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**TECHNICAL SPECIFICATION**  
**FOR**  
**INERT GAS EXTINGUISHING SYSTEM**


<u>PROJECT</u>	: <u>5X800 MW YADADRI THERMAL POWER STATION PROJECT, NALGONDA, TELANGANA</u>
<u>CUSTOMER</u>	: <u>TELANGANA STATE POWER GENERATION CO. LTD.</u>
<u>CONSULTANT</u>	: <u>TATA CONSULTING ENGINEERS LIMITED, BENGALURU</u>


		<b>Revisions :</b>	<b>Prepared by:</b>	<b>Checked by:</b>	<b>Approved By:</b>	<b>Date</b>
			<b>-SD-</b>	<b>-SD-</b>	<b>-SD-</b>	
		<b>00</b>	<b>RAVITEJA JETTI</b>	<b>D V PRASHANT</b>	<b>P C SEKHAR</b>	<b>18/02/2021</b>


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<b>COPYRIGHT AND CONFIDENTIAL</b> 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>1. INTENT OF SPECIFICATION:</b></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 Panki site in proper condition and supervision of Erection &amp; Commissioning at site for the Inert Gas Extinguishing System, which forms part of this <b>5 x 800 MW YADADRI Thermal Power Station (TPS)</b> for Telangana State Power Generation Corporation Limited (TSGENCO) at Nalgonda, Telangana.</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><b>2. SPECIAL NOTES TO BIDDERS</b></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 &amp; 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>		
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<b>COPYRIGHT AND CONFIDENTIAL</b> 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>2.6. 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> <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><b>3. PROJECT DESCRIPTION</b></p> <table border="1" data-bbox="355 758 1240 1134"> <tr> <td>Project</td> <td>5 x 800 MW Yadadri Thermal Power Station</td> </tr> <tr> <td>Owner</td> <td>Telangana State Power Generation Corporation Limited (TSGENCO)</td> </tr> <tr> <td>Owner's Consultant</td> <td>Tata Consulting Engineers Limited (TCE), Bangalore</td> </tr> <tr> <td>Location</td> <td>Nalgonda, Telangana</td> </tr> <tr> <td>Nearest Railway Station</td> <td>Damaracherla – 7 kms</td> </tr> <tr> <td>Nearest Town</td> <td>Miryalaguda – 30 kms</td> </tr> <tr> <td>Nearest Airport</td> <td>Vijayawada – 130 kms</td> </tr> </table> <p><b>4. GENERAL SYSTEM REQUIREMENT</b></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 &amp; 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 (refer Annexure-10) for inert gas extinguishing system are 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 rooms. Adequate</p>			Project	5 x 800 MW Yadadri Thermal Power Station	Owner	Telangana State Power Generation Corporation Limited (TSGENCO)	Owner's Consultant	Tata Consulting Engineers Limited (TCE), Bangalore	Location	Nalgonda, Telangana	Nearest Railway Station	Damaracherla – 7 kms	Nearest Town	Miryalaguda – 30 kms	Nearest Airport	Vijayawada – 130 kms
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<b>COPYRIGHT AND CONFIDENTIAL</b> 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>space for Operation &amp; 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> <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><b>5. APPLICABLE CODES &amp; STANDARDS</b></p> <p>i. The design, engineering, installation, testing, commissioning of the package shall be as per all relevant &amp; applicable codes/standards, however specifically the following :</p> <ul style="list-style-type: none"> <li>➤ NFPA 2001: National Fire Protection ( Standard on Clean Agent Fire Extiguishing System)</li> <li>➤ VDS – Flow calulations of the system</li> <li>➤ UL/FM/LPCB/VdS approval for IGES equipment such as cylinders, contact gauges, pressure regulators etc.</li> <li>➤ ASTM A 106 - Piping</li> <li>➤ ASTM A 105, Grade WPB, ANSIB-16.9 for 65 NB &amp; Above - Butt Weld Fittings</li> <li>➤ ASTM A-105, ANSI B-16.11 for 50 NB &amp; Below – Socket Weld Weld fittings</li> <li>➤ ANSI B-16.5, Class 1500 # - Flanges</li> <li>➤ IS 2932 : Enamel , synthetic , Exterior</li> <li>➤ IS:1248(Part I)-1983 -Direct acting indicating analogue electrical measuring and their accessories: Part I General requirements(Second revision)</li> </ul>		
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	<p><b>6. BIDDER'S SCOPE OF WORK</b></p> <p>Separate Inert Gas Extinguishing System shall be provided for following buildings as mentioned below:-</p> <p>6.1. Unit – #1 &amp; #2 TG Building</p> <ul style="list-style-type: none"> <li>- CER #1</li> <li>- CER #2</li> <li>- Computer Room #1</li> <li>- Computer Room #2</li> <li>- C&amp;I Maintenance Room</li> <li>- Conference Room</li> <li>- Central Control Room Unit - #1 &amp; #2</li> </ul> <p>6.2. Unit – #3 &amp; #4 TG Building</p> <ul style="list-style-type: none"> <li>- CER #3</li> <li>- CER #4</li> <li>- Computer Room #3</li> <li>- Computer Room #4</li> <li>- C&amp;I Maintenance Room</li> <li>- Conference Room</li> <li>- Central Control Room Unit - #3 &amp; #4</li> </ul> <p>6.3. Unit – #5 TG Building</p> <ul style="list-style-type: none"> <li>- CER #5</li> <li>- Computer Room #5</li> <li>- C&amp;I Maintenance Room</li> <li>- Conference Room</li> <li>- Central Control Room Unit - #5</li> </ul> <p>6.4. Each IGES system should include the following minimum items:</p> <p>a) One (01) Inert Gas Release Panel.</p> <p>b) 1 lot of Inert Gas Cylinders required for the system along with same no. of standby cylinders. Including solenoid valves, directional valves, pilot manifold etc. and shall be FM/UL/Vds/LPCB approved.</p>		
