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TECHNICAL SPECIFICATION
FOR
INERT GAS EXTINGUISHING SYSTEM

<u>PROJECT</u>	: <u>4 x 270 MW BHADRADRI TPS</u>
<u>CUSTOMER</u>	: <u>TELANGANA STATE POWER GENERATION CO. LTD.</u>
<u>CONSULTANT</u>	: <u>DESEIN CONSULTING ENGINEERS, NEW DELHI</u>

		Revisions :	Prepared by:	Checked by:	Approved By:	Date
			-SD-	-SD-	-SD-	
		02	D V Prashant Kumar	Kumar Gunjan	MNSR	10/04/2017

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		1. INTENT OF SPECIFICATION: 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 Manuguru site in proper condition and supervision of Erection & Commissioning at site for the Inert Gas Extinguishing System, which forms part of this 4x270 MW Bhadradi TPS project at Manuguru, Telangana. 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 2. SPECIAL NOTES TO BIDDERS 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, 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. 2.2. All materials supplied under this contract shall be new and unused. 2.3. All equipment/items as applicable, shall be UL/FM/VDs/LPCB approved. 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. 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.		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	2.6. 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. 2.7. Bidder to note that the Purchase Order for the entire IGES system for the project shall be placed on lump sum fixed prices based as per tender specification requirements. 2.8. Bidder offer shall be strictly as per these specification requirements. Unsolicited or Alternate offers from the bidders will not be entertained. 2.9. In case bidder feels that it is necessary to exclude some components of scope of supply or some of the features of specification requirements due to any technical constraints, bidder shall bring the same to the notice of purchaser during pre-bid stage and take their prior approval before submission of their bid. Format for pre-bid queries is attached to this specifications. 2.10. The design information, specifications and drawings indicate the "Minimum" requirements and are intended to enable Bidders to ascertain the extent of the work involved. Bidders are expected to supplement the information included in this specification as required and submit a comprehensive bid. 2.11. Bidder to refer to the Special Conditions of the contract (SCC) & General Conditions of the Contract (GCC) of tender specifications. 3. PROJECT DESCRIPTION <table border="1"> <tr> <td>1</td> <td>Owner</td> <td>Telangana State Power Generation Corporation Limited (TSGENCO)</td> </tr> <tr> <td>2</td> <td>Project</td> <td>4x270 MW Bhadradi TPS</td> </tr> <tr> <td>3</td> <td>Location</td> <td>Manuguru, Telangana</td> </tr> <tr> <td>4</td> <td>Consultant</td> <td>Desein Consulting Engineers, New Delhi</td> </tr> </table> 4. GENERAL SYSTEM REQUIREMENT 4.1. IGES system shall be designed to operate as and when required in 24 hours per day and 365 days in a year. 4.2. The life span to be considered in the design, equipment and component selection shall be a minimum of 20 years. 4.3. 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.			1	Owner	Telangana State Power Generation Corporation Limited (TSGENCO)	2	Project	4x270 MW Bhadradi TPS	3	Location	Manuguru, Telangana	4	Consultant	Desein Consulting Engineers, New Delhi
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		4.4. 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. 4.5. The design of the plant shall ensure that the plant can adapt itself to load, pressure (in the state of normal operation) with primary parameter variation within the allowable range of design. 4.6. 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. 4.7. The dimensions of the cylinder room (20m 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. 4.8. 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. If at any stage of work, any dismantling or modification or relocation of any facilities is required to be done to complete the work in bidder's scope and which has been agreed by the Purchaser, the same shall be done by the bidder at no extra cost or time implication to the Purchaser. All such changes will be executed only after the proposed drawings and work plan are approved by the purchaser. 4.9. The Bidder shall take all necessary precautions to protect all the existing equipment, structures, facilities and buildings etc. from damage. In case any damage occurs due to the activities of the Bidder on account of negligence, ignorance, accidental or any other reason whatsoever, the damage shall be immediately made good by the Bidder at his own cost to the satisfaction of the purchaser. 4.10. The Bidder shall also take all necessary safety measures at his own cost, to avoid any harm or injury to his workers and staff from the equipment and facilities of the power station. 4.11. Supplies shall be rendered in conformity with proven design principles. The purpose of this contract must be fulfilled in its entirety and the maximum of reliability and economy		
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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.		guaranteed. All the components shall be so designed that repairs and overhauling is minimum and can be carried out easily in the shortest possible time. 4.12. 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, however, responsibility for adequate manning the system shall be that of bidder. 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. 5. APPLICABLE CODES & STANDARDS i. The design, engineering, installation, testing, commissioning of the package shall be as per all relevant & applicable codes/standards, however specifically the following : ➤ 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.)		
