
	Package : FDPS Package		Sub-Vendor List for controlled items		Rev No	2
	Main Contractor: BHEL, PE&SD/Hyd		Mechanical Items		Date	26.09.2019
	Contract No. : CS-9585-001-2					
SL.NO.	ITEM	QP/INSPN CAT	ACCEPTABLE SUPPLIER AS PER THE PRESENT DATABASE	PLACE OF MANUFACTURING	Approval Cat	Remarks
5	STRAINER (All type)	III	OTOKLTN GLOBAL BUSINESS	MUMBAI	MAIN CONTRACTOR APPROVED SOURCES ACCEPTABLE	
			SAROJINI ENTERPRISE	HOWRAH		
			FILTRATION ENGINEERS	MUMBAI		
			HAWA ENGINEERS LTD.	AHMEDABAD		
			GRAND PRIX	FARIDABAD		
			MULTITEX	NOIDA		
			GUJARATOTOFILT	AHMEDABAD		
			TELEFLO STRAINERS & PRESSURE	CHENNAI		
			PROCEDYNE ENGINEERS	CHENNAI		
			SUNGOV ENGINEERING PVT LTD,	CHENNAI		
			ASIAN INDUSTRIAL VALVES AND	CHENNAI		
			NISAN SCIENTIFIC PROCESS	NAVI MUMBAI		
			SKILT FABRICATORS PVT. LTD,	MUMBAI		
			MICON VALVES (I) PVT. LTD.	MUMBAI		
			JAY-EESH ENGINEERING COMPANY	MUMBAI		
			SCIENTIFIC DEVICES (BOMBAY) PVT. LT	NAVI MUMBAI		
			GRAND PRIX ENGINEERING PVT. LTD	FARIDABAD		
			TRIVENI EQUIPMENTS PVT LTD	AHMEDABAD		
			GUJARAT OTOFILT,	AHMEDABAD		
6	BUTTERFLY VALVE (CS/SS - PN 16 UPTO 600 NB)	II	DYNAMIC VALVES PVT. LTD.	NAVI MUMBAI	MAIN CONTRACTOR APPROVED SOURCES ACCEPTABLE	
			VALVE TECH INDUSTRIES	TALOJA, RAIGAD		
			CRANE PROCESS FLOW TECHNOLOGIES	SATARA		
			R & D MULTIPLES (METAL CAST)	PARDI		
			HI-TECH BUTTERFLY VALVES INDIA	INDORE		
			LEADER VALVES LIMITED	JALANDHAR		
			DELVAL FLOW CONTROLS PVT LTD.,	CHENNAI		
			CANLE VALVES PRIVATE LIMITED	COIMBATORE		
			STAFFORD CONTROLS LIMITED	CHENNAI		
			A.V. VALVES LIMITED	AGRA		
			ADVANCE VALVES PVT. LTD.	NOIDA		
			JUPITER ENGINEERING CO	HOWRAH		
			KAMALA VALVES & ENGINEERING PVT. LT	HOWRAH		
			VENUS PUMP & ENGINEERING WORKS	HOWRAH		
			KALPANA VALVES MFG. CO. PVT. LTD.	HOWRAH		
			KAMALA VALVES & ENGINEERING WORKS	HOWRAH		
			DURGA VALVES PRIVATE LIMITED	SECUNDERABAD		


 सी.एच. प्रशान्त कुमार
 CH Prashanth Kumar
 Up Manager / Contracts Management / PE&SD
 बी.पी.ई. मंत्रालय, BHEL, HYD-32



 03/10/19

	Project : Patratu STPP 3X800 MW		Sub-Vendor List for controlled items		Doc No	QA-Mech-FDPS-01
	Package : FDPS Package		Mechanical Items		Rev No	2
	Main Contractor: BHEL, PE&SD/Hyd				Date	26.09.2019
	Contract No. : CS-9585-001-2					
SL.NO.	ITEM	QP/INSPN CAT	ACCEPTABLE SUPPLIER AS PER THE PRESENT DATABASE	PLACE OF MANUFACTURING	Approval Cat	Remarks
7	CI BUTTER FLY VALVE (above 600 NB all classes & above class 150 all sizes)	I	L & T VALVES LIMITED	HYDERABAD	A	SGI / CI / D2 1400MM PN10, SGI / CI 1000MM PN16, CS/SS 500MM PN16, SS 400MM CLASS#300, UPTO 2800NB, PN6
			ASHWATHI CONTROLS PVT. LTD.	AHMEDABAD		
			BRAY CONTROLS INDIA PRIVATE LIMITED	VADODARA		
			DINTECH VALVES PVT. LTD.	AHMEDABAD		
			Sap Industries Limited	AHMEDABAD		
			FLOTEK INDUSTRIES	AHMEDABAD		
			ORTON S.R.L.	ITALY		
			INSTRUMENTATION LTD	PALAKKAD		
			WEIR BDK VALVES	HUBLI		
			HAWA VALVES (INDIA) PVT. LTD.	NAVI MUMBAI		
			MICON VALVES (I) PVT. LTD.	MUMBAI		
			UNIQUE VALVES LIMITED,	PUNE		
			INTERVALVE POONAWALLA LIMITED	PUNE		
			DEMBLA VALVES LTD.	THANE		
			RMEBS CONTROLS	THANE		
			INTERVALVE POONAWALLA LIMITED	PUNE	A	CI/ DI butterfly valve up to 1000MM and PN16 AND up to 1800MM and PN10, CCS UP TO 1050MM CLASS 150 AND up to 1800MM and PN16 SS - UP TO 400NB PN-16, FABRICATED 800MM CLASS#150
			WEIRBDK	HUBLI	A	CAST SGI/CI/CS 1400 MM PN16, SS 300 MM PN16, 1800MM CLASS 150, MS FABRICATED 900 NB PN40, 2800NB, PN6
			KIRLOSKER	KONDHAPURI	A	CAST SGI/CI/MS FABRICATED- UP TO 1800 MM PN-10/CLASS # 75, 1100MM PN25, 1400MM CLASS#150, UPTO 2800NB CLASS # 75
			R & D MULTIPLE	VALSAD	A	UPTO 2200NB CLASS # 75
			IL	PALAKKAD	A	CAST SGI/CI/ MS FABRICATED- UP TO 1200 PN-10, UP TO 350 PN-16, 2400 MM PN6/CLASS150 SS - UP TO 300NB PN-10, UPTO 2700NB CLASS # 75
			FOURESS ENGG	BANGALORE	A	FOR SS UP TO 500 NB PN-10, CI- UP TO 900NB PN-10, UP TO 500NB PN-16, 450MM CLASS#300, UPTO 2800NB, PN6
			PENTAIR	HALOL	A	METAL SEATED, TRIPLE ECCENTRIC, SS BFV OF SIZE UPTO 100NB, AND PRESSURE RATING UPTO CLASS #300
			ADVANCE VALVES PVT.LTD.	GREATER NOIDA	A	CI/ CS & FABRICATED UPTO 1200MM, CLASS #150, SS UPTO 250MM, CLASS#150
			HAWA ENGINEERS	AHMEDABAD	A	



 सी.एच. प्रशान्त कुमार
 CH Prashanth Kumar
 Dy Manager / Contracts Management / PE&SD
 को.एच.ई.एल. - चेन्नई, BHEL-HYD-32



 03/10/19

<div><div><div>एनटीपीसी</div><div>NTPC</div></div></div> <div>Project : Patratu STPP 3X800 MW</div>			Sub-Vendor List for controlled items		Doc No	QA-Mech-FDPS-01
Package : FDPS Package			Rev No		2	
Main Contractor: BHEL,PE&SD/Hyd			Date		26/09/2019	
Contract No. : CS-9585-001-2			Mechanical Items			
SL.NO.	ITEM	QP/INSPN CAT	ACCEPTABLE SUPPLIER AS PER THE PRESENT DATABASE	PLACE OF MANUFACTURING	Approval Cat	Remarks
8	CI GATE/SLUICE, CHECK VALVES (UPTO 600NB, & CL 300)	II	KAMALA VALVES & ENGINEERING WORKS	Howrah	MAIN CONTRACTOR APPROVED SOURCES ACCEPTABLE	
			Kamala Valves Manufacturing Concern	HOWRAH (WEST BENGAL)		
			KALPANA VALVES MFG. CO. PVT. LTD.	HOWRAH		
			VENUS PUMP & ENGINEERING WORKS	HOWRAH		
			KAMALA VALVES & ENGINEERING PVT. LT	Howrah		
			LEVCON VALVES PVT. LTD.	HOWRAH		
			FLUIDLINE VALVES COMPANY PVT.	KOLKATA		
			A.V.VALVES LIMITED	GHAZIABAD		
			LEADER VALVES LIMITED	JALANDHAR		
			CRESCENT VALVES MFG CO. PVT. LTD.	MUMBAI		
			MICON VALVES (I) PVT. LTD.	MUMBAI		
			HAWA VALVES (INDIA) PVT. LTD	NAVI MUMBAI AHMEDABAD		
			FLOSTEER ENGINEERS PVT. LTD.,	AHMEDABAD		
9	CI GATE/GLOBE/CHECK VALVES (ABOVE 600 NB OR CL 300)	I	H SARKAR	HOWRAH	DR	UP TO NB 600 ONLY
			BANKIM	HOWRAH	DR	UP TO NB 600 ONLY
			LEADER	JULLANDHER	DR	GATE 300NB AND PN16,GLOBE 150 NB AND PN16 & 450NB PN10,CHECK 600NB CLASS #150
			HAWA ENGINEERS	AHMEDABAD	DR	
10	SS GATE /GLOBE/CHECK VALVE (UPTO 300 NB - & CL 300)	II	LEADER	JULLANDHER	MAIN CONTRACTOR APPROVED SOURCES ACCEPTABLE	
			FOURESS ENGG.	AURNGABAD		
			Weir-BDK	HUBLI		
			STEEL STRONG VALVE	NABI MUMBAI		
			HI TECH	AHMEDABAD		
			KSB WATAR PUMPS AND VALVE	COIMBATORE		
			BHEL	GOINDWAL		
			A.V.VALVES LIMITED	AGRA		
			AMPO VALVES INDIA PRIVATE LIMITED	TAMILNADU		
			VALVE TECH INDUSTRIES	NAVI MUMBAI		
			SHALIMAR VALVES PVT. LTD.	NAVI MUMBAI		
			SKILT FABRICATORS PVT.LTD,	MUMBAI		
			NITON VALVE INDUSTRIES LTD	BOMBAY		
			MICON VALVES (I) PVT. LTD.	MUMBAI		
			NSSL LIMITED	NAGPUR		
			B.F.E.SRL BONNEY FORGE	ALESSANDRO		
			VALVITALIA S.P.A	RIVANAZZANO		
			FLOSTEER ENGINEERS PVT. LTD.,	AHMEDABAD		
			OSWAL INDUSTRIES LTD.	KALOL, GANDHINAGAR		
			L & T VALVES LIMITED	HYDERABAD		
			FOURESS ENGINEERING (I)PVT.LTD	HYDERABAD		



 सी.एच. प्रशान्त कुमार
 CH Prashanth Kumar
 Dy Manager / Contracts Management / PE&SD
 भेल एन.डी. 32, बेलगाँव, बेलगाँव, BHEL, HYD 32