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<b>COPYRIGHT AND CONFIDENTIAL</b> 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 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.</p> <p>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.</p> <p>h) Suitable selector switches shall be provided for "Main/Standby" cylinder bank supply selection.</p> <p>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.</p> <p>j) Following are the minimum signals required through potential free contacts of gas release panel:</p> <ul style="list-style-type: none"> <li>• Pre-Discharge (one each for each zone)</li> <li>• Gas Discharged (one each for each zone)</li> </ul> <p>Any other signals for which potential free contacts are required shall be finalized during detailed engineering.</p> <p>k) To prevent the loss/release of gas automatically or manually during maintenance, the system shall have the facility of “ LOCK OUT”.</p> <p>l) Complete control system shall be listed and approved by UL / FM / VDS / LPCB.</p> <p>7.2. Inert Gas Cylinders:</p> <p>a) 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.</p> <p>b) The storage cylinders offered shall be of seamless type &amp; brand new. Welded cylinders are not permitted.</p> <p>a) The design pressure for storage cylinders shall be suitable for the maximum pressure developed at 55°C and shall be designed to meet the requirements in NFPA-2001.</p> <p>b) All cylinders and cylinder valves 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).</p>		
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<b>COPYRIGHT AND CONFIDENTIAL</b> 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="313 323 1463 1230"> <ul style="list-style-type: none"> <li>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.</li> <li>b) Audio and visual pre-discharge alarms shall be provided within the protected area to give positive warning of impending discharge.</li> <li>c) The operation of the warning devices shall continue after agent discharge until positive action has been taken to acknowledge the alarm.</li> <li>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.</li> <li>e) Warning and instruction signs shall be provided at the entrances to and inside the protected areas.</li> <li>f) The safety sign format and color and the letter style of the signal words shall be in accordance with ANSI Z535.</li> <li>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.</li> </ul> </div> <div data-bbox="284 1346 592 1377"> <b>7.7. Operating Devices:</b> </div> <div data-bbox="313 1419 1463 1885"> <ul style="list-style-type: none"> <li>a) Operating devices shall include agent-releasing devices or valves, discharge controls, and shutdown equipment necessary for successful performance of the system.</li> <li>b) Operation shall be by listed mechanical, electrical, or pneumatic means. An adequate and reliable source of energy shall be used.</li> <li>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.</li> <li>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.</li> </ul> </div>		
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<b>COPYRIGHT AND CONFIDENTIAL</b> 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="310 323 1463 1524"> <ul style="list-style-type: none"> <li>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.</li> <li>f) A discharge pressure switch shall be required where mechanical system actuation is possible.</li> <li>g) The discharge pressure switch shall provide an alarm initiating signal to the releasing panel.</li> <li>h) The normal manual control(s) for actuation shall be located for easy accessibility at all times, including at the time of a fire.</li> <li>i) The manual control(s) shall be of distinct appearance and clearly recognizable for the purpose intended.</li> <li>j) Operation of any manual control shall cause the complete system to operate as designed.</li> <li>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.</li> <li>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.</li> <li>m) All devices for shutting down supplementary equipment shall be considered integral parts of the system and shall function with the system operation.</li> <li>n) All manual operating devices shall be identified as to the hazard they protect.</li> </ul> </div> <div data-bbox="282 1587 628 1619"> 7.8. Pressure Relief Vents: </div> <div data-bbox="310 1661 1463 1801"> <ul style="list-style-type: none"> <li>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.