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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.		➤ IS:8573-1977 -Digital electronic DC voltmeters and DC electronic analogue-to-digital convertors(with Amendment No.1) (Reaffirmed1991) ➤ 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 i. Requirements of the following local statutory authorities (as applicable) shall be taken into account for compliance: a. Tariff Advisory Committee (TAC) Guidelines (for Insurance purposes) b. VDE : 0150, protection against corrosion due to stray currents from DC installations. c. DIN : 30676 d. Requirement of Petroleum & Explosives Safety Organization (PESO), Nagpur, India. ii. 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. iii. All addenda including the latest addenda to all the above codes and standards (latest editions) shall be followed by the bidder. iv. 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. Note: Bidder to follow all other applicable statutory rules and regulations of India during manufacturing, procurement & transportation of the IGES components. 6. BIDDER’S SCOPE OF SUPPLY There are two separate control rooms in the TG building. One control room for Unit-1 & Unit-2 and another control room for Unit-3 & Unit-4. Each control room consists of the following rooms/ enclosures:		
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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.		- Common Control room - Central Equipment Room (CER) - Computer room Separate Inert Gas Extinguishing system (IGES) shall be provided for each of the control room. The IGES of each control room shall cover all the areas mentioned above. (Please refer dwg. No. PE-DG-411-145-I401). Each IGES system should include the following minimum items: 6.1. One (01) Inert Gas Release Panel. 6.2. 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. 6.3. 1 Lot of Piping & fittings, pressure gauges, nozzles, threadolets, weldolets, socketolets & all other equipment/accessories required for completion of system. 6.4. One lot of Cables and Conduit and related erection hardware 6.5. One lot of Inert gas Discharge Warning Signs 6.6. One lot of gas discharge EPB & inhibitor unit 6.7. One lot of Pressure Operated Switches 6.8. One lot of Pressure Relief Vents 6.9. First Fill of consumables 6.10. Erection & Commissioning spares 6.11. One lot of erection hardware 6.12. Special tools & tackles 6.13. Mandatory spares 6.14. Items like Trolleys, etc required for Refilling & Maintenance of Inert Gas cylinders. 6.15. Other items not specified but required to complete the system in all respects.		
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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.		• The offered IGES shall be in designed as per NFPA-2001. • Make of all electrical equipments/items supplied shall be reputed make & shall be subject to approval of BHEL/customer after award of contract. • The dimensions of the cylinder room (20m x 5m) for each inert gas extinguishing system is already finalized and cannot be changed now. There are two separate cylinder rooms, one for each IGES system. 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. • BOQ of inert gas pipes shall be considered by considering welding allowances, cutting allowances etc. As inert gas extinguishing system is site intensive package, hence a margin of 10% shall be considered over total BOQ and shall be reflected in each layout drawing. • All erection hardware including structural steel, fittings, brackets, U clamps, nuts & bolts, base plates, anchor fastners (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. 7. PRODUCT DESCRIPTION 7.1. Gas release panel: - 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. - Panel shall be located in inert gas cylinder room. - 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. 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. - 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		
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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.		v. Special corrosion-resistant materials or coatings shall be required in severely corrosive atmospheres. vi. 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 cl 5.7.1.2 of NFPA 2001. vii. Each nozzle shall be permanently marked to identify the manufacturer as well as type and size of orifice. viii. 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. 7.6. Warning Signs: i. Alarms or indicators or both shall be used to indicate the operation of the system, hazards to personnel, or failure of any supervised device. ii. Audio and visual pre-discharge alarms shall be provided within the protected area to give positive warning of impending discharge. iii. The operation of the warning devices shall continue after agent discharge until positive action has been taken to acknowledge the alarm. iv. 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. v. Warning and instruction signs shall be provided at the entrances to and inside the protected areas. vi. The safety sign format and color and the letter style of the signal words shall be in accordance with ANSI Z535. vii. 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. 7.7. Operating Devices: i. Operating devices shall include agent-releasing devices or valves, discharge controls, and shutdown equipment necessary for successful performance of the system. ii. Operation shall be by listed mechanical, electrical, or pneumatic means. An adequate and reliable source of energy shall be used. iii. 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.		
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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.		iv. 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. v. 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. vi. A discharge pressure switch shall be required where mechanical system actuation is possible. vii. The discharge pressure switch shall provide an alarm initiating signal to the releasing panel. viii. The normal manual control(s) for actuation shall be located for easy accessibility at all times, including at the time of a fire. ix. The manual control(s) shall be of distinct appearance and clearly recognizable for the purpose intended. x. Operation of any manual control shall cause the complete system to operate as designed. xi. 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. xii. 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. xiii. All devices for shutting down supplementary equipment shall be considered integral parts of the system and shall function with the system operation. xiv. All manual operating devices shall be identified as to the hazard they protect. 7.8. Pressure Relief Vents: i. 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. 7.9. First Fill of Consumable: i. 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. ii. Price of these items shall be construed to be included in the main package price. No separate price for the same shall be offered.		
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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.	7.10. Erection & Commissioning Spares i. All commissioning spares as required during erection and commissioning of the Inert Gas Extinguishing system is included in bidder's scope. ii. 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. iii. All spares having a shelf life shall be dispatched to site only after completion of major erection activities. The dispatch schedule of these spares shall however be planned in a way that it doesn't delay any commission activity. iv. 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. v. 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. vi. Any equipment not specifically mentioned above but required for satisfactory operation of complete Inert Gas Extinguishing system and to meet desired intent of specification shall be included in scope of supply of bidder. vii. Such requirements, if any, whenever noticed during any stage of order execution shall be deemed to be included in bidder's scope without any commercial implication to purchaser. 7.11. Special tools and tackles: i. 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" style="width: 100%; border-collapse: collapse;"> <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> Any other tools required for repairs and maintenance but not mentioned above shall be supplied by the bidder. ii. 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			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.