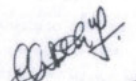

 03/10/19

	Project : Patratu STPP 3X800 MW				Doc No	QA-Mech-FDPS-01
	Package : FDPS Package		Sub-Vendor List for controlled items		Rev No	2
	Main Contractor: BHEL, PE&SD/Hyd		Mechanical Items		Date	26.09.2019
	Contract No. : CS-9585-001-2					
SL.NO.	ITEM	QP/INSPN CAT	ACCEPTABLE SUPPLIER AS PER THE PRESENT DATABASE	PLACE OF MANUFACTURING	Approval Cat	Remarks
11	SEAMLESS PIPE (FOR INERT GASS SYSTEM)	I	ISMT	AHMEDNAGAR	A	UPTO 150NB &
			ISMT	BARAMATI	A	UPTO 200 NB
			REMI	BHARUCH	A	UPTO 177.8 MM OD, HOT FINISHED
			MAHARASHTRA SEAMLESS	RAIGAD	A	UPTO 350 NB
12	MS PIPE (IS:1239/IS:3589 UPTO 150NB/900NB)	II	MUKAT TANKS AND VESSELS	TARAPUR	MAIN CONTRACTOR APPROVED SOURCE ACCEPTABLE (BIS APPROVED SOURCE HAVING VALID LICENSE)	
			SAIL	ROURKELA		
			PSL	CHENNAI/ VIZAG/KUTCH/DAMAN		
			MAHARASHTRA SEAMLESS	RAIGAD		
			RATNAMANI	KUTCH		
			JINDAL	GHAZTABAD		
			SURYA ROHNI	BAHADURGARH		
			RATNAMANI	CHHATRAL		
			JCO GAS PIPES	CHINDWARA		
			PRATIBHA PIPES & STRUCTURE PVT. LTD	THANE		
			LALIT PROFILE	THANE		
			SURENDRA ENGG.	RAJPURA		
			SAMSHI PIPES INDUSTRIES	VADODARA		
			MUKUT PIPES	RAJPURA		
			INDUS TUBES	G B NAGAR		
			MANN IND	INDORE		
			TATA	JAMSHEDPUR		
			WELSPUN	BHARUCH		
			DADUPIPES	SIKANDRABAD		
			JINDAL INDUSTRIES LTD.	HISSAR		
			APL APOLLO TUBES LTD.	SIKANDRABAD		
			LLYODS LINE PIPES LTD.	THANE		
			WELPSUN	AN JAR		
			POONAM ENTERPRISE	MUMBAI		
			EVERGREEN SEAMLESS PIPES & TUBES	BANGALORE		
			GAJANAN TUBES PRIVATE LIMITED	KOLKATA		
			UTKARSH INDIA LIMITED	KOLKATA		
			NEZONE TUBES LIMITED	KOLKATA		
			APL APOLLO TUBES LIMITED	GHAZIABAD		
			DADU PIPES PVT. LTD.	GHAZIABAD		
			BHARAT TUBES CORPORATION	SECUNDERABAD		
			M K K METAL SECTIONS PVT. LTD.	RANIPET		
			MADRAS STEEL AND TUBES	CHENNAI		
			TUBES INDIA	MUMBAI		
			MOKSHI INDUSTRIES PVT. LTD.	MUMBAI		
			JINDAL PIPES LIMITED	GURGAON		



 सी.एच. प्रशान्त कुमार
 CH Prashanth Kumar
 Dy. Manager / Contracts Management / PE&SD
 बी.एल.ई.एल. बिल्डिंग, BHEL-HYD-32

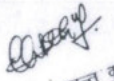

 03/10/19

	Project : Patratu STPP 3X800 MW		Sub-Vendor List for controlled items		Doc No	QA-Mech-FDPS-01
	Package : FDPS Package				Rev No	2
	Main Contractor: BHEL, PE&SD/Hyd		Mechanical Items		Date	26.09.2019
	Contract No. : CS-9585-001-2					
SL.NO.	ITEM	QP/INSPN CAT	ACCEPTABLE SUPPLIER AS PER THE PRESENT DATABASE	PLACE OF MANUFACTURING	Approval Cat	Remarks
			SWASTIK PIPE LIMITED	DELHI		
			NAVRATAN PIPE AND PROFILE LIMITED	NEW DELHI		
			FUTNANI STEELS PVT LTD.	SECUNDERABAD		
13	FIREHOSE	II	BIS APPROVED SOURCES A WITH VALID LICENCE		MAIN CONTRACTOR APPROVED SOURCE ACCEPTABLE (BIS APPROVED SOURCE HAVING VALID LICENSE)	
			GHOSH ENGINEERING INDUSTRIES	WEST BENGAL		
			ASCO STRUMECH PVT. LTD.	KOLKATA		
			Sukan Equipments Pvt Ltd	Gujarat		
			NEWAGE FIRE FIGHTING CO. LTD.	SURENDRANAGAR		
			SHAH BHOGILAL JETHALAL & BROTHERS	AHMEDABAD		
14	WATER MONITOR	II	HDFIRE	JALGAON	A	
			NEWAGE	SURENDRANAGAR	A	
			SHAHBHOGILAL	AHMEDABAD	A	
15	BRANCH PIPE COUPLING & NOZZLE (SS & GM)	II	ASHOKA ENGINEERING COMPANY	NEW DELHI	MAIN CONTRACTOR APPROVED SOURCE ACCEPTABLE (BIS APPROVED SOURCE HAVING VALID LICENSE)	
			SHAH BHOGILAL JETHALAL & BROTHERS	AHMEDABAD		
			NEWAGE FIRE FIGHTING CO. LTD.	SURENDRANAGAR		
			Sukan Equipments Pvt Ltd	Gujarat		
			ASCO STRUMECH PVT. LTD.	KOLKATA		
			GHOSH ENGINEERING INDUSTRIES	WEST BENGAL		
16	DELUGE VALVE WITH TRIMS	I	HD FIRE	THANE/JALGAON	A	
			TYCO (GRINEEL)	UK/USA	A	
			SHIELD	UK	A	
17	HV/MV SPRAY NOZZLE	II	CARRIER	GURGAON	A	FOR PISTON TYPE DELUGE VALVE ONLY
			HDFIRE	THANE	A	
			TYCO	UK/USA	A	
			SHIELD	U K	A	
18	QB DETECTOR	III	UTC FIRE & SECURITY INDIA LTD.	BANGALORE	A	
			TYCO (GRINELL)	UK	MAIN CONTRACTOR APPROVED SOURCES ACCEPTABLE	
			HD FIRE	THANE		
			MINIMAX	GERMANY		
19	WRAPPING & COATING MATERIAL	II	NEWAGE FIRE FIGHTING CO. LTD.	SURENDRANAGAR		
			MP TAR PRODUCTS	BHILAI	A	
			PORWAL INDUSTRIES	RATPUR	A	
			STP	JAMSHEDPUR	A	
			RUSTECH	KOLKATA	A	



 सी.एच. प्रशान्त कुमार
 CH Prashanth Kumar
 उप प्रबंधक / Contracts Management / PE&SD
 1. श्री एच. ई. एल. के.एल.एल. BHEL HYD-32



 03/10/19

	Project : Patratu STPP 3X800 MW				Doc No	QA-Mech-FDPS-01
	Package : FDPS Package		Sub-Vendor List for controlled items		Rev No	2
	Main Contractor: BHEL, PE&SD/Hyd		Mechanical Items		Date	26/09/2019
	Contract No. : CS-9585-001-2					
SL.NO.	ITEM	QP/INSPN CAT	ACCEPTABLE SUPPLIER AS PER THE PRESENT DATABASE	PLACE OF MANUFACTURING	Approval Cat	Remarks
20	INERT GAS EXTINGUISHING SYSTEM	II	ANSUL	USA	A	Subject to meeting Sub QR requirement.
			KIDDE (GINGEKERR)	DAN MARK	A	
			MINIMAX GmbH & Co. KG	GERMANY	A	
			TOTAL WALTHER	GERMANY	A	
			NOHMI BOSAI	JAPAN	A	
21	GM VALVE	III	LEADER VALVES	JULLANDHER	MAIN CONTRACTOR APPROVED SOURCES	
			SANTVALVES	JULLANDHER	ACCEPTABLE	
22	FIRE EXTINGUISHER	I	UNITED FIRE EQUIPMENTS PVT LTD.	NEW DELHI	MAIN CONTRACTOR APPROVED SOURCE ACCEPTABLE (BIS APPROVED SOURCE HAVING VALID LICENSE)	
			ASHOKA ENGINEERING COMPANY	NEW DELHI		
			NITIN FIRE PROTECTION INDUSTRIES LI	.		
			SUPREMEX EQUIPMENTS	MUMBAI		
			INTIME FIRE APPLIANCES PVT. LTD.	NAVI MUMBAI		
			KANADIA FYR FYTER PVT. LTD.	MUMBAI		
			SAFEX FIRE SERVICES LTD.	Palghar		
23	HOSE BOX	III	INTEGRATED FIRE PROTECTION	KOLKATA	MAIN CONTRACTOR APPROVED SOURCES	
			MAIN CONTRACTOR APPROVED SOURCES			
24	MALLEABLE FITTINGS	III	MAIN CONTRACTOR APPROVED SOURCES		MAIN CONTRACTOR APPROVED SOURCES	
25	MS FITTINGS (BLACK/GI)	III	MAIN CONTRACTOR APPROVED SOURCES		MAIN CONTRACTOR APPROVED SOURCES	
26	FITTINGS (ASTM A 234 / A105)	III	NLHAZRA	KOLKATA	MAIN CONTRACTOR APPROVED SOURCES ACCEPTABLE	
			GUJRAT INFRA PIPES	BARODA		
			TUBE PRODUCTS	BARODA		
			PIPEFIT ENGINEERS	BARODA		
			MS FITTINGS	KOLKATA		
			SIDDARTH & GAUTAM	FARIDABAD		
			EBY	MUMBAI		
			Jindal forging Pvt Ltd	Kolkata		
			ENGINEERING SERVICE ENTERPRISE	KOLKATA		
			N L HAZRA AND SON	HOWRAH		
			M. S. FITTINGS MANUFACTURING CO. PVT	KOLKATA		
			POONAM ENTERPRISE	MUMBAI		
			NAV DURGA FORGING AND FITTINGS	MUMBAI		
			TUBE TURN (INDIA) P. LTD.	NAVI MUMBAI		
			UNITECH MACHINES LIMITED	GURGAON		
			K. S. PIPE FITTINGS PVT. LTD.	DIST- PALWAL		
			P. K. TUBES & FITTINGS PVT. LTD.	GURGAON		
			TRUE FAB ENGINEER (P) LTD.	FARIDABAD		



 सी एच प्रशान्त कुमार
 CH Prashanth Kumar
 Dy. Manager / Contracts Management - 95450
 को एच डी प्रो. विभाग, BHEL-HYD-32



 03/10/19

		Project : Patratu STPP 3X800 MW			Doc No	QA-Mech-FDPS-01
		Package : FDPS Package			Rev No	2
		Main Contractor: BHEL, PE&SD/Hyd			Date	26.09.2019
		Contract No. : CS-9585-001-2				
		Sub-Vendor List for controlled items				
		Mechanical Items				
SL.NO.	ITEM	QP/INSPN CAT	ACCEPTABLE SUPPLIER AS PER THE PRESENT DATABASE	PLACE OF MANUFACTURING	Approval Cat	Remarks
			DEE DEVELOPMENT ENGINEERS LTD.,	FARIDABAD		
			TRUE FORGE PVT.LTD.,	FARIDABAD		
			PETRO CHEM INDUSTRIES	VADODARA		
			TOPAZ PIPING INDUSTRIES	VADODARA		
			SAWAN ENGINEERS PVT. LTD.	VADODARA		
			GUJARAT INFRAPIPES PVT.LTD.,	BARODA		
			WEIFANG HUODA PIPE FITTINGS	WEIFANG		
			TRIOMECH ENGINEERING PVT. LTD.	SANGAREDDY DIST		
			PRESHZINGER ENGINEERING	HYDERABAD		
			FLOWTECH	KOLKATA		
			LEADER VALVES LIMITED	JALANDHAR		
			FITTECH INDUSTRIES PVT. LTD.	THANE		
			PRECISION ENGINEERING INDS.,	MUMBAI		
			SKY FORGE PRIVATE LIMITED	DUNDSA, PALWAL		
			S.S.PIPE FITTINGS & FORGINGS	MEDAK DIST.		
			UNIQUE ENGINEERING ENTPS. PVT. LTD.	SECUNDERABAD		
			FLASH FORGE PVT LTD	VISAKHAPATNAM		
			CARLO DYNATECH INDUSTRIES,	PATANCHERU		
			U I PIPE FITTINGS PVT. LTD.	HYDERABAD		
			PIPEFIT ENGINEERS PVT. LTD.	VADODARA		
27	SS ERW PIPES	III	APBXTUBES	BEHROR	A	
			REMI EDELSTAHL TUBULARS LIMITED	MUMBAI	A	
			HEAVY METAL AND TUBES (INDIA)	DIST. GANDHINAGAR	A	
			RATNAMANI METALS & TUBES LTD.,	AHMEDABAD	A	
			PRODUCTOS TUBULARES S.A.,	SPAIN	A	
28	EOT CRANES (UPTO 10 T)/ ELECTRIC HOISTS (UPTO 10 T)	Cat-I for EOT crane and Cat-III for Hoists up to 10 T capacity	ARMSSELL	BANGALORE	A	
			EDDY CRANES	PUNE	A	
			LIFTING EQUIPMENTS	DELHI	A	ONLY FOR ELECTRIC HOIST UPTO 5 T
			TRACTOR TRIFEL	PALVEL	A	FOR ELECTRIC HOIST ONLY
			CONSOLIDATED HOIST PVT. LTD.	SATARA / PUNE	A	
			ALPHA SERVICES	BHIWADI	A	GEARBOX FROM NTPC APPROVED SOURCES.
			TUOBRO FURGUSON INDIA PVT. Ltd	KOLKATA	A	FOR ELECTRIC HOIST UPTO 5 T
			MUKAND	THANE	A	EOT CRANE
			FAFCO	VADODARA/MUMBAI	A	
			WMI	MUMBAI	A	
			AVON CRANES	GURGAON	A	
			MILLARS INDIA LTD.	KARAN SAD	A	FOR EOT CRANE ONLY
			TISCO GROWTH	JAMSH EDPUR	A	FOR EOT CRANE ONLY
			UNIQUE INDUSTRIAL HANDLERS	NASHIK	A	EOT CRANE