</li> </ul> </div> <div data-bbox="282 1843 654 1875"> 7.9. First Fill of Consumable: </div>		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	<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 Performance test (Dump test).</p> <p><b>7.10. Erection &amp; Commissioning Spares</b></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 &amp; 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><b>7.11. Special tools and tackles:</b></p> <p>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:</p> <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> <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> </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.	6.	Insulation Pliers	1 no.	7.	Nose Pliers	1 no.	8.	Screw Driver	1 no.	9.	First Aid Box	1 no.
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<b>COPYRIGHT AND CONFIDENTIAL</b> 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"> <li>• Per day supervision charges of an Engineer including all other expenses like boarding, lodging, local travel, insurance etc.</li> <li>• Travel expenses (inclusive of any clearance charges like Visa fee etc, insurance) from / to vendor works to site.</li> </ul> <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&amp;C shall be made only after BHEL-site supervision.</p> <p>f) Bidder to mobilize concerned competent person for supervision of Erection &amp; 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><b>9. DESIGN OF IGES SYSTEM</b></p> <p>9.1. General</p> <p>a) Complete design and all the system components/equipment or major system components like cylinder, cylinder valve assembly, hoses, check valve, actuation controls, restrictor / pressure reducer, directional / selector valve, pressure relief device / safety valve, pressure gauge, pressure switch, nozzle, etc. (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> <p>c) Operating devices shall be by mechanical, electrical and pneumatic means conforming to NFPA-2001. The power supply to electrical actuators shall be backed up with reliable battery supply. Such batteries shall be charged automatically by battery chargers.</p>		
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<b>COPYRIGHT AND CONFIDENTIAL</b> 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>volume so that the design concentration is achieved throughout the hazard area. Further gas quantity will be adjusted for ambient pressure &amp; temperature conditions.</p> <p>f) To provide primary supply of gas &amp; 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> <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><b>9.3. System Flow Calculation</b></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><b>9.4. Clean Agent Quantity</b></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>		
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<b>COPYRIGHT AND CONFIDENTIAL</b> 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>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> <p>a) System operation shall be possible by the following means:</p> <ul style="list-style-type: none"> <li>Automatically due to fire detection in protected area</li> <li>Operation of manual release push button located adjacent to protected area.</li> <li>By operating manual lever provided on electrical/manual control head on pilot cylinder</li> <li>By push button actuation at Clean Agent Control panel , in manual mode</li> </ul> <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 &amp; 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>		
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<b>COPYRIGHT AND CONFIDENTIAL</b> 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 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> <p>e) The min. O<sub>2</sub> concentration shall be as per NOAEL mentioned in NFPA-2001</p> <p><b>10. INSPECTION, TESTING, APPROVAL &amp; COMMISSIONING</b></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 &amp; 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>		
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COPYRIGHT AND CONFIDENTIAL  The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	<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> <p><b>11. MARKING, PACKING AND DISPATCH</b></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 co-relation 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>		
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Ref. Doc		a) Duly filled & Signed copy of Check list		