	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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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company. bidder. Price of these items shall be construed to be included in the main package price. No separate price for the same shall be offered iii. All the special tools and tackles shall be shipped in separate heavily constructed wooden boxes. Notes: - 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. 7.12. Mandatory Spares: 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. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Sl. No.</th> <th rowspan="2">Description</th> <th colspan="2">Quantity</th> </tr> <tr> <th>For Inert Gas system of Bhadradi Unit-1&2</th> <th>For Inert Gas system of Bhadradi Unit-3&4</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Transmitters/ Gauges/Switches etc. along with relevant accessories</td> <td>10% of total or at least two (whichever is higher) for each type along with accessories.</td> <td>10% of total or at least two (whichever is higher) for each type along with accessories.</td> </tr> <tr> <td>2.</td> <td>Solenoid Valve Coil</td> <td>2 nos. of each rating & insulation</td> <td>2 nos. of each rating & insulation</td> </tr> <tr> <td>3.</td> <td>Valves of all types</td> <td>10% of each type, class, size & model</td> <td>10% of each type, class, size & model</td> </tr> <tr> <td>4.</td> <td>Cables</td> <td>10% of each type, pair and size of actual installed quantity</td> <td>10% of each type, pair and size of actual installed quantity</td> </tr> </tbody> </table>					Sl. No.	Description	Quantity		For Inert Gas system of Bhadradi Unit-1&2	For Inert Gas system of Bhadradi Unit-3&4	1.	Transmitters/ Gauges/Switches etc. along with relevant accessories	10% of total or at least two (whichever is higher) for each type along with accessories.	10% of total or at least two (whichever is higher) for each type along with accessories.	2.	Solenoid Valve Coil	2 nos. of each rating & insulation	2 nos. of each rating & insulation	3.	Valves of all types	10% of each type, class, size & model	10% of each type, class, size & model	4.	Cables	10% of each type, pair and size of actual installed quantity	10% of each type, pair and size of actual installed quantity
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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.		8. BIDDER'S SCOPE OF SERVICES 8.1. Supervision of erection & commissioning a) Supervision of erection, commissioning & performance testing at site for the supplied system shall be included in bidder's scope of service. b) Bidder to note that the supervision charges for erection & commissioning shall consists of the following: • Per day supervision charges of an Engineer including all other expenses like boarding, lodging, local travel, insurance etc. • Travel expenses (inclusive of any clearance charges like Visa fee etc, insurance) from / to vendor works to site. c) Per diem charges shall be applicable from the day bidder's person reaches site, up to the day he leaves the site. d) For the purpose of tender total number of 50 man days to be covered in 6 visits have been considered. However, either or both of the number of man days or no of visits may change on either side based on the actual site requirement. e) All payments towards supervision of E&C shall be made only after BHEL-site supervision. 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. g) Bidder to quote supervision of erection and commissioning activities strictly as per BHEL's price format (Annexure-1). h) Engineering of cables, cable routing and cable scheduling within Inert Gas extinguishing system. i) Engineering of cables, cable routing and cable scheduling between Gas release panel and Fire Alarm Panel. List of major services included in bidder's scope are as follows : 1) Design 2) Detailed Engineering 3) Engineering for interfacing all inputs and outputs 4) Submission and obtaining approval of all engineering documents		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		5) Engineering for procurement 6) Preparation of all MTOs and MRs, as required 7) Ordering of all equipments and materials 8) Preparation of Documentation and obtaining owner/consultant approvals for the same 9) Expediting suppliers and sub vendors 10) Procurement 11) Manufacture, fabrication and assembly at works 12) Inspection and testing including third party Inspection 13) Painting at works 14) Dispatch and transportation of equipments, consumables and other material to site. 15) Material Reconciliation 16) Material re-conciliation will be done jointly by Purchaser's erection office & Sub-vendor. Bidder to note that the payment towards the supply for any item will be made only after the completion of the material reconciliation activity at site. 17) Bidder to further note that no separate payment shall be made by Purchaser for material reconciliation activity (material reconciliation at site will not be considered as a part of supervision of E&C activity) & any price of this service will be deemed to be included in the basic price of supply of the package quoted by the bidder. 18) Mechanical Completion 19) Preparation of startup and operating manuals 20) Pre-commissioning activities and rectification 21) Commissioning and reliability run. 22) Running of the IGES System as per Purchaser / End customer's requirements till final handing over. 23) Successful Performance guarantee testing 24) Handing over the IGES to the owner 25) Coordination and statutory approval from government/non-government bodies/agencies 26) Supply of all test reports /certificates 27) Providing as built drawings 28) Training of the Clients Engineering and Operating Personnel NOTE: Bidder to note that the above list is not exhaustive and any other service required as per the intent of this specification / project requirements /good engineering practice shall be deemed to be included in bidder's scope without any commercial implication to the purchaser 8.2. Documentation for TAC Approval and TAC approval		
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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.		a) All activities related to TAC approval like preparation of documents, furnishing clarifications, information etc. as and when required, till final approval is obtained, shall be in bidder's scope. b) All comments, modifications etc. suggested by the TAC / TAC accredited agency shall have to be incorporated by the bidder without any extra cost to the purchaser. c) Bidder shall be responsible for getting the approval for the fire protection system from concerned authorities for insurance meeting any additional requirement as demanded by such authorities without any extra cost. 8.3. Training To End Customer: a) Prior to handing over of the system to Owner, the supplier shall provide operational training to Owner's operating personnel, which shall consist of control system operation, troubleshooting procedures, emergency procedures, safety requirements etc. b) The duration of the training shall be for a minimum of three working days for five personnel. 8.4. After award of work, before finalizing his layout especially the layout/levels of equipments cable/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. 8.5. Arrange for services of manufacturer's installation / commissioning engineer at site during mechanical completion / pre-commissioning & commissioning of all the major equipment and systems is included in bidder's scope. All the cost including that towards boarding, lodging, servicing, Insurance, Local Travel, Service charges etc. for arranging all the above visits shall be deemed to be included in the bidder's quoted price. Bidder shall not be eligible to raise any extra claim in this regard. 8.6. 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, however, responsibility for adequate manning the system shall be that of bidder. 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. 9. Design of IGES system:		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		9.1. General i. 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. ii. The IGES shall be a total flooding centralized system with directional valves and have 100% standby cylinders. iii. Total flooding Clean Agent System shall be provided by inert gas only. iv. 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 following six (6) zones (refer Annexure-10) each: <u>For Unit-#1 & 2:</u> ➤ Central Equipment Room-1 (CER-1) ➤ Central Equipment Room-2 (CER-2) ➤ Central Equipment Room-3 (CER-3) ➤ Computer room- Unit-#1 ➤ Man-Machine-Interface (MMI) room ➤ Computer room- Unit-#2 <u>For Unit-#3 & 4:</u> ➤ Central Equipment Room-1 (CER-1) ➤ Central Equipment Room-2 (CER-2) ➤ Central Equipment Room-3 (CER-3) ➤ Computer room- Unit-#3 ➤ Man-Machine-Interface (MMI) room ➤ Computer room- Unit-#4 v. 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: • The beam and ribs which criss-cross the ceiling • Path of AC ducts • Cabling in false flooring • Light fitting, detectors etc. vi. 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.		