 श्री एच. प्रशान्त कुमार
 CM Prashanth Kumar
 ज्येष्ठ प्रबंधक / निरीक्षण प्रभाग, पी&एस, बी
 ज्येष्ठ प्रबंधक / Contract Management, PE&SD
 बी.पी.ए. सं. नि. बी.पी.ए. BHEL/HYD-32



 03/10/19

	Project : Patratu STPP 3X800 MW		Doc No		QA-Mech-FDPS-01	
	Package : FDPS Package		Sub-Vendor List for controlled items		Rev No	
	Main Contractor: BHEL, PE&SD/Hyd		Mechanical Items		Date	
	Contract No. : CS-9585-001-2				26/09/2019	
SL.NO.	ITEM	QP/INSPN CAT	ACCEPTABLE SUPPLIER AS PER THE PRESENT DATABASE	PLACE OF MANUFACTURING	Approval Cat	Remarks
			ANUPAM INDUSTRIES LTD.	V.U. NAGAR	A	FOR EOT CRANE ONLY
			HEC	RANCHI	A	
			CENTURY CRANE	BALLABHGARH	A	GEARBOX FROM NTPC APPROVED SOURCES
			GRIP	FARIDABAD	A	FOR EOT CRANE ONLY
			HERCULES HOIST	RAIGAD	A	FOR ELECTRIC HOIST UPTO 5 T
			REVA INDUSTRIES	FARIDABAD	A	FOR ELECTRIC HOIST UPTO 5 T
			GRIP	HYDERABAD	A	GEARBOX FROM NTPC APPROVED SOURCES.
			MEEKA MACHINERY PVT. LTD.	AHMEDAMAD	A	FOR ELECTRIC HOIST UPTO 10 T
			SMACO ENGINEERING PRIVATE LIMITED	MUMBAI	A	EOT-60T, EOT-2T
			MANGLA HOISTS PVT. LTD	Greater Noida	A	EOT-15T,
29	CHAIN PULLEY BLOCK (UPTO 5 TONS)	III	CRANEX LIMITED	GHAZIABAD	A	FOR EOT CRANE ONLY. GEARBOX FROM NTPC APPROVED SOURCES.
			TRACTEL TRIFEL	PALVEL	MAIN CONTRACTOR APPROVED SOURCES ACCEPTABLE	
			ARMSELL	BANGALORE		
			LEAP	DELHI		
			HERCULES (INDEF)	RAJ GAD		
30	MULTI PURPOSE NOZZLE	II	CENTURY CRANE	BALLABHGARH	MAIN CONTRACTOR APPROVED SOURCES ACCEPTABLE	
			SHAH BHOGILAL	AHMEDABAD		
31	PRESSURE RELIEF DAMPER (GRAVITY DAMPER)	III	NEW AGE INDUSTRIES	SURENDRA NAGAR	MAIN CONTRACTOR APPROVED SOURCES	
			MAIN CONTRACTOR APPROVED SOURCES			
32	ALARM VALVE WITH TRIMS	I	HD FIRE	THANE	A	
			HD FIRE	JALGAON	A	
33	PRESSURE REDUCING VALVE (PRV)	III	RAPHEAL VALVES (TYCO VALVES)	ISREAL	MAIN CONTRACTOR APPROVED SOURCES ACCEPTABLE	
			DARLING MUESCO	AHMEDABAD		
34	AIR RELEASE VALVE	III	MAIN CONTRACTOR APPROVED SOURCES			
35	FOAM SYSTEM (BLADDER TANK TYPE)	I	FIRETECH	MUMBAI	A	
			HDFIRE	JALGAON	A	
			NAFFCO	UAE	A	
36	LOCAL CONTROL PANEL FOR DIESEL ENGINE/DELUGE VALVE	III	L&T	MUMBAI/ COIMBATORE	MAIN CONTRACTOR APPROVED SOURCES ACCEPTABLE	
			GE	BANGALORE		
			SIEMENS	MUMBAI		
			SCHEINDER	NASHIK		



 सी.एच. प्रशान्त कुमार
 CH Prashanth Kumar
 Dy Manager / Control Room / BHEL HYD-32

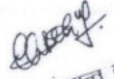

 03/10/19


<div><div>एनटीपीसी</div><div>NTPC</div></div>	Project : Patratu STPP 3X800 MW		Sub-Vendor List for controlled items		Doc No	QA-Mech-FD/PS-01
	Package : FDPS Package				Rev No	2
	Main Contractor: BHEL,PE&SD/Hyd				Date	26/09/2019
	Contract No. : CS-9585-001-2					
SL.NO.	ITEM	QP/INSPN CAT	ACCEPTABLE SUPPLIER AS PER THE PRESENT DATABASE	PLACE OF MANUFACTURING	Approval Cat	Remarks
			UNILEC	GURGAON		
			CONTROL & SWITCHGEAR	NOIDN HARDWAR		
			CONTROL & SCHEMATIC	HYDERABAD		
			JACKSON	G.NOTDA		
			ANAND POWER	NOIDA		
			PYROTECH	UDAIPUR		
			SWITCHING CIRCUIT	KOLKATA		
			POSITRONICS	VADODARA		
			MAKTEL	VADODARA		
			TRICOLITE	SAHIBABAD/MANESAR		
			HINIDUSTAN CONTROL & EQUIPMENT	KOLKATA		
			CONTROL DEVICES	KOLKATA		
			VIDYUT CONTROL	GHAZIABAD		
			ADLECPower	ROHAD (JHAJJHAR)		
			JOLLY ENGG.	KOLKATA		
			JASPER	NOIDA		
			HAVELL	FARIDABAD		
			UNITED OIL AND GAS ENGINEERING PVT LTD	CHENNAI		
			CHW FORGE PRIVATE LIMITED	Ghaziabad		
			C.D. INDUSTRIES,	Ghaziabad		
			SUPER FORGE PVT LTD	Ghaziabad		
			C.D.ENGINEERING CO.	Ghaziabad		
			KUNJ FORGINGS PVT. LTD.	Ghaziabad		
			Jindal forging Pvt Ltd	KOLKATA		
			TESHI ENGINEERS AND SALES PROMOTERS	KOLKATA		
			MAHESH INDUSTRIES	Navi MUMBAI		
			NAV DURGA FORGING AND FITTINGS	Mumbai		
			TRUE FORGE PVT.LTD.,	Faridabad		
			PIPEFIT ENGINEERS PVT. LTD.	Vadodara		
			PETRO CHEM INDUSTRIES	Vadodara		
			METAL FORGINGS P. LTD.	NEW DELHI		
			PRESHZINGER ENGINEERING	HYDERABAD		
			UNIQUE ENGINEERING ENTPS. PVT. LTD.	HYDERABAD		


 सी.एच. प्रशान्त कुमार
 CH Prashanth Kumar
 जय प्रकाश एनर्जी मैनेजमेंट प्रा. लि.
 Jy Manager / Contracts Management / NTPC
 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000



 09/11/19

		Project : Patratu STPP 3X800 MW		Sub-Vendor List for controlled items		Doc No		QA-Mech-FDPS-01	
		Package : FDPS Package		Mechanical Items		Rev No		2	
		Main Contractor: BHEL,PE&SD/Hyd				Date		26.09.2019	
		Contract No. : CS-9585-001-2							
SL.NO.	ITEM	QP/INSPN CAT	ACCEPTABLE SUPPLIER AS PER THE PRESENT DATABASE	PLACE OF MANUFACTURING	Approval Cat	Remarks			
38	Gaskets	III	GOODRICH GASKET PVT. LTD.	Chennai	MAIN CONTRACTOR APPROVED SOURCES ACCEPTABLE				
			I G P ENGINEERS PVT LIMITED,	Chennai					
			BOMBAY CHEMICAL EQUIPMENTS						
			TEEKAY FLOWFLEX PVT. LTD.	Raigad (MH)					
			JYOTHI INDUSTRIES,	HYDERABAD					
			STARFLEX SEALING INDIA PVT. LTD.	Verna,Goa					
			UNI KLINGER LTD.	Pune & Ahmedabad					
			JAMES WALKER INMARCO INDS PVT LTD	Mumbai					
39	Stud nuts	III	SREE PAVITHRA INDUSTRIES,	Chennai	MAIN CONTRACTOR APPROVED SOURCES ACCEPTABLE				
			HARYANA FASTNERS	Ludhiana					
			KWALITY FORGE	HYDERABAD					
			UDEHRA FASTENERS LIMITED	Ludhiana					
			MORNING STAR INDUSTRIES,	Ludhiana					
			PIONEER NUTS AND BOLTS PVT.LTD	Vadodara					
			MEGA ENGINEERING PVT. LTD.	Thane & Kolhapur					
			PRESIDENT ENGINEERING WORKS	Silvassa					
			BOLTMASTER (INDIA)PVT.LTD.	Palghar & Rudrapur					
			ATLAS FASTENERS	HYDERABAD					
LEGENDS :									
1.0 SYSTEM SUPPLIER / SUB SUPPLIER APPROVAL STATUS CATEGORY									
A - For those items proposed vendor is acceptable to Customer. To be indicated with letter "A" in the list alongwith the condition of approval, if any.									
DR - For those items "Detailed Required" for Customer review. To be identified with letter "DR" in the list. For these items, vendor shall be proposed for owner acceptance with-in the agreed contract schedule of the package.									
2.0 QP INSPECTION CATEGORY :									
CAT - I : For those items the Quality Plans are approved by Customer and final acceptance will be on physical inspection witness by Customer									
CAT - II : For those items the Quality Plans are approved by Customer. However no physical inspection shall be done by Customer. The final acceptance by Customer shall be on the basis of review of documents.									
CAT - III : For these items Quality control to be exercised as per Main Contractor Quality Assurance System. The final acceptance by NTPC/PVUN shall be on the basis of Certificate of Conformance (COC) by Main Contractor.									
UNITS/WORKS : Place of manufacturing- Place of main supplier of multi units/works.									