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<b>COPYRIGHT AND CONFIDENTIAL</b> 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="315 289 1464 464"> <ul style="list-style-type: none"> <li>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”.</li> <li>c) Unpriced price schedule (To be submitted compulsorily without fail)</li> <li>d) Bill of materials</li> </ul> </div> <div data-bbox="282 506 812 537"> <p>12.2. Documentation after P.O. Placement</p> </div> <div data-bbox="315 541 1464 1524"> <ul style="list-style-type: none"> <li>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)</li> <li><b>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.</b></li> <li>c) Further BHEL will provide comments on vendor submitted document within 25 working days for revision &amp; resubmission. Vendor shall follow up with BHEL for non-receipt of comments/approvals.</li> <li>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.</li> <li>e) All the approvals required for manufacturing shall be completed with 2months 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.</li> <li>f) Vendor shall obtain final approvals on all technical + quality aspect documents before inspection dates.</li> <li>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.</li> </ul> </div> <div data-bbox="282 1581 1464 1686"> <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> <div data-bbox="315 1728 1276 1833"> <ul style="list-style-type: none"> <li>a) Complete O&amp;M manual.</li> <li>b) Approved Engg documents, As-Shipped documents, As-Built documents</li> </ul> </div>		
Ref. Doc				





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<b>COPYRIGHT AND CONFIDENTIAL</b> 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.	c) Guarantee and all test certificates for review and acceptance by BHEL and / or BHEL's Customer  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).  e) Following may be noted wrt the drawing submission schedule:																																	
	<table border="1"> <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 &amp; 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 &amp; 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&amp;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
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<b>COPYRIGHT AND CONFIDENTIAL</b> 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) 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) <b>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 (1 week) of receipt of such requisition from Bidder.</b></p> <p>d) Drawings attached with this specification are preliminary in nature &amp; are not exhaustive. These drawings may get revised and /or new drawings will be furnished to bidder during detail engineering.</p> <p><b>12.5. Review meetings &amp; kick off meeting</b></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"> <li>• Any clarifications required by the Bidder on purchaser's order.</li> <li>• Bidder Data Index &amp; Schedule.</li> <li>• Bidder Data Review/approval modalities.</li> <li>• Sub-Bidder lists proposed by Bidder.</li> <li>• Utility requirements.</li> <li>• List of input drawings required from BHEL</li> <li>• Preliminary General Arrangement &amp; layout drawings</li> </ul> <p><b>13. PRICE BID FORMAT</b></p> <p><b>13.1.</b> Price bid format is enclosed as Annexure-1, bidder to furnish the offer in line with the same.</p>		
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<b>COPYRIGHT AND CONFIDENTIAL</b> 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>13.2. 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 &amp; 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. <b>Bidder shall confirm to the unpriced bid as part of their offer.</b></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><b>14. SUB VENDOR LIST</b></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 for BHEL’s approval. Non-acceptance of any sub-vendor by BHEL / customer shall not have any commercial &amp; delivery implication. While submitting sub-vendors for approval of BHEL, bidder shall furnish following documents :</p>		
	Ref. Doc			

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	<p>a) ISO certificate of Sub-vendors</p> <p>b) Proven track record &amp; references for makes and models supplied earlier.</p> <p><b>Note:</b></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 and cylinder valves shall also have PESO , Nagpur approval certificate.</p> <p><b>15. DOCUMENTS ALONG WITH BID</b></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 &amp; 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><b>Note:</b></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><b>16. LIST OF ANNEXURES</b></p> <table border="1"> <thead> <tr> <th colspan="3">LIST OF ANNEXURES</th> </tr> <tr> <th>Sl. No</th> <th>Drawings/Documents</th> <th>Drg/Doc no</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Price Bid Format</td> <td>Annexure – 1</td> </tr> <tr> <td>2.</td> <td>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> <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> </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	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
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	00	18/02/2021	Original Issue	RTJ	DVPK	PCS	
	Ref.						