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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.		vii. IGES system shall be interconnected with FDA system of the plant. 9.1.1. Design Concentration, Quantity & Discharge Time: i. 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. ii. 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 70⁰ F (21⁰ C) for the single largest risk zone to be protected. iii. 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. iv. 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. v. 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. vi. 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). vii. 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. viii. The quality of gas shall conform to relevant design standard such as NFPA-2001 or as specified by listing authorities. ix. 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. 9.1.2. System Flow Calculation:		
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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.		i. 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. ii. Approval certificate of software from UL/FM/Vds/LPCB etc. shall be submitted along with the offer. iii. Bidder shall also provide sufficient measures (like properly designed louvers etc.) facilities 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. 9.1.3. Clean Agent Quantity: i. Minimum design concentration of Clean Agent gas shall be as per CI no 5.4.2 of NFPA-2001 at 70 deg F by volume for clean agent fire extinguishing system based on approved/listed flow calculation method. ii. 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. 9.1.4. The principle of operation shall be as follows : i. 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 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. ii. 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		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		9.1.6. Clean Agent Gas & Its Grouping/Distribution: - 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. - Suitable combination of cylinders shall be made to cater to all the risk areas individually. - 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. - 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. 9.1.7. Gas properties and its discharge characteristics: - Physical properties of Inert gas agent shall meet the requirements in table A-1-4.1 (a) and (b) respectively, of NFPA-2001. Properties of Agents used as Fire Extinguishing Agents (Shall be as per NFPA-2001 latest edition) - The agent container pressure shall be as recommended in NFPA 2001. - The agent discharge shall be substantially completed in a nominal 120 sec. - 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. - The min O₂ concentration shall be as per NFPA-2001 9.1.8. Electrical design Parameters - Equipment design temperature (IS-9676) : 50°C - Minimum temp for battery sizing : 10 ° C - Lt Motor Voltage: AC 415 V, 3 phase, 50 Hz (for motors up to 160 kW) - Frequency : 50 Hz - Design voltage variation: +/- 10 % - Design Frequency variation: +/- 5 % - Combined variation (Voltage & Frequency) : 10 %(sum of absolute values) - Fault Level at rated voltage: 50 KA (1 sec)		
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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. 10. Inspection, Testing, Approval & Commissioning: 10.1. Bidder, to ensure that the equipment and material supplied, meet all the specifications laid down in the contract. 10.2. In case bidder find any deviation or non - conformity with respect to the agreed specifications, during manufacturing of the item and where corrective action is not feasible, the bidder shall report the same to Purchaser and seek prior approval from Purchaser / before proceeding with the job. 10.3. Bidder shall notify in writing to the Purchase, at least two weeks (Ten working days) in advance of the date and the place at which the items will be ready for witnessing of inspection / testing by Purchaser. In case any postponement becomes necessary, the CONTRACTOR shall provide written notification at least 48 hours prior to the original scheduled date. 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. 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. 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. 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. 10.8. Inspection certificate i. Bidder shall submit, copy of each Inspection Certificate (IC) / Inspection Release Note (IRN) issued by TPIA, along with all attachments mentioned therein. The IC / IRN shall include the following as minimum:				
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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.		ii. All comments, modifications etc. suggested by the TAC / TAC accredited agency shall have to be incorporated by the bidder without any extra cost to the purchaser. iii. Prior to handing over of the system to Owner, the supplier shall provide operational training to Owner's operating personnel, which shall consist of control system operation, troubleshooting procedures, emergency procedures, safety requirements etc. iv. The complete installation, testing, commissioning & training shall be carried out by the Contractor under the supervision of the Manufacturer/designer at site. v. Performance test of this system will be carried out by releasing circuit without discharge the agent in all the area and the parameters will be measured.(Discharge test is not recommended as per NFPA-2001) 10.12. Safety : i. All the safety requirements recommended in NFPA-2001 or as specified by listing authorities shall be incorporated in the installation by the Bidder. ii. Appropriate warning signs shall be fixed outside of those areas protected by the system and also in areas where the gas may spread indicating clearly the hazard associated with the system such as Noise, turbulence, cold temperature, physiological effects on personnel etc. iii. Apart from written warning signs, audio-visual type warning signs (i.e.) hooters & strobe lights shall be provided for pre-discharge and post- discharge activity. The sounder shall have selectable tone options. iv. The gas shall be discharged after a set time delay on receiving signal from the fire detection system. The duration of the timer shall be up to a range of 0-5 minutes settable (adjustable in 1 minute variation) at site after conducting test to find out the duration for evacuation of the personnel from the area. v. To prevent the loss/release of gas automatically or manually during maintenance, the system shall have the facility of "LOCKOUT". The status of the system lockout condition shall be annunciated audio visually in the panel. 10.13. Quality Assurance: i. Bidder shall maintain an effective Quality Assurance System, to ensure that all equipment and material supplied as a part of the IGES System package meet required Quality standards and specifications.		