 सी.एच. प्रशान्त कुमार
 CH Prashanth Kumar
 Dy Manager / Contract Management / PE&SD
 BHEL HYD-32


 03/10/19
 (Kamlesh Singh)
 PVUNL

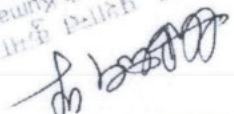
<div style="border: 1px solid black; padding: 2px; display: inline-block;"> एनटीपीसी NTPC </div>	Project : Patratu STPP 3X800 MW				Doc No	QA C&I-FDPS 01
	Package : FDPS Package			Sub-Vendor List for controlled items	Rev No	0
	Main Contractor : BHEL, Hyderabad			Control & Instrumentation Items	Date	02.04.2019
	Sub Contractor :					
	Contract No. : CS-9585-001-2					
Sl No.	Item	QP/ Insp. Cat.	Acceptable Supplier As Per Database	Place of Manufacturing	Approval Status	Remarks
1	Fire Alarm Panel - Microprocessor Based	II	Notifier	USA	A	
			Tyco	USA	A	
			Autronica	Norway	A	
			Schrack	Austria	A	
			Edward	USA	A	
			ESSER (Honeywell)	Germany	DR	
2	ADDRESSABLE DETECTORS (MULTI SENSOR, PHOTO & HEAT DETECTORS TYPE), INTERFACE UNITS & MANNUAL CALL POINTS	II	Notifier	USA	A	
			Tyco	USA	A	
			Autronica	Norway	A	
			Schrack	Austria	A	
			Edward	USA	A	
			ESSER (Honeywell)	Germany	DR	
3	Coupling / Interposing Relays	III	Paramount /Omron/Oen/Jyoti/Elsa Or OEM Approved Sources			NOTE-6
4	Electrical Actuator (With Gear Box, If Applicable)	II	Antrieb Technik Pvt Ltd	Chennai	A	for low torque application
			Auma	Bangalore	A	
			Limitorque	Faridabad	A	
			Rotork	Chennai/Banglore	A	
5	Fiber Optic Cable	II	HFCL	Goa	A	
			Aksh Fibre	Bhiwadi	A	
			Finolex	Pune/Goa	A	
			M/S Birla Cable Limited	Rewa	A	
			R&M	Switzerland	A	
			Apar Industries Limited	MUMBAI	DR	
			RPG Cables Limited	Thane	DR	


CH Prashanth Kumar
 Dy. Manager / Control Monitoring PG&SH
 40, 44 & 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

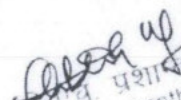

P.P. Pathak

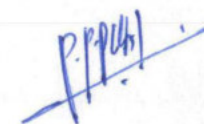
					
Project : Patratu STPP 3X800 MW		Package : FDP5 Package		Main Contractor : BHEL, Hyderabad	
		Sub Contractor :		Contract No. : CS-9585-001-2	

SI No.	Item	QP/ Insp. Cat.	Acceptable Supplier As Per Database	Place of Manufacturing	Approval Status	Remarks
6	Instrument Cables (F, G & T/C Cables) Note-2	I	Paramount Communication Ltd	Kushkhera	A	PVC, FRLS type
			Daman	Faridabad	A	PVC, FRLS type
			Delton	Bhiwadi	A	PVC, FRLS type
			Kel	Faridabad	A	PVC, FRLS type
			Elkey Telelinks	Faridabad	A	PVC, FRLS type
			Cords	Kaharani	A	PVC, FRLS type
			Cords	Bhiwadi	A	PVC, FRLS type
			Nicco	Kolkata	A	PVC, FRLS type
			Universal Cable	Satna	A	PVC, FRLS type
			Thermocables	Hyderabad	A	PVC, FRLS type
			Gupta Power Infrastructure Ltd.	Khurda	A	PVC, FRLS type
			Cmi	Faridabad	A	PVC, FRLS type
			Advance Cables Pvt Ltd	Banglore	A	PVC, FRLS type
			Gemscab Industries Ltd	Bhiwadi	A	PVC, FRLS type
			Apar Industries Limited	Valiad	A	PVC, FRLS type
7	24 V Intelligent Battery Charger / DCDB & BHMS (As applicable)	II	Eitech	Gurgaon	A	
			MasTech	Jalgaon	A	
			VERTIV ENERGY PVT LTD	Mumbai	A	
			GE Intelligent Plateforms Pvt Ltd	Bangalore	A	
			ABB	Bangalore	A	
			Schneider	Nasik	A	
			Rockwell	Sahibabad	A	
			Siemens	Nasik	A	
8	PLC System	I	Honeywell	Pune	A	1-PLC modules should be procured from M/s Honeywell Co Ltd, Korea. 2-Make of Panel components & interposing relay should be from NTPC approved source.

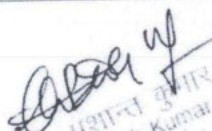

 M. Prashanth Kumar
 Sr. Manager / Control Management / PE&SD
 BHEL, HYD-02

<div>एनटीपीसी</div> <div>NTPC</div>	Project : Patratu STPP 3X800 MW				Doc No	QA-C&I-FDPS-01
	Package : FDPS Package			Sub-Vendor List for controlled items	Rev No	0
	Main Contractor : BHEL, Hyderabad			Control & Instrumentation Items	Date	02.04.2019
	Sub Contractor :					
	Contract No. : CS-9585-001-2					
Sl No.	Item	QP/ Insp. Cat.	Acceptable Supplier As Per Database	Place of Manufacturing	Approval Status	Remarks
9	IR Detectors	III	Neola Corporation (ODTI)	Pawane	A	
			Patol		A	
			AGNI Controls	Chennai	DR	
10	Terminal Block (Cage And Clamp Type)	III	Weidmuller	Germany	A	
			Phoenix	Germany / India	A	
			Wago	Germany / India	A	
			Elmex	Vadodara	A	Model should have CE Marking
11	Ni-Cd Battery	I	AMCO SAFT INDIA LIMITED	Bengalure	A	
		I	HBL POWER	Hyderabad	A	
		II	HOPPECKE BATTERIEN GMBH & CO KG	Germany	A	
12	Short term fire proof cables, MICC Cables	III	Pentair	UK	A	
			Wrexham Mineral	UK	A	
			KME	Italy	A	
			TYCO	UK / China	A	
Following C&I items (as applicable) to be supplied as per main contractor approved sources meeting the NTPC Specification requirement						
1	Air Filter Regulator/ Lubricator	III	Main Contractor approved sources			
2	Annunciator	III	Main Contractor approved sources			
3	Battery Health Monitoring System	III	Main Contractor approved sources			
4	Compression Fittings(Ss)	III	Main Contractor approved sources			
5	Conduits / Pipe (Gi)	III	Main Contractor approved sources			
6	Conduits Lead Coated (Flexible)	III	Main Contractor approved sources			
7	Copper Tubing/Brass Connectors	III	Main Contractor approved sources			
8	Beam Detector	III	Main Contractor approved sources			


 प्रशांत कुमार
 CH Prashanth Kumar
 By Manager / Engineer / Inspector / PE/SD
 BHEL-HYD-32



 P. Prashanth

एनटीपीसी NTPC	Project : Patratu STPP 3X800 MW				Doc No	QA-C&I-FDPS-01
	Package : FDPS Package			Sub-Vendor List for controlled items	Rev No	0
	Main Contractor : BHEL, Hyderabad			Control & Instrumentation Items	Date	02.04.2019
	Sub Contractor :					
	Contract No. : CS-9585-001-2					
SI No.	Item	QP/ Insp. Cat.	Acceptable Supplier As Per Database	Place of Manufacturing	Approval Status	Remarks
9	Desk for Ows/Ews/Printer/Server	III	Main Contractor approved sources			
10	Push Button stations	III	Main Contractor approved sources			
11	Blank Panel / Local control panel	III	Main Contractor approved sources			
12	Flow Gauge	III	Main Contractor approved sources			
13	Flow Switch	III	Main Contractor approved sources			
14	Frp Junction Box	III	Main Contractor approved sources			
15	Furniture for Control Room (along with Chair, Almira, Lock - if applicable)	III	Main Contractor approved sources			
16	Graphic Interface Unit	III	Main Contractor approved sources			
17	Hand Held Calibrator	III	Main Contractor approved sources			
18	Impulse Pipes/Tubes	III	Main Contractor approved sources			
19	Instrument Fittings (Air)	III	Main Contractor approved sources			
20	Instrument Valve(Needle Valve)	III	Main Contractor approved sources			
21	Level Gauge / Indicator (Transperent & Reflex, Tubular Type)	III	Main Contractor approved sources			
22	Level Indicator (Float & Board, Tubular Type)	III	Main Contractor approved sources			
23	Level Switch - Float/Displacer Type/Paddle	III	Main Contractor approved sources			
24	Level Switch Capacitance Type	III	Main Contractor approved sources			
25	Limit Swtch	III	Main Contractor approved sources			
26	Maintenance And Calibration Equipment	III	Main Contractor approved sources			
27	Mini UPS Up to 3.5 Kva	III	Main Contractor approved sources			
28	Orifice Plate Assembly	III	Main Contractor approved sources			
29	Pr./ Vacuum/ Dp Gauges	III	Main Contractor approved sources			
30	Press, Dp, Vacuum Switch	III	Main Contractor approved sources			


 श्री प्रशान्त कुमार
 CH Prashanth Kumar
 Sr. Manager / Contracts Management / PESSO
 BHEL HYD-32



 P.P. P. P. P.


एनटीपीसी NTPC	Project : Patratu STPP 3X800 MW				Doc No	QA C&I-FDPS-01
	Package : FDPS Package			Sub-Vendor List for controlled items	Rev No	0
	Main Contractor : BHEL, Hyderabad			Control & Instrumentation Items	Date	02.04.2019
	Sub Contractor :					
	Contract No. : CS-9585-001-2					
SI No.	Item	QP/ Insp. Cat.	Acceptable Supplier As Per Database	Place of Manufacturing	Approval Status	Remarks
31	Lead Acid Battery for Fire Alarm Panel	III	Main Contractor approved sources			
32	Printer (Inkjet / Laser)	III	Main Contractor approved sources			
33	DC UPS for PLC	III	Main Contractor approved sources			
34	Rotameter	III	Main Contractor approved sources			
35	Sight Flow Indicator	III	Main Contractor approved sources			
36	Socket Weld Fittings	III	Main Contractor approved sources			
37	Solenoid Valve	III	Main Contractor approved sources			
38	Temperature Gauge(With Thermowell)	III	Main Contractor approved sources			
39	Temperature Switch	III	Main Contractor approved sources			
40	Valve Manifolds	III	Main Contractor approved sources			
41	Ultrasonic Type Level Transmitter	III	Main Contractor approved sources			
42	Siren	III	Main Contractor approved sources			
43	Transmitter (Electronic) (Pressure, DP, Flow, Level Application)	III	Main Contractor approved sources			
44	LHS Cable	III	Main Contractor approved sources			


 श्री एच. प्रशान्त कुमार
 CH Prashanth Kumar
 Dy Manager / Contracts Management / E&S
 की एच.ई.एन. BHEL HYD-32


 P.P. Pathi

एनटीपीसी NTPC	Project : Patratu STPP 3X800 MW			Doc No	QA-C&I-FDPS-01	
	Package : FDPS Package		Sub-Vendor List for controlled items	Rev No	0	
	Main Contractor : BHEL, Hyderabad		Control & Instrumentation Items	Date	02.04.2019	
	Sub Contractor :					
	Contract No. : CS-9585-001-2					
SI No.	Item	QP/ Insp. Cat.	Acceptable Supplier As Per Database	Place of Manufacturing	Approval Status	Remarks
LEGENDS :						
1.0 SYSTEM SUPPLIER / SUB SUPPLIER APPROVAL STATUS CATEGORY						
A - For those items proposed vendor is acceptable to Customer. To be indicated with letter "A" in the list along with the condition of approval, if any.						
DR - For those items "Detailed Required" for Customer review. To be identified with letter "DR" in the list. For these items, vendor shall be proposed for owner acceptance within the agreed contract schedule of the package						
2.0 QP INSPECTION CATEGORY :						
CAT - I : For those items the Quality Plans are approved by Customer and final acceptance will be on physical inspection witness by Customer						
CAT - II : For those items the Quality Plans are approved by Customer. However no physical inspection shall be done by Customer. The final acceptance by Customer shall be on the basis of review of documents.						
CAT - III : For those items Main supplier approves Quality Plans. The final acceptance by Customer shall be on the basis of Certificate of Conformance by main supplier.						
UNITS/WORKS : Place of manufacturing- Place of main supplier of multi units/works.						
NOTES: As applicable (if required)						
Note 1 :	Approval is conditional and subject to Sub QR / Provenances clearance as specified in the contract specification. Further for any change in the Technical specification at later stage vendor approval will be reviewed accordingly.					
Note 2 :	For Instrument cable up to 1 KM inspection category CAT - III, For 1 KM to 2.5 KM Inspection category CAT - II.					
Note 3 :	For the items not appearing in the preaward list and falls in the scope of supply of the bidder, bidder and Customer will mutually discuss in future.					
Note 4 :	Blank					
Note 5 :	For the C & I instruments mounted on the skid of the main item or supplied as an integral part of the main item, instrument to be supplied as per proven practice of the manufacturer meeting the Customer technical specification requirement.					
Note 6 :	This item is a bought out component of main equipments like DDCMIS, PLC, TSI, CCTV, PA system etc.					
Note 7 :	Blank					
Note 8 :	Mandatory Spares to be treated as NTPC inspection category CAT - III.					