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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.		ii. After award of contract bidder shall submit Quality Plan for approval (refer annexure-3 & 4). The quality plan shall be submitted in BHEL quality plan format. Bidder to note that all the cost involved in any of the inspection & testing requirements as per the approved quality plan shall be deemed to be included in the price quoted by the bidder. Bidder shall not be eligible to raise any extra claim on account of any inspection & testing of the complete IGES as per the approved quality plan 11. CLARITY OF SCOPE IN OTHER AREAS 11.1. Bidder shall note that IGES SYSTEM shall be offered on turnkey basis for areas specified, meeting specification requirements. 11.2. Bidder shall also note that the deviation in any form is not acceptable and same shall not be considered for review/ evaluation purpose / comments and it is assumed that the system/ materials/ equipments have been offered strictly in line with specification requirements. 11.3. Bidder shall confirm complete basis of design, all calculations, equipment selection criterion, layout drawings/schemes/G.A. drawings and documents like data sheet, technical particulars etc. shall be subject to CUSTOMER and/or BHEL approval during detailed engineering stage. 11.4. Bidder shall confirm that all drawings and documents shall be AutoCAD based. For inputs from customer, BHEL will extend all efforts to get the same in soft copy, but there is no commitment about editable soft copy. 11.5. Bidder to meet the codes and standards indicated in the specification. 11.6. Bidder shall note that quality plan shall be subject to CUSTOMER & BHEL approval after award of contract i.e. during detailed engineering. All comments as given by BHEL/ customer shall be taken care by bidder without any commercial & delivery implication. 11.7. Bidder to comply with sub-vendor list enclosed with the specification. If any item is left over other than indicated in the sub-vendor list, sub-vendor name shall be furnished during detail engg. subject to BHEL/ customer approval. Non-acceptance of any sub-vendor by BHEL / customer shall not have any commercial & delivery implication. 11.8. Bidder to confirm that the performance guarantee of the equipments shall be as per data meeting specification requirements and system requirement. 11.9. Bidder to confirm acceptance to furnish drawings/documents as per the drawings / documents distribution as per project requirements. 11.10. Bidder to confirm that instruments required for performance testing of various Equipments / systems of the package shall be arranged by bidder at site without any cost Implication to BHEL. 11.11. Bidder to confirm that all instruments for testing shall be calibrated before taking up testing.		
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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.	11.12. Bidder shall furnish one set of catalogue for equipment items offered for this package. 11.13. Bidder to confirm that entire IGES System shall be subject to approval by TAC accredited agency to qualify maximum premium discount. Complete documentation required for obtaining TAC approval shall be furnished by bidder. 11.14. Painting to suit environment for all equipments / items for this package shall be in the scope of IGES system bidder. 11.15. Engineering of the cables, cable routing and cable schedule shall be in the scope of bidder. 11.16. Instruments used in hazardous areas shall generally be intrinsically safe and shall be selected based on entity parameters. If intrinsically safe item is not available for any instrument, then it must be flameproof. 12. EXCLUSIONS The following items are excluded from bidder scope of supply:- a) Storage, preservation of Materials/Equipments at site (however detailed storage and preservation procedure shall be furnished by bidder). b) Erection and Commissioning (however supervision of Erection and Commissioning is in the bidder's scope) 13. MARKING, PACKING AND DISPATCH 13.1. Marking i. 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. ii. For ease of identification, the color of painted strip (wherever required) shall be as per the applicable standard. iii. 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.		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		vi. A separate document indicating the details of all the items having SHELF LIFE shall be furnished. Prior permission from BHEL shall be taken before dispatch of any of the item having shelf life. 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. vii. Loose vendor items sent to sites shall be quantified/numbered/tagged and not merely mentioned as ONE lot of loose items. 14. DOCUMENTATION 14.1. Bidder shall submit the list of documents as mentioned in Annexure-2 as per the schedule mentioned. 14.2. Bidder to note that the dates of submission of all the documents shall be finalized by him considering the time required for approval of various documents at Purchaser's end. It shall be solely bidder's responsibility to get approval on the entire document from purchaser to meet project schedule. 14.3. Drawings / Documents Review And Approvals i. The bidder's documentation shall be in accordance with this specification, codes/standards and good engineering practices. The discrepancies/deviations found in documentation of bidder shall be implemented by bidder without commercial implications. ii. Any delay on the part of bidder's documentation shall be to bidder's account only. iii. All the dimensions should be in S.I. units. iv. All documents before forwarding to Purchaser will have to be vetted in detail by bidder. Document received without vetting will be returned without review. Also any inaccuracies/mistakes found will not only be rectified by the bidder but the bidder shall remain liable for bearing charges towards efforts spent by Purchaser for discussing the same. Delay owing to these shall be to the account of bidder v. The bidder shall thoroughly review and submit the documents before forwarding to Purchaser vi. Only the approved drawings duly stamped and signed by a competent engineer of bidder shall be submitted to purchaser for review.		
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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.		vii. Documents submitted without meeting pre-requisite requirements will be returned without review. viii. Review of drawings and documents issued by bidder shall be carried out by Purchaser /End customer. ix. Approval/ review of the drawings/ documents by the Purchaser /End customer would be only limited to the review of compatibility with basic designs and concepts. x. The approval and /or review by the Purchaser /End customer shall not be construed by the bidder as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and drawings. xi. The Bidder shall be responsible for and shall pay for any alterations of the Work to be accrued out by other agencies due to any discrepancies, errors or omissions in the Drawings or other Particulars supplied by him whether such drawings or particulars have been approved by the Purchaser/ End customer or not. xii. Revisions in drawings/documents shall be clearly marked within clouds. No revision without clouding shall be recognized and the same shall not be considered reviewed and approved. All revised drawings / documents shall be associated with comments compliance report. xiii. First submission of the drawings / documents shall be made by bidder within 30 days from P.O placement. xiv. Normally the first submission of drawings / documents shall be reviewed by the purchaser with 14 calendar days of receipt of drawing at Purchaser's end. 14 days shall be reckoned from the date of receiving hard/soft copy of the documents at purchaser's center. xv. All revised drawings / Documents shall be submitted by Bidder in 07 days of receipt of comments / observations from BHEL. BHEL shall revert within 07 days on receipt of these revised documents / drawings from Bidder. xvi. Engineering shall be considered completed once all documents mentioned in Document list (Annexure-2) are submitted and applicable approvals are obtained from BHEL. 14.4. Document Submission Procedure		
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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.		i. All Drawings/Datasheet etc. shall be submitted in soft as well as hard copy. Soft submission of all drawings/data sheets is mandatory. ii. First submission of the set of documents shall be submitted within 30 calendar days of LOI/ PO. iii. Bidder shall furnish all documents in A4 Size (210 mm x 297 mm) paper or folded in A4 size unless otherwise specified. All drawings and sketches shall be in multiples of A4 size like A3 (297 mm x 420 mm) or A2 (420 mm x 594 mm) etc., but folded to 'A4' size. iv. It has been observed that at times mails fails to deliver because of problem in sender's /receiver's server .Hence it is recommended that bidder shall intimate concerned BHEL personal about any soft copy submission over phone immediately after any drawing / document is submitted for BHEL's review / approval. v. Final documentation shall be submitted in bound volumes and softcopy shall be furnished in non - writable CD. vi. Bidder shall submit 6 sets of hard copies of final approved drawings & two sets of hard copies of first submission drawings. vii. Hard copies of all the documents shall be forwarded to the following address: Name: (Name will be intimated during awarding of the contract) Address: Bharat Heavy Electrical Limited Administrative Building Purchase dept., PESD RC Puram Hyderabad- 32 viii. Date of receipt of hard copies shall be considered as date of submission of any document. Soft copy submission shall be considered as advance submission of drawing/document ix. BHEL shall furnish Approval/Observation of Drawings/Datasheet/Design calculation etc. in Soft Copy only. 14.5. Data Sheets Bidder shall provide data sheets of all Inert Gas System components in line with the specifications. 14.6. Erection & Commissioning Documentation		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		14.6.1. Erection documentation i. Erection document List shall be prepared during Engineering review meeting (after award of contract) identifying all the DOCUMENTS / DRAWINGS required for completion of Erection activities of the complete system, to be submitted by the bidder as part of documentation. ii. The Bidder shall submit for Purchaser's approval draft manual for Equipment Delivery and Erection (EDE Manual) covering detailed instructions, write up, technical data, drawings, check-lists, documentation formats for all activities after equipment manufacture upto installation of equipment. This manual shall cover general instructions for all equipment and specific instructions for individual equipment wherever required and shall include at least the following : • Instructions for packing, shipping, receiving, handling, ware-housing and storage. • Part number/Dispatch link-up of all the equipments/items supplied and also their co-relation with system/drawing/approved BOQ. • Instructions for location and installation of equipment furnished by this specification. • Installation drawings for field mounted equipment, panels, cubicles and other equipment covered under this specification. • Instruction relating installation of piping/ tubing, support and routing drawings of impulse pipes/signal tubes and tube/cable trays. • Check lists and quality assurance hold points. • Formats for all related documentation. • The EDE Manual shall conform to the requirements of this specification, all applicable codes and standards, recommendations of equipment manufacturers and accepted good engineering practices and shall be subject to Employer approval during detailed engineering. • The Bidder shall ensure that all work under this part shall be performed as per the requirements of this specification, Employer approved EDE Manual and drawing/documents approved by the Employer during detailed engg. 14.6.2. Erection Manuals i. The erection manuals shall be submitted at least three (3) months prior to the commencement of erection activities of particular equipment/system. The erection manual should contain the following as a minimum. • Erection strategy. • Sequence of erection. • Erection instructions. • Critical checks and permissible deviation/tolerances. • List of tool, tackles, heavy equipments like cranes, dozers, etc.		