 Anshanth Kumar
 CH - Instrumentation
 BHEL, Hyderabad


 Anshanth Kumar
 03/10/2019

ANNEXURE-13

BOQ FOR INERT GAS EXTINGUISHING SYSTEM										
Sl.No.	Drawing Title	Unit	P&ID of IGES	Piping Layout of IGES	Isometric View of IGES	GA of Inergen cylinder storage room & supporting arrangement	GA of Cylinder Manifold	Pressure Vent Location Location Layout	Electrical Cabling Layout	TOTAL BOQ
	Vendor Documet No.									
	Drawing Approval status (By BHEL)									
	Remarks									
1.0	Inergen CYLINDER -300 BAR, CAPACITY. 140 LTRS.	Nos.								
2.0	LABEL FOR140 LTRS CYLINDER	Nos.								0
3.0	PNEUMATIC VALVE (INCLUDED IN CYLN. ASSEMBLY)	Nos.								0
4.0	CHECK VALVE 3/4"NPT X 1/2"BSP	Nos.								0
5.0	CONTACT GAUGE UNIT	Nos.								0
6.0	DISCHARGE HOSE 1/2" X 400 LG.	Nos.								0
7.0	NON RETURN VALVE 1/4 inch	Nos.								0
8.0	1/4 INCH CROSS FOR ACTUATION LINE	Nos.								0
9.0	HI-FLEX. HOSE FOR PILOT 1/4" X 365 Length.	Nos.								0
10.0	HI FLEX HOSE 1/4" X 500MM	Nos.								0
11.0	HI FLEX HOSE 1/4" X 400MM (1X90°)	Nos.								0
12.0	HI FLEX HOSE 1/4" X 700MM (1X90°)									0
13.0	PRESSURE GAUGE 1/2 NPT-300 Bar	Nos.								0
14.0	PRESSURE RELIEF DEVICE 300 BAR, BSP	Nos.								0
15.0	RELEASE UNIT 300 BAR(Automatic & Manual Release)	Nos.								0
16.0	1/4 Inch TEE PIECE FOR ACTUATOR LINE	Nos.								0
17.0	BALL VALVE, 1 1/2 INCH (DIVERter VALVE) FE - NPT	Nos.								0
18.0	HANDLE FOR 1 1/2 INCH BALL VALVE	Nos.								0
19.0	BALL VALVE, 1 INCH (DIVERter VALVE) FE - NPT	Nos.								0
20.0	HANDLE FOR 1 INCH BALL VALVE	Nos.								0

[illegible]


Sl.No.	Drawing Title	Unit	P&ID of IGES	Piping Layout of IGES	Isometric View of IGES	GA of Inergen cylinder storage room & supporting arrangement	GA of Cylinder Manifold	Pressure Vent Location Location Layout	Electrical Cabling Layout	TOTAL BOQ
	Vendor Documet No.									
	Drawing Approval status (By BHEL)									
	100 NB	Mtrs.								0
40.2	END CAP-100 NB	Nos.								0
40.3	CS FLANGES-100 NB	Nos.								0
40.4	Full COUPLINGS-3/4 NPT	Nos.								0
40.5	Gaskets	Nos.								0
40.6	M 36 x 275 mm long stud &nuts for 100 NB Flange 2500#									0
41.0	Piping from Manifold to Pilot manifold									
41.1	CS ASTM A 106 GR B SCH.XXS									
	100 NB	Mtrs.								0
42.0	Fittings Details at Cylinder Room									
42.1	Elbows-100 NB	Nos.								0
42.2	Equal Tee-100 NB	Nos.								0
42.3	END CAP-100 NB	Nos.								0
42.4	CS FLANGES-100 NB	Nos.								0
42.5	Gaskets	Nos.								0
42.6	M 36 x 275 mm long stud &nuts for 100 NB	Nos.								0
42.7	Full COUPLINGS-3/4 NPT	Nos.								0
42.8	U-Bolts-100 NB	Nos.								0
43.0	Cylinder supporting Strecturals									
43.1	ISMC-150 x 75 x 6	Mtrs.								0
43.2	Angle-75x75x6	Mtrs.								0
43.3	Square Plate- 250x150x10	Nos.								0
43.4	Base Square Plate-300x75x6	Nos.								0
43.5	Anchor fastener -M10x75	Nos.								0
43.6	Stiffner-Square Plate-200x200x6	Nos.								0
43.7	Bolts &nuts	Nos.								0
43.8	U-CLAMP-100 NB	Nos.								0
43.9	Angle-(Cylinder Bracket)-ISA-75x75x6									0
44.0	DRV Manifold supporting Strecturals									
44.1	ISMC-100x40x6	Mtrs.								0
44.2	Angle-	Mtrs.								0
44.3	Square Plate	Nos.								
44.4	Base Square Plate-	Nos.								0

Sl.No.	Drawing Title	Unit	P&ID of IGES	Piping Layout of IGES	Isometric View of IGES	GA of Inergen cylinder storage room & supporting arrangement	GA of Cylinder Manifold	Pressure Vent Location Location Layout	Electrical Cabling Layout	TOTAL BOQ
	Vendor Documet No.									
	Drawing Approval status (By BHEL)									
44.5	Anchor fastener	Nos.								0
44.6	Stiffner-Square Plate	Nos.								0
44.7	U-Bolts-100 NB	Nos.								0
45.0	Floor Structural Support									
45.1	ISA-75x75x6									0
45.2	Square Plate-150x150x6	Nos.								0
45.3	Anchor Fastener-M10x75	Nos.								0
46.0	Distripution Piping(Downstream piping from Restrictor)									
46.1	CS ASTM A 106 GR B SCH.40									
46.1.1	100NB	Mtrs.								0
46.1.2	80NB	Mtrs.								0
46.1.3	65NB	Mtrs.								0
46.1.4	50NB	Mtrs.								0
46.1.5	40NB	Mtrs.								0
46.2	CS Fittings for Piping at TG Building 17 Mtr									
46.2.1	Equal Tee									
46.2.1.1	100 NB ,B/W	Nos.								0
46.2.1.2	80 NB ,B/W	Nos.								0
46.2.1.3	65 NB B/W	Nos.								0
46.2.1.4	40 NB ,S/W	Nos.								0
46.2.2	Unequal Tee									
46.2.2.1	100X100X80NB, B/W	Nos.								0
46.2.2.2	100X100X40NB, B/W	Nos.								0
46.2.2.3	80X80X50NB, B/W	Nos.								0
46.2.2.4	80X80X40NB, B/W	Nos.								0
46.2.2.5	65x 65 x 40 NB,S/W	Nos.								0
46.2.2.6	50 x 50 x 40 NB,S/W	Nos.								0
46.2.3	Elbow-90° Elbow									
46.2.3.1	100NB B/W	Nos.								0
46.2.3.2	80NB B/W	Nos.								0
46.2.3.3	65NB S/W	Nos.								0
46.2.3.4	40NB S/W	Nos.								0

Sl.No.	Drawing Title	Unit	P&ID of IGES	Piping Layout of IGES	Isometric View of IGES	GA of Inergen cylinder storage room & supporting arrangement	GA of Cylinder Manifold	Pressure Vent Location Location Layout	Electrical Cabling Layout	TOTAL BOQ
	Vendor Documet No.									
	Drawing Approval status (By BHEL)									
46.2.4	REDUCING ELBOW									
46.2.4.1	100X80NB B/W	Nos.								0
46.2.5	Concentric Reducer									
46.2.5.1	100X80NB B/W	Nos.								0
46.2.5.2	80x65NB B/W	Nos.								0
46.2.5.3	80x50NB B/W	Nos.								0
46.2.5.4	65X50NB S/W	Nos.								0
46.2.5.5	65X40NB S/W	Nos.								0
46.2.5.6	50X40NB S/W	Nos.								0
47.0	<u>Piping Supports for Downstream Piping(S-1 to S-7- 94 Nos)</u>									
47.1	ISMC 100 x 50 x 5	Mtrs.								0
47.2	ISA 50 x 50 x5	Mtrs.								0
47.3	Square Plate-200 x 100 x 6 mm thick	Nos.								0
47.4	Anchor Fasteners	Nos.								0
47.5	M12 x 115 mm long	Nos.								0
47.6	M10 x 75 mm long	Nos.								0
47.7	U Bolts ,Double nuts with Washers									
47.7.1	M12 x 100 NB	Nos.								0
47.7.2	M10 x 80 NB	Nos.								0
47.7.3	M8 x 65 NB	Nos.								0
47.7.4	M8 x 50 NB	Nos.								0
47.7.5	M8 x 40 NB	Nos.								0
48.0	Full Coupling-1 1/2" (40 NB) for Nozzle fixing	Nos.								0


SUB-SECTION – B-20

LT POWER CABLES


CLAUSE NO.	TECHNICAL REQUIREMENTS																									
1.00.00	CODES & STANDARDS																									
1.01.00	<p>All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions as on date of opening of bid. In case of conflict between this specification and those (IS : codes, standards, etc.) referred to herein, the former shall prevail. All the cables shall conform to the requirements of the following standards and codes:</p> <table><tr><td>IS :1554 - I</td><td>PVC insulated (heavy duty) electric cables for working voltages upto and including 1100V.</td></tr><tr><td>IS : 3961</td><td>Recommended current ratings for cables</td></tr><tr><td>IS : 3975</td><td>Low carbon galvanised steel wires, formed wires and tapes for armouring of cables.</td></tr><tr><td>IS : 5831</td><td>PVC insulation and sheath of electrical cables.</td></tr><tr><td>IS:7098 (Part -I)</td><td>Cross linked polyethylene insulated PVC sheathed cables for working voltages upto and including 1100V.</td></tr><tr><td>IS : 8130</td><td>Conductors for insulated electrical cables and flexible cords.</td></tr><tr><td>IS : 10418</td><td>Specification for drums for electric cables.</td></tr><tr><td>IS : 10810</td><td>Methods of tests for cables.</td></tr><tr><td>ASTM-D -2843</td><td>Standard test method for density of smoke from the burning or decomposition of plastics.</td></tr><tr><td>IEC-754 (Part-I)</td><td>Tests on gases evolved during combustion of electric cables.</td></tr><tr><td>IEC-332</td><td>Tests on electric cables under fire conditions. Part-3: Tests on bunched wires or cables (Category-B).</td></tr></table>				IS :1554 - I	PVC insulated (heavy duty) electric cables for working voltages upto and including 1100V.	IS : 3961	Recommended current ratings for cables	IS : 3975	Low carbon galvanised steel wires, formed wires and tapes for armouring of cables.	IS : 5831	PVC insulation and sheath of electrical cables.	IS:7098 (Part -I)	Cross linked polyethylene insulated PVC sheathed cables for working voltages upto and including 1100V.	IS : 8130	Conductors for insulated electrical cables and flexible cords.	IS : 10418	Specification for drums for electric cables.	IS : 10810	Methods of tests for cables.	ASTM-D -2843	Standard test method for density of smoke from the burning or decomposition of plastics.	IEC-754 (Part-I)	Tests on gases evolved during combustion of electric cables.	IEC-332	Tests on electric cables under fire conditions. Part-3: Tests on bunched wires or cables (Category-B).
IS :1554 - I	PVC insulated (heavy duty) electric cables for working voltages upto and including 1100V.																									
IS : 3961	Recommended current ratings for cables																									
IS : 3975	Low carbon galvanised steel wires, formed wires and tapes for armouring of cables.																									
IS : 5831	PVC insulation and sheath of electrical cables.																									
IS:7098 (Part -I)	Cross linked polyethylene insulated PVC sheathed cables for working voltages upto and including 1100V.																									
IS : 8130	Conductors for insulated electrical cables and flexible cords.																									
IS : 10418	Specification for drums for electric cables.																									
IS : 10810	Methods of tests for cables.																									
ASTM-D -2843	Standard test method for density of smoke from the burning or decomposition of plastics.																									
IEC-754 (Part-I)	Tests on gases evolved during combustion of electric cables.																									
IEC-332	Tests on electric cables under fire conditions. Part-3: Tests on bunched wires or cables (Category-B).																									
2.00.00	TECHNICAL REQUIREMENTS																									
2.01.00	<p>The cables shall be suitable for laying on racks, in ducts, trenches, conduits and under ground buried installation with chances of flooding by water.</p>																									
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE –I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.: CS-9585-001-2	SUB-SECTION-B-20 LT POWER CABLES	PAGE 1 OF 6																						

CLAUSE NO.	<div> <div>TECHNICAL REQUIREMENTS</div> <div>एनटीपीसी NTPC</div> </div>														
2.02.00	All cables including EPR cables shall be flame retardant, low smoke (FRLS) type designed to withstand all mechanical, electrical and thermal stresses developed under steady state and transient operating conditions as specified elsewhere in this specification.														
2.03.00	Aluminium conductor used in power cables shall have tensile strength of more than 100 N/sq.mm. Conductors shall be stranded.														
2.04.00	XLPE insulation shall be suitable for a continuous conductor temperature of 90 deg. C and short circuit conductor temperature of 250 deg C. PVC insulation shall be suitable for continuous conductor temperature of 70 deg C and short circuit conductor temperature of 160 deg. C.														
2.05.00	The cable cores shall be laid up with fillers between the cores wherever necessary. It shall not stick to insulation and inner sheath. All the cables, other than single core unarmoured cables, shall have distinct extruded PVC inner sheath of black colour as per IS : 5831.														
2.06.00	<p>For single core armoured cables, armouring shall be of aluminium wires/ formed wires. For multicore armoured cables, armouring shall be of galvanised steel as follows :</p> <table> <tr> <th>Calculated nominal dia. of cable under armour</th><th>Size and Type of armour</th></tr> <tr> <td>Upto 13 mm</td><td>1.4mm dia GS wire</td></tr> <tr> <td>Above 13 & upto 25mm</td><td>0.8 mm thick GS formed wire / 1.6 mm dia GS wire</td></tr> <tr> <td>Above 25 & upto 40 mm</td><td>0.8mm thick GS formed wire / 2.0mm dia GS wire</td></tr> <tr> <td>Above 40 & upto 55mm</td><td>1.4 mm thick GS formed wire /2.5mm dia GS wire</td></tr> <tr> <td>Above 55 & upto 70 mm</td><td>1.4mm thick GS formed wire / 3.15mm dia GS wire</td></tr> <tr> <td>Above 70mm</td><td>1.4 mm thick GS formed wire / 4.0 mm dia GS wire</td></tr> </table>	Calculated nominal dia. of cable under armour	Size and Type of armour	Upto 13 mm	1.4mm dia GS wire	Above 13 & upto 25mm	0.8 mm thick GS formed wire / 1.6 mm dia GS wire	Above 25 & upto 40 mm	0.8mm thick GS formed wire / 2.0mm dia GS wire	Above 40 & upto 55mm	1.4 mm thick GS formed wire /2.5mm dia GS wire	Above 55 & upto 70 mm	1.4mm thick GS formed wire / 3.15mm dia GS wire	Above 70mm	1.4 mm thick GS formed wire / 4.0 mm dia GS wire
Calculated nominal dia. of cable under armour	Size and Type of armour														
Upto 13 mm	1.4mm dia GS wire														
Above 13 & upto 25mm	0.8 mm thick GS formed wire / 1.6 mm dia GS wire														
Above 25 & upto 40 mm	0.8mm thick GS formed wire / 2.0mm dia GS wire														
Above 40 & upto 55mm	1.4 mm thick GS formed wire /2.5mm dia GS wire														
Above 55 & upto 70 mm	1.4mm thick GS formed wire / 3.15mm dia GS wire														
Above 70mm	1.4 mm thick GS formed wire / 4.0 mm dia GS wire														
2.06.01	The aluminium used for armouring shall be of H4 grade as per IS: 8130 with maximum resistivity of 0.028264 ohm mm ² per meter at 20 deg C. The sizes of aluminium armouring shall be same as indicated above for galvanized steel.														
2.06.02	The gap between armour wires / formed wires shall not exceed one armour wire / formed wire space and there shall be no cross over / over-riding of armour wire / formed wire. The minimum area of coverage of armouring shall be 90%. The breaking load of armour joint shall not be less than 95% of that of armour wire / formed wire. Zinc rich paint shall be applied on armour joint surface of G.S.wire/ formed wire.														
2.07.00	<p>Outer sheath shall be of PVC as per IS: 5831 & black in colour. In addition to meeting all the requirements of Indian standards referred to, outer sheath of all the cables shall have the following FRLS properties.</p> <p>(a.) Oxygen index of min. 29 (as per IS 10810 Part-58).</p> <p>(b.) Acid gas emission of max. 20% (as per IEC-754-I).</p>														
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE –I (3X 800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.: CS-9585-001-2														
SUB-SECTION-B-20 LT POWER CABLES	PAGE 2 OF 6														

CLAUSE NO.	TECHNICAL REQUIREMENTS	<div>एनटीपीसी NTPC</div>		
2.08.00	<p>(c.) Smoke density rating shall not be more than 60 % (as per ASTM D-2843).</p> <p>Cores of the cables shall be identified by colouring of insulation. Following colour scheme shall be adopted:</p> <p>1 core - Red, Black, Yellow or Blue</p> <p>2 core - Red & Black</p> <p>3 core - Red, Yellow & Blue</p> <p>4 core - Red, Yellow, Blue and Black</p>			
2.09.00	For reduced neutral conductors, the core shall be black.			
2.10.00	<p>In addition to manufacturer's identification on cables as per IS, following marking shall also be provided over outer sheath.</p> <p>(a.) Cable size and voltage grade - To be embossed</p> <p>(b.) Word 'FRLS' at every 5 metre - To be embossed</p> <p>(c.) Sequential marking of length of the cable in metres at every one metre -To be embossed / printed</p> <p>The embossing shall be progressive, automatic, in line and marking shall be legible and indelible. For EPR cables identification shall be printed on outer sheath.</p>			
2.11.00	All cables shall meet the fire resistance requirement as per Category-B of IEC 332 Part-3.			
2.12.00	Allowable tolerances on the overall diameter of the cables shall be ± 2 mm maximum, over the declared value in the technical data sheets.			
2.13.00	In plant repairs to the cables shall not be accepted. Pimples, fish eye, blow holes etc. are not acceptable.			
2.14.00	Cable selection & sizing			
2.14.01	<p>Cables shall be sized based on the following considerations:</p> <p>(a) Rated current of the equipment</p> <p>(b) The voltage drop in the cable, during motor starting condition, shall be limited to 10% and during full load running condition, shall be limited to 3% of the rated voltage</p> <p>(c) Short circuit withstand capability</p> <p>This will depend on the feeder type. For a fuse protected circuit, cable should be sized to withstand the letout energy of the fuse. For breaker controlled feeder, cable shall be capable of withstanding the system fault current level for total breaker tripping time inclusive of relay pickup time.</p>			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE –I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.: CS-9585-001-2	SUB-SECTION-B-20 LT POWER CABLES	PAGE 3 OF 6


CLAUSE NO.	TECHNICAL REQUIREMENTS			
2.14.02	<p>Derating Factors</p> <p>Derating factors for various conditions of installations including the following shall be considered while selecting the cable sizes:</p> <ul style="list-style-type: none">a) Variation in ambient temperature for cables laid in airb) Grouping of cablesc) Variation in ground temperature and soil resistivity for buried cables.			
2.14.03	Cable lengths shall be considered in such a way that straight through cable joints are avoided.			
2.14.04	Cables shall be armoured type if laid in switchyard area, CHP area or directly buried.			
2.14.05	All LT power cables of sizes more than 120 sq.mm. shall be XLPE insulated and preferable sizes are 1Cx150, 1Cx300, 1Cx630, 3Cx150 & 3Cx240 sq.mm. However for cable sizes upto 120 sq.mm. both XLPE insulated & PVC insulated LT power cables are acceptable			
3.00.00	CONSTRUCTIONAL FEATURES			
3.01.00	<p>1.1 KV Grade Power Cables</p> <ul style="list-style-type: none">(a) 1.1 KV grade XLPE power cables shall have compacted aluminium conductor, XLPE insulated, PVC inner-sheathed (as applicable), armoured/ unarmoured, PVC outer-sheathed conforming to IS:7098. (Part-I).(b) 1.1KV grade PVC power cables shall have aluminium conductor(compact type for sizes above 10 sq.mm), PVC Insulated, PVC inner sheathed (as applicable) armoured/ unarmoured, PVC outer-sheathed conforming to IS:1554 (Part-I).(c) 1.1 KV grade Trailing cables shall have tinned copper(class 5)conductor, insulated with heat resistant elastomeric compound based on Ethylene Propylene Rubber(EPR) suitable for withstanding 90 deg.C continuous conductor temperature and 250deg C during short circuit, inner-sheathed with heat resistant elastomeric compound, nylon cord reinforced, outer-sheathed with heat resistant, oil resistant and flame retardant heavy duty elastomeric compound conforming to IS 9968.			
4.00.00	CABLE DRUMS			
	<ul style="list-style-type: none">(a) Cables shall be supplied in non returnable wooden or steel drums of heavy construction. The surface of the drum and the outer most cable layer shall be covered with water proof cover. Both the ends of the cables shall be properly sealed with heat shrinkable PVC/ rubber caps secured by 'U' nails so as to eliminate ingress of water during transportation, storage and erection. Wood preservative anti-termite treatment shall be applied to the entire drum. Wooden drums shall comply with IS: 10418.(b) Each drum shall carry manufacturer's name, purchaser's name, address and contract number, item number and type, size and length of cable and net gross weight stencilled on both sides of the drum. A tag containing same information shall be attached to the leading end of the cable. An arrow and suitable accompanying wording shall be marked on one end of the reel indicating the direction in which it should be rolled.(c.) The standard drum length for power cables shall not be 1000 metres; however for cable sizes of 1C X 630mm², 3C X 150mm² and 3C X 240mm² (sizes if			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE –I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.: CS-9585-001-2	SUB-SECTION-B-20 LT POWER CABLES	PAGE 4 OF 6