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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.		• Bill of Materials • Procedure for erection. • General safety procedures to be followed during erection/installation. • Procedure for initial checking after erection. • Procedure for testing and acceptance norms. • Procedure / Check list for pre-commissioning activities. • Safety precautions to be followed in erection all equipments and electrical supply distribution during erection ii. Bidder shall provide sufficient written instructions, including a cross-reference list of all drawings for correctly installing the equipment and prepare the equipment for start-up. iii. It shall include any special information required for proper installation that is not on the drawings, special alignment or grouting procedures, utility specifications (including quantity) and all installation data. iv. It shall also contain the following information: • Instructions for erecting, piping, aligning (including the expected thermally induced shaft centerline shift between normal site ambient temperature position and that at normal equipment operating temperature). • A description of rigging procedures, including the lifting of the assembled equipment, and methods of disassembly, repair, adjustment, inspection and reassembly of the equipment and auxiliaries. • Pre-commissioning/commissioning/functional test procedures and acceptance criterion. 14.6.3. Commissioning documentation i. The contractor shall submit the commissioning documentation, comprising of Standard checklists, pre-commissioning procedures, testing schedules, commissioning schedules and commissioning networks for various Equipment / systems covered under the contract, for the approval of employer. ii. Standard checklist, as the name suggests, shall be a fairly general documents, containing the list of all checks required to be carried out for similar and repetitive type of equipment to ensure consistent and thorough checking. iii. The testing schedule is a document, designed for safe and systematic commissioning of individual equipment/sub-system. Commissioning schedule is a document envisaged for commissioning of a system. The testing/Commissioning schedule shall have a standard format in order to maintain consistency of presentation, content		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	and reporting. A brief write up on the contents of the Testing Schedule/Commissioning Schedule is as per the following: iv. Testing Schedules should be designed to ensure that the plant area, equipment or apparatus are tested and commissioned and will operate as per the employer's specifications and good engineering practices. v. Testing Schedule/Commissioning Schedule is required to be of a standard format in order to maintain consistency of presentation, content and reporting. vi. Testing Schedule/Commissioning Schedule should contain the following sections to make the document a self contained one: • Plant Details/Design data • Testing Objective/Proposals • State of the Plant required prior to commissioning • Erection Status with respect to Mech. Elect and C&I • Services required • Safety requirements • Test method including completion/acceptance criteria • Results • Testing Programme • Mech/Elect/C&I –Plant item completing list • List of Drawing/documents required for carrying out the testing. vii. The contractor shall submit the list of commissioning documentation to be submitted by him, alongwith their submission schedule for various equipment/systems covered under the contract, with in 6 (six) months from the date of award of contract, for the acceptance of employer. viii. The Contractor shall submit the commissioning documentation, for various equipment/covered under the contract, for the approval of employer, at least 12 months before the scheduled date of commissioning of the equipment/systems. ix. 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</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
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14.7. Input drawings																															
i. List of inputs as envisaged by purchaser is attached in annexure-8.																															
ii. 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 – the required base drawings/documents shall be furnished to the Bidder within one week (1 week) of receipt of such requisition from Bidder. Any ultimate delay arising out of the delay by the successful bidder in putting up such a requisition shall solely be to the bidder's account.																															
iii. 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. After the award of contract, in case there is a delay in supplies, bidder's delivery extension shall be processed																															
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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.		ii. Weekly Progress Report (Overall). This report shall be prepared by bidder and issued on weekly basis to Purchaser. The report shall include the following: • Executive Summary • Project highlights with dates of achievements • Project exception (work programmed but not achieved with reasons for non- achievement) and work programmed for next week • Critical areas • Actions taken/to be taken for slippages • Progress statistics This shall cover both for Bidder's Home/Design office activities and construction activities at site. iii. Weekly Progress Report (Construction) This report shall be prepared by bidder and submitted on weekly basis within 1 calendar day from cut-off date. The report shall cover following items. • Progress statistics • Work item wise quantity completed against programme for the week including • Reasons for shortfall. • Programme for next week • Work Front available • Constraints, if any • Resources deployed against planned with reasons for shortfall in resource deployed • List of equipment/materials received at site during the week iv. Expediting Report Bidder shall submit fortnightly expediting report based on his representative's visit to vendor's work for orders where delivery of materials is critical to project completion. A list of such critical items/vendors shall be specified by Purchaser during the kick-off meeting or at a later date. In addition to the above, purchaser may request expediting report based on visit of bidder's representative in case of orders which were though not critical at the		
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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.		16.3 In case the bidder considers requirement of additional instrumentation, controls, safety devices and any other accessories/auxiliaries essential for safe and satisfactory operation of the equipment, he shall recommend the same along with reasons in a separate section as a part of pre-bid query to enable purchaser take a suitable decision on the requirement of the same. 16.4 Information like Bill of materials (BOM), Instrument list, datasheets, and typical specifications enclosed by the bidder as a part of their bid, shall be retained for information only and shall not be referred by contractor as contractual agreement. No implication shall be admissible on the basis of these documents during any stage of contract execution. 17 SUB VENDOR LIST 17.1 All the equipment shall be sourced from recommended Bidders only as specified Annexure-12. 17.2 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). 17.3 Supply items for which no definite “make/brand” is indicated, shall be procured only from makes & models having proven track records and requires purchaser approval. 17.4 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 & delivery implication. While submitting sub-vendors for approval of BHEL, bidder shall furnish following documents : i. ISO certificate of Sub-vendors ii. Proven track record & references for makes and models supplied earlier. Note: i. 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. ii. Bidder shall take prior approval of BHEL w.r.to vendors for procurement of items which are not envisaged in the vendor list.		