CLAUSE NO.	TECHNICAL REQUIREMENTS			<div>एनटीपीसी NTPC</div>																																
5.00.00	applicable) standard drum length shall be 750 meters. The length per drum shall be subjected to a maximum tolerance of +/- 5% of the standard drum length. The Employer shall have the option of rejecting cable drums with shorter lengths.																																			
	TESTS																																			
	1.0 All equipments to be supplied shall be of type tested design. During detailed engineering, the contractor shall submit for Owner's approval the reports of all the type tests as listed in this specification and carried out within last ten years from the date of bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.																																			
	2.0 However if the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the owner either at third party lab or in presence of client /owners representative and submit the reports for approval.																																			
	3.0 All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.																																			
	4.0 The type test reports once approved for any projects shall be treated as reference. For subsequent projects of NTPC, an endorsement sheet will be furnished by the manufacturer confirming similarity and "No design Change". Minor changes if any shall be highlighted on the endorsement sheet.																																			
	5.01.00																																			
	Type Tests																																			
	5.01.01																																			
	The reports for the following type tests shall be submitted for one size each of LT XLPE and LT PVC Power cables. Size shall be decided by the employer during detailed engineering:																																			
<table><tr><th>S.No.</th><th>Type test</th><th>Remarks</th></tr><tr><td colspan="3">For Conductor</td></tr><tr><td>1.</td><td>Resistance test</td><td></td></tr><tr><td>2.</td><td>Tensile test</td><td>For circular non-compacted conductors only</td></tr><tr><td>3.</td><td>Wrapping test</td><td>For circular non-compacted only</td></tr><tr><td colspan="3">For Armour Wires/ Formed Wires</td></tr><tr><td>4.</td><td>Measurement of Dimensions</td><td></td></tr><tr><td>5.</td><td>Tensile Test</td><td></td></tr><tr><td>6.</td><td>Elongation test</td><td></td></tr><tr><td>7.</td><td>Torsion test</td><td>For round wires only</td></tr><tr><td>8.</td><td>Wrapping test</td><td>For aluminium wires / formed wires only.</td></tr></table>				S.No.	Type test	Remarks	For Conductor			1.	Resistance test		2.	Tensile test	For circular non-compacted conductors only	3.	Wrapping test	For circular non-compacted only	For Armour Wires/ Formed Wires			4.	Measurement of Dimensions		5.	Tensile Test		6.	Elongation test		7.	Torsion test	For round wires only	8.	Wrapping test	For aluminium wires / formed wires only.
S.No.	Type test	Remarks																																		
For Conductor																																				
1.	Resistance test																																			
2.	Tensile test	For circular non-compacted conductors only																																		
3.	Wrapping test	For circular non-compacted only																																		
For Armour Wires/ Formed Wires																																				
4.	Measurement of Dimensions																																			
5.	Tensile Test																																			
6.	Elongation test																																			
7.	Torsion test	For round wires only																																		
8.	Wrapping test	For aluminium wires / formed wires only.																																		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE –I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.: CS-9585-001-2	SUB-SECTION-B-20 LT POWER CABLES	PAGE 5 OF 6																																

CLAUSE NO.	TECHNICAL REQUIREMENTS			
	9.	Resistance test		
	10(a)	Mass of zinc coating test	For GS Formed wires/wires only	
	10(b)	Uniformity of zinc coating	For GS Formed wires /wires only	
	11.	Adhesion test	For GS Formed wires/wires only	
	For PVC/XLPE insulation & PVC Sheath			
	12.	Test for thickness		
	13.	Tensile strength & elongation tests	before ageing and after ageing	
	14.	Ageing in air oven		
	15.	Loss of mass test	For PVC insulation and sheath only	
	16.	Hot deformation test	For PVC insulation and sheath only	
	17.	Heat shock test	For PVC insulation and sheath only	
	18.	Shrinkage test		
	19.	Thermal stability test	For PVC insulation and sheath only	
	20.	Hot set test	For XLPE insulation only	
	21.	Water absorption test	For XLPE insulation only	
	22.	Oxygen index test	For outer sheath only	
	23.	Smoke density test	For outer sheath only	
	24.	Acid gas generation test	For outer sheath only	
	For completed cables			
	25.	Insulation resistance test (Volume resistivity method)		
	26.	High voltage test		
	27.	Flammability test as per IEC-332 Part-3 (Category-B)		
	Indicative list of tests/checks, Routine and Acceptance tests shall be as per Quality Assurance & Inspection table of LT power cables enclosed.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE –I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.: CS-9585-001-2	SUB-SECTION-B-20 LT POWER CABLES	PAGE 6 OF 6


SUB-SECTION – B-21

LT CONTROL CABLES

CLAUSE NO.	TECHNICAL REQUIREMENTS			
1.00.00	CODES & STANDARDS			
1.01.00	All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions as on date of opening of bid. In case of conflict between this specification and those (IS : codes, standards, etc.) referred to herein, the former shall prevail. All the cables shall conform to the requirements of the following standards and codes:			
	IS :1554 - I	PVC insulated (heavy duty) electric cables for working voltages upto and including 1100V.		
	IS : 3961	Recommended current ratings for cables		
	IS : 3975	Low carbon galvanised steel wires, formed wires and tapes for armouring of cables.		
	IS : 5831	PVC insulation and sheath of electrical cables.		
	IS : 8130	Conductors for insulated electrical cables and flexible cords.		
	IS : 10418	Specification for drums for electric cables.		
	IS : 10810	Methods of tests for cables.		
	ASTM-D –2843	Standard test method for density of smoke from the burning or decomposition of plastics.		
	IEC-754 (Part-I)	Tests on gases evolved during combustion of electric cables.		
	IEC-332	Tests on electric cables under fire conditions. Part-3: Tests on bunched wires or cables (Category-B).		
2.00.00	TECHNICAL REQUIREMENTS			
2.01.00	The cables shall be suitable for laying on racks, in ducts, trenches, conduits and under ground buried installation with chances of flooding by water.			
2.02.00	All cables including EPR cables shall be flame retardant, low smoke (FRLS) type designed to withstand all mechanical, electrical and thermal stresses develop under steady state and transient operating conditions as specified elsewhere in this specification.			
2.03.00	Conductor of control cables shall be made of stranded, plain annealed copper.			
2.04.00	PVC insulation shall be suitable for continuous conductor temperature of 70 deg C and short circuit conductor temperature of 160 deg. C.			
2.05.00	The cable cores shall be laid up with fillers between the cores wherever necessary. It shall not stick to insulation and inner sheath. All the cables, other than single core unarmoured cables, shall have distinct extruded PVC inner sheath of black colour as per IS: 5831.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE –I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS- 9585-001-2		SUB-SECTION-B-21 LT CONTROL CABLES
PAGE 1 OF 6				


CLAUSE NO.	TECHNICAL REQUIREMENTS			<div>एनटीपीसी NTPC</div>															
2.06.00	<p>For multicore armoured cables, the armouring shall be of galvanised steel as follows:</p> <table><tr><td>Calculated nominal dia of cable under armour</td><td>Size and Type of armour</td></tr><tr><td>Upto 13 mm</td><td>1.4mm dia GS wire</td></tr><tr><td>Above 13 upto 25 mm</td><td>0.8 mm thick GS formed wire / 1.6 mm dia GS wire</td></tr><tr><td>Above 25 upto 40 mm</td><td>0.8mm thick GS formed wire / 2.0mm dia GS wire</td></tr><tr><td>Above 40 upto 55mm</td><td>1.4 mm thick GS formed wire/2.5mm dia GS wire</td></tr><tr><td>Above 55 upto 70 mm</td><td>1.4mm thick GS formed wire / 3.15mm dia GS wire</td></tr><tr><td>Above 70mm</td><td>1.4 mm thick GS formed wire / 4.0 mm dia GS wire</td></tr></table> <p>The gap between armour wires / formed wires shall not exceed one armour wire / formed wire space and there shall be no cross over / over-riding of armour wire / formed wire. The minimum area of coverage of armouring shall be 90%. The breaking load of armour joint shall not be less than 95% of that of armour wire / formed wire. Zinc rich paint shall be applied on armour joint surface.</p>				Calculated nominal dia of cable under armour	Size and Type of armour	Upto 13 mm	1.4mm dia GS wire	Above 13 upto 25 mm	0.8 mm thick GS formed wire / 1.6 mm dia GS wire	Above 25 upto 40 mm	0.8mm thick GS formed wire / 2.0mm dia GS wire	Above 40 upto 55mm	1.4 mm thick GS formed wire/2.5mm dia GS wire	Above 55 upto 70 mm	1.4mm thick GS formed wire / 3.15mm dia GS wire	Above 70mm	1.4 mm thick GS formed wire / 4.0 mm dia GS wire	
Calculated nominal dia of cable under armour	Size and Type of armour																		
Upto 13 mm	1.4mm dia GS wire																		
Above 13 upto 25 mm	0.8 mm thick GS formed wire / 1.6 mm dia GS wire																		
Above 25 upto 40 mm	0.8mm thick GS formed wire / 2.0mm dia GS wire																		
Above 40 upto 55mm	1.4 mm thick GS formed wire/2.5mm dia GS wire																		
Above 55 upto 70 mm	1.4mm thick GS formed wire / 3.15mm dia GS wire																		
Above 70mm	1.4 mm thick GS formed wire / 4.0 mm dia GS wire																		
2.07.00	<p>Outer sheath shall be of PVC as per IS: 5831 and grey in colour. In addition to meeting all the requirements of Indian Standards referred to, outer sheath of all the cables shall have the following FRLS properties.</p> <p>(a.) Oxygen index of min. 29. (As per IS 10810 Part-58)</p> <p>(b.) Acid gas emission of max. 20% (As per IEC-754-I)</p> <p>(c.) Smoke density rating shall not be more than 60% during Smoke Density Test as per ASTM-D-2843.</p>																		
2.08.00	<p>Cores of the cables of upto 5 cores shall be identified by colouring of insulation. Following colour scheme shall be adopted.</p> <table><tr><td>1 core</td><td>-</td><td>Red, Black, Yellow or Blue</td></tr><tr><td>2 core</td><td>-</td><td>Red & Black</td></tr><tr><td>3 core</td><td>-</td><td>Red, Yellow & Blue</td></tr><tr><td>4 core</td><td>-</td><td>Red, Yellow, Blue and Black</td></tr><tr><td>5 core</td><td>-</td><td>Red, Yellow, Blue, Black and Grey</td></tr></table>				1 core	-	Red, Black, Yellow or Blue	2 core	-	Red & Black	3 core	-	Red, Yellow & Blue	4 core	-	Red, Yellow, Blue and Black	5 core	-	Red, Yellow, Blue, Black and Grey
1 core	-	Red, Black, Yellow or Blue																	
2 core	-	Red & Black																	
3 core	-	Red, Yellow & Blue																	
4 core	-	Red, Yellow, Blue and Black																	
5 core	-	Red, Yellow, Blue, Black and Grey																	
2.09.00	<p>For cables having more than 5 cores, core identification shall be done by numbering the insulation of cores sequentially, starting by number 1 in the inner layer (e.g. say for 10 core cable, core numbering shall be from 1 to 10). The number shall be printed in Hindu-Arabic numerals on the outer surfaces of the cores. All the numbers shall be of the same colour, which shall contrast with the colour of insulation. The colour of insulation for all the cores shall be grey only. The numerals shall be legible and indelible. The numbers shall</p>																		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE –I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS- 9585-001-2	SUB-SECTION-B-21 LT CONTROL CABLES	PAGE 2 OF 6															

CLAUSE NO.	TECHNICAL REQUIREMENTS			<div>एनटीपीसी NTPC</div>										
	<p>be repeated at regular intervals along the core, consecutive numbers being inverted in relation to each other. When the number is a single numeral, a dash shall be placed underneath it. If the number consists of two numerals, these shall be disposed one below the other and a dash placed below the lower numeral. The spacing between consecutive numbers shall not exceed 50 mm.</p>													
2.10.00	<p>In addition to manufacturer's identification on cables as per IS, following marking shall also be provided over outer sheath:</p> <p>(a.) Cable size and voltage grade - To be embossed</p> <p>(b.) Word 'FRLS' at every 5 metre - To be embossed</p> <p>(c.) Sequential marking of length of the cable in metres at every one metre - To be embossed / printed.</p> <p>The embossing / printing shall be progressive, automatic, in line and marking shall be legible and indelible. For EPR cables identification shall be printed on outer sheath.</p>													
2.11.00	<p>All cables shall meet the fire resistance requirement as per Category-B of IEC-332 Part-3.</p>													
2.12.00	<p>Allowable tolerances on the overall diameter of the cables shall be ± 2 mm maximum over the declared value in the technical data sheets.</p>													
2.13.00	<p>In plant repairs to the cables shall not be accepted. Pimples, fish eye, blow holes etc. are not acceptable.</p>													
2.14.00	<p>Cable selection & sizing</p> <p>Control cables shall be sized based on the following considerations:</p> <p>(a) The minimum conductor cross-section shall be 1.5 sq.mm.</p> <p>(b) The minimum number of spare cores in control cables shall be as follows:</p> <table><tr><td>No. of cores in cable</td><td>Min. No. of spare cores</td></tr><tr><td>2C, 3C</td><td>NIL</td></tr><tr><td>5C</td><td>1</td></tr><tr><td>7C-12C</td><td>2</td></tr><tr><td>14C & above</td><td>3</td></tr></table>				No. of cores in cable	Min. No. of spare cores	2C, 3C	NIL	5C	1	7C-12C	2	14C & above	3
No. of cores in cable	Min. No. of spare cores													
2C, 3C	NIL													
5C	1													
7C-12C	2													
14C & above	3													
2.14.01	<p>Cable lengths shall be considered in such a way that straight through cable joints are avoided.</p>													
2.14.02	<p>Cables shall be armoured type if laid in switchyard area, CHP area or directly buried.</p>													
3.00.00	<p>CONSTRUCTIONAL FEATURES</p>													
3.01.00	<p>1.1 KV Grade Control Cables shall have stranded copper conductor and shall be multicore PVC insulated, PVC inner sheathed, armoured / unarmoured, FRLS PVC outer sheathed conforming to IS: 1554. (Part-I).</p>													
3.02.00	<p>1.1 KV grade Trailing cables shall have tinned copper(class 5)conductor, insulated with heat resistant elastomeric compound based on Ethylene Propylene Rubber(EPR) suitable for withstanding 90 deg.C continuous conductor temperature and 250deg C during short circuit,</p>													
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE –I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS- 9585-001-2	SUB-SECTION-B-21 LT CONTROL CABLES	PAGE 3 OF 6										

CLAUSE NO.	TECHNICAL REQUIREMENTS			
4.00.00	inner-sheathed with heat resistant elastomeric compound, nylon cord reinforced, outer-sheathed with heat resistant, oil resistant and flame retardant heavy duty elastomeric compound conforming to IS 9968. Minimum conductor size shall be 2.5 sqmm.			
	CABLE DRUMS			
5.00.00	(a.) Cables shall be supplied in non returnable wooden or steel drums of heavy construction. The surface of the drum and the outer most cable layer shall be covered with water proof cover. Both the ends of the cables shall be properly sealed with heat shrinkable PVC/ rubber caps secured by 'U' nails so as to eliminate ingress of water during transportation, storage and erection. Wood preservative anti-termite treatment shall be applied to the entire drum. Wooden drums shall comply with IS: 10418.			
	(b.) Each drum shall carry manufacturer's name, purchaser's name, address and contract number, item number and type, size and length of cable and net gross weight stenciled on both the sides of the drum. A tag containing same information shall be attached to the leading end of the cable. An arrow and suitable accompanying wording shall be marked on one end of the reel indicating the direction in which it should be rolled.			
5.01.00	(c.) The standard drum length for control cables shall not be less than 1000 metres. The length per drum shall be subjected to a maximum tolerance of +/- 5% of the standard drum length. The Employer shall have the option of rejecting cable drums with shorter lengths.			
	TESTS			
5.01.01	All equipments to be supplied shall be of type tested design. During detailed engineering, the contractor shall submit for Owner's approval the reports of all the type tests as listed in this specification and carried out within last ten years from the date of bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.			
	However if the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the owner either at third party lab or in presence of client /owners representative and submit the reports for approval.			
5.01.01	All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price			
	The type test reports once approved for any projects shall be treated as reference. For subsequent projects of NTPC, an endorsement sheet will be furnished by the manufacturer confirming similarity and "No design Change". Minor changes if any shall be highlighted on the endorsement sheet.			
TYPE TESTS				
The reports for the following type tests shall be submitted for one size of control cables. Size shall be decided by the employer during detailed engineering				
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE –I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS- 9585-001-2		SUB-SECTION-B-21 LT CONTROL CABLES
PAGE 4 OF 6				

CLAUSE NO.	TECHNICAL REQUIREMENTS			<div>एनटीपीसी NTPC</div>
	<div>S. No.</div>	<div>Type Test</div>	<div>Remarks</div>	
		<div>For Conductor</div>		
	1.	Resistance test		
		<div>For Armour Wires / Formed Wires (If applicable)</div>		
	2.	Measurement of Dimensions		
	3.	Tensile Test		
	4.	Elongation test		
	5.	Torsion test	For round wire only	
	6.	Wrapping test	For aluminium wires / formed wires only.	
	7.	Resistance test		
	8(a).	Mass of zinc Coating test	For GS wires/formed wires only	
	8(b).	Uniformity of zinc coating	For GS wires/formed wires only	
	9.	Adhesion test	For GS wires/formed wires only	
		<div>For PVC insulation & PVC Sheath</div>		
	10.	Test for thickness		
	11.	Tensile strength and elongation test	before ageing and after ageing	
	12.	Ageing in air oven		
	13.	Loss of mass test	For PVC insulation and sheath only	
	14.	Hot deformation test	For PVC insulation and sheath only	
	15.	Heat shock test	For PVC insulation and sheath only	
	16.	Shrinkage test		
	17.	Thermal stability test	For PVC insulation and sheath only	
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE –I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS- 9585-001-2	SUB-SECTION-B-21 LT CONTROL CABLES	PAGE 5 OF 6

CLAUSE NO.	TECHNICAL REQUIREMENTS			<div>एनटीपीसी NTPC</div>
5.02.00	S. No.	Type Test	Remarks	
	18.	Oxygen index test	For outer sheath only	
	19.	Smoke density test	For outer sheath only	
	20.	Acid gas generation test	For outer sheath only	
	For completed cables			
	21.	Insulation resistance test(Volume resistivity method)		
	22.	High voltage test		
	23.	Flammability test as per IEC-332 Part-3 (Category-B)		
	Indicative list of tests/checks, Routine and Acceptance tests shall be as per Quality Assurance & Inspection table of Control Cables enclosed.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE –I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS- 9585-001-2	SUB-SECTION-B-21 LT CONTROL CABLES	PAGE 6 OF 6

		<div>BHARAT HEAVY ELECTRICALS LIMITED</div> <div>PROJECT ENGINEERING & SYSTEMS DIVISION</div> <div>HYDERABAD-32</div>			
PAINTING SCHEDULE FOR FIRE PROTECTION SYSTEM					
1. Paint requirement FOR Over-ground (GI Pipe) pipes normally empty but periodically charged with water .					
SL No	Name of the item	Type	Number of coat	DFT of each layer in micron	Remark
1	Primer	Etch Primer: micaceous iron oxide (MIO)	2	6	
2	Final Paint	Synthetic Enamel paint (Long Oil Alkyd) to IS2932.	3	25	shade : RAL3000 PO RED
		Total DFT in micron		87	
	Note: Surface preparation shall be done either by manually or by any other approved method.				
2. Paints for external surfaces protection of piping / fittings/ Structural steel, etc. (Carbon steel /Mild Steel) to be installed indoor and outdoor.					
SL No	Name of the item	Type	Number of coat	DFT of each layer in micron	Remark
1	Primer	Red Oxide Zinc Phosphate primer to IS 12744 (Alkyd base)	1	30	
2	Final Paint	Synthetic Enamel paint (Long Oil Alkyd) to IS2932.	3	25	Shade : RAL3000 PO RED shade for structural steel: Dark Admiralty Grey colour shade 632
		Total DFT in micron		105	
2. Paints for external surfaces protection of Deluge valve, alarm valve , foam monitor, Foam proportioning equipments and foam maker etc. to be installed indoor and outdoor.					
SL No	Name of the item	Type	Number of coat	DFT of each layer in micron	Remark
1	Primer	Zinc filled epoxy Primer	1	35	
2	Final Paint	Aliphatic Polyurethane	3	30	shade : shade : RAL3000 PO RED
		Total DFT in micron		125	
	Note: 1. Surface preparation shall be done by means of Degreasing and Mech. Cleaning with wire brushing/hand tool (SP6 as applicable).				
Note:					
1	Paint shall be as per IS 2932.				
2	Painting not required on a. Uninsulated austenitic stainless steel, b. Plastic and/or plastic coated materials and c. Non-ferrous materials like aluminum.				
3	Painting for the internal surfaces of vessel and tanks shall be as per manufactuer standard.				

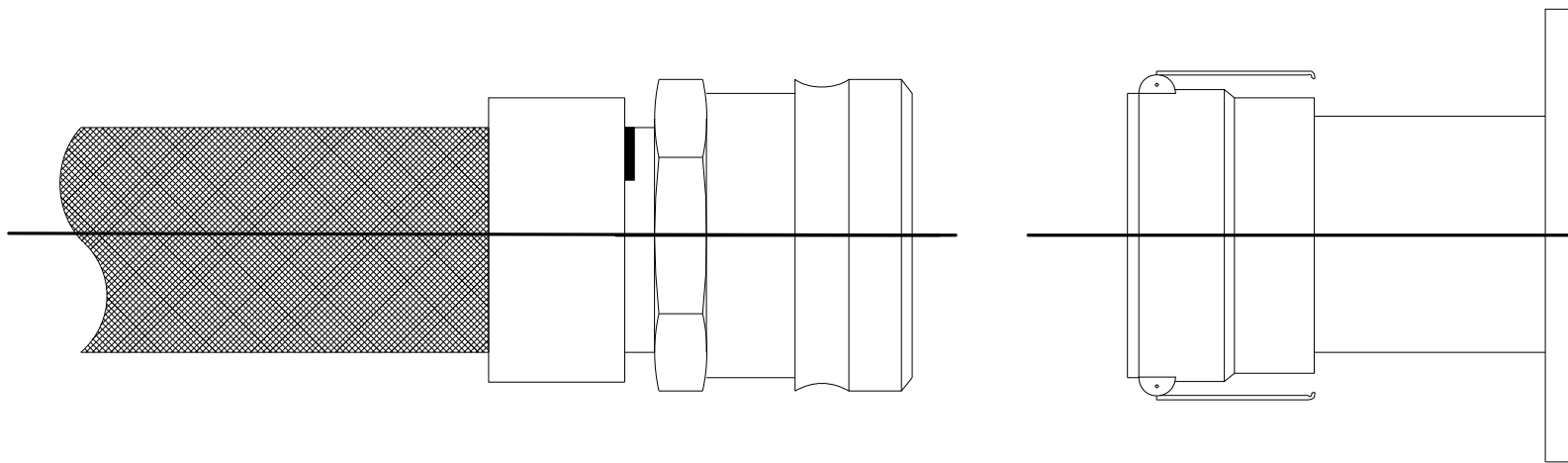
ANNEXURE-16

DATASHEET & GA OF CAMLOCK COUPLING WITH SS FLEXIBLE HOSE

A	Item	Datasheet of SS Flexible Hose (Both End Flanged)
1	Size	25NB x 25M and 100NB x 25M
2	Specification	BS 6501
3	MOC	
a	Corrugated Hose	SS304
b	Single wire braiding	SS304
c	Stub End	SS304
d	Neck Ring	SS 304
4	Working Pressure	50 Kg/cm ²
5	Test pressure	75 Kg/cm ²
6	End Connection Details	Both end flanged. Flanged as per ANSI B 16.5

B	Item	Data Sheet for SS Flexible Hoses with Quick Coupling (Male)
1	Size	150NB x 25M
2	Specification	BS 6501
3	MOC	
a	Corrugated Hose	SS304
b	Single wire braiding	SS304
c	Stub End	SS304
d	Neck Ring	SS 304
4	Working Pressure	50 Kg/cm ²
5	Test pressure	75 Kg/cm ²
6	End Connection Details	One end Flanged as per ANSI B 16.5 Other end male CAM coupler.

C		Data Sheet for Camlock type female coupling
1	Size	150NB
2	Specification	BS 6501
3	MOC	
a	Camlock Coupler	SS304
b	Fixed Flange	SS304, rating 150LBS
4	Working Pressure	16 Kg/cm ²
5	Test pressure	24 Kg/cm ²
6	End Connection Details	One end Flanged as per ANSI B 16.5 Other end female CAM coupler (matching with flexible hose mentioned at SL B above)



CAMLOCK COUPLING