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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.		The following documents shall be submitted by bidder and the bidder's offer shall be evaluated on the following: ➤ Duly filled & Signed copy of Check list ➤ Deviation list, if any (as per “No deviation format” given in this specification) ➤ Unpriced price schedule (To be submitted compulsorily without fail) <u>Note:</u> 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. 19 BILLING BREAKUP METHODOLOGY Billing break-up (BBU) shall be submitted to BHEL in following methodology: 19.1 The BBU shall be prepared only for the pro-rata billing purpose. 19.2 Typical BBU for IGES is attached as annexure-6 of this specification. 19.3 BBU will contain complete list of items required for the completion of the project as per specification and shall be dispatched by bidder irrespective of the items/quantities are indicated in the document or not. 19.4 Any additional requirement of the item already indicated in the document will be updated in the subsequent revision of this document. All such item will be dispatched as “free item” term to BHEL. 19.5 Inspection & Testing of all items shall be as per approved quality plan. The entire item shall be dispatched to site only after the completion of Inspection and testing requirement as per approved quality plan. Non-inclusion of any item does not absolve the vendor from meeting the requirement. 19.6 Vendor shall obtain prior permission from BHEL after submitting all the documents before ensuring dispatch of all main items applicable for project. 19.7 Inspection & quality: All the items applicable for this project shall be inspected as per approved quality plan. It may be noted that any item shall be dispatched to site only after complying with the Inspection requirements as per approved quality plan.		
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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.		19.8 As separate document indicating the details of all the items having SHELF LIFE shall be furnished. Prior permission from BHEL shall be taken before dispatch of any of the item having shelf life. 19.9 Applicable taxes & duties shall be extra. 19.10 BBU shall be a comprehensive document having details of all the items applicable for this project. There should not be any Non-Billable item to be supplied at site. 19.11 BBU shall be submitted as per “Payment Terms of Annexure-BB” 19.12 Wherever Lot items are indicated, same shall be quantified in details in a separate annexure. Similarly all Accessories/ Instruments/ items are to be defined with comprehensive details. 19.13 In case requirement of any such item / additional item is detected at any stage of the contract execution, BBU will be revised to reflect the same. However all the additional items will be supplied as a ‘Zero Value Item’, without any commercial implication to BHEL. All the contractual requirements shall be valid for these additional items also. 20 DEFINITIONS 20.1 BIDDER: Bidder means the party supplying Inert Gas Extinguishing System for this project. 20.2 SUB VENDOR : Sub vendor means any party on whom bidder suborders materials and items (like tubes, forgings etc). 20.3 Quality Assurance Plan (QAP) / Inspection and Test Plan (ITP) It is a document generated by the supplier with complete listing of various inspection stages, tests, material certification requirements and parties involved with their respective roles in inspection; indicating the requirements of Hold (H),Witness (W) Inspection, and Review (R) of Quality control documents / records for an item. QAP and ITP are considered synonymous. 20.4 THIRD PARTY INSPECTION AGENCY (TPIA) Third Party Inspection Agency means an inspection agency appointed by the EPCC/LSTK CONTRACTOR for carrying out Inspection and witness of tests of equipment and material being procured by the CONTRACTOR for the Project. 20.5 INSPECTION CATEGORY		
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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.		Inspection category determines the scope of Inspection for the Supplier, TPIA / OWNER for various equipment and material depending upon their use, serviceability, safety criteria and complexity. 20.6 MECHANICAL COMPLETION Mechanical Completion of systems shall mean that all installation works of the system have been completed and hydro tested in accordance with approved construction drawings, approved specification, applicable code as defined in the document, accepted international good engineering practices and all the activities have been completed in a comprehensive manner by the bidder. 20.7 PRE-COMMISSIONING ACTIVITIES Pre commissioning activities, which are required to be performed after completion/ installation, inspection, hydro testing etc. of an equipment/ system to make it ready for commissioning. 21 LIST OF ANNEXURES <table border="1" data-bbox="386 1014 1451 1619"> <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> <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> </tbody> </table> NOTE: 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.			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	13.	Typical BOQ Format	Annexure-13	14.	Specification for Cables	Annexure-14
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	00	31/08/2015	Original Issue	Pras Lamb	gurun gurun	gurun	
	01	21/04/2016	Internal Revision	Pras Lamb	gurun gurun	gurun	
	02	10/04/2017	Internal Revision	Pras Lamb	gurun gurun	gurun	
	Ref.						