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		GAS TURBINE ENGINEERING DIVISION				PAGE 1 OF 22
SUPERSEDES INVENTORY No.	Based on own Experience					
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<h2 style="margin: 0;">Bid Specification</h2> <h3 style="margin: 0;">for</h3> <h2 style="margin: 0;">Ignition Gas Cylinder</h2> <h2 style="margin: 0;">Heating System</h2> <h3 style="margin: 0;">of a</h3> <h2 style="margin: 0;">V94.2 Gas Turbine</h2> <p style="margin: 20px 0 0 0;">Project: Baiji Gas Power Project</p> <p style="margin: 0 0 0 0;">IRAQ</p>						
SIGN & DATE	TSX	MEMBER OF PSC	STE-TA	QAX	AGREED DEPTT.	SIGN & DATE
P-6190	R. BHATIA	R. PANDYA	S. K. DAS	S. S. Chauhan	NAME	SIGN & DATE
20/11/99	R. Bhatia	R. Pandya	S. K. DAS	S. S. Chauhan	DATE & SIGN	SIGN & DATE
	13-11-99	DRAWN	WORKED	CHECKED	SUPERVISED	SIGN & DATE
	A. S. Rajput	A. S. Rajput	A. Mehrotra	A. K. Jain	A. K. Jain	SIGN & DATE
	9/11/99	9/11/99	9/11/99	10/11/99	10/11/99	SIGN & DATE
	APPROVED					SIGN & DATE
	A. Wadhwa					SIGN & DATE
	PREPARED:					ISSUED:
	G.T.E					G.T.E
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INVENTORY No.	P-6/96			


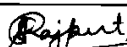
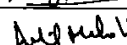
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SUPERSEDES INVENTORY No.	II List of Appendices to this specification <ol style="list-style-type: none"> 1. Layout Plan of the System 2. Signal Exchange Diagram 3. Manufacturing Quality Plan 				
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P-6190	<i>[Signature]</i> 20/11/99				

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SUPERSEDES INVENTORY No.	1 Intent of Specification 1.1 Scope of Contract The scope of the contract for this system is as follows: i) Detailed design and engineering of all equipment, systems, recommended spares and special tools and tackles as mentioned in the specifications. ii) Complete manufacture including shop testing; iii) Providing engineering data, drawings, erection and commissioning procedure, operation and maintenance manual etc. of main equipment and auxiliaries. iv) Packing and transportation from the manufacturer's works to the destination as per contract requirement. v) Receipt, storage, preservation and Conservation of equipment as per contract requirement. vi) Supervision during erection and commissioning/erection and commissioning of the system (Actual scope shall be defined during ordering stage). vii) Satisfactory conclusion of the contract. Notes: 1) In this bid specification, the company submitting the enquiry, namely Bharat Heavy Electricals limited, Hardwar is herein after referred to as "Purchaser" or "BHEL", the manufacturer tendering the bid is referred to as "Bidder", the bidder to whom contract is awarded is referred to as "Supplier", Agency owning the power plant is referred to as "Owner", Engineer deputed by purchaser / owner at site is referred to as "ENGINEER" or "ENGINEER IN-CHARGE". 2) BHEL interface for commissioning : operation of GT by BHEL. 1.2 Responsibility of Bidder The bidder shall be <u>responsible</u> for providing all material, equipment and services, specified or otherwise which are required to complete the project and fulfil the intent of ensuring operability, maintainability and the reliability of the complete work covered under this specification. It is not the intent to specify completely here in, all aspects of design and construction of equipment. Nevertheless, the equipment shall conform in all respects to high standards of engineering, design & workmanship & shall be capable of performing in continuous commercial operation, in a manner acceptable to Purchase/Owner. Bidder is requested to carefully examine and understand the specification & seek clarification, if required, to ensure that they have understood the specifications prior to submit the bid.			
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INVENTORY No.	24.12-99 P-6190	WORKED BY:	A. S. Rajput	<i>Rajput</i> 20.12.99
		CHECKED BY:	A. Mehrotra	<i>Ashish</i> 20.12.99

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<p>2 Functional Description</p> <p>The main fuel of the gas turbine (fuel oil or fuel gas) is ignited during the start up of gas turbine by means of ignition flame. For this every burner is equipped with an ignition gas burner.</p> <p>Either the fuel gas or the cylinder gas (Propane : Butane – 60:40) can be used as ignition gas depending on the fuel (main) of the gas turbine. During start with fuel oil only, the cylinder gas is used as ignition gas. During starting of gas turbine with cylinder gas, if the ambient temperature is less than 40°C, then this heating system is required. This is in order to ensure proper vapour pressure of gaseous mixture of minimum 7-8 bar in the pipeline required for ignition.</p> <p>For this purpose, eight cylinders, four in each cylinder cabinet of suitable size, are arranged in the cylinder room provided in the GT building. In order to take out any cylinder from the cylinder cabinet during operation, each cabinet is provided with one door of suitable dimensions. For the above two cylinder cabinets, two independent heating systems viz. system 1 and system 2 controlled by a common control panel are envisaged.</p> <p>In this system, atmospheric air is blown by flameproof blower, installed outside the room, into the flameproof air heater tanks through GI sheet fabricated ducts. The heated air at a temp of approx. 40°C is taken into the cylinder room through insulated GI sheet fabricated ducts. The cylinders are kept inside insulated GI fabricated cylinder cabinet to avoid the heat loss.</p> <p>In order to prevent any over pressurisation inside the cylinder cabinets, flameproof exhaust fans are installed. The cylinder room serves as a common cylinder gas facility for both the turbines.</p> <p>The system shall be approved by CMRS, Dhanbad.</p> <p>3 General Design Requirement</p> <p>3.1 System Requirements</p> <p>The system consists of the following equipments:</p> <table border="0"> <tr> <td>i)</td> <td>FLP(Flameproof) & WP (IP 55) Control Panel</td> <td>: 1 Set</td> </tr> <tr> <td>ii)</td> <td>FLP Air Blowers</td> <td>: 2 Nos.</td> </tr> <tr> <td>iii)</td> <td>Air Tank with Heaters (100% redundancy in Heaters)</td> <td>: 2 Nos.</td> </tr> </table>					i)	FLP(Flameproof) & WP (IP 55) Control Panel	: 1 Set	ii)	FLP Air Blowers	: 2 Nos.	iii)	Air Tank with Heaters (100% redundancy in Heaters)	: 2 Nos.
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	<p>iv) Pt RTD Sensors(3 Wire) for temperature indication on control panel : 4 Nos.(1 in each cabinet & tank)</p> <p>v) G. I. Thermo-insulated Ducts : Required Length</p> <p>vi) G.I. Fabricated Thermo-insulated LPG Cylinder cabinet with one door for easy access to LPG cylinders : 2 Nos.</p> <p>vii) FLP Exhaust Fan : 2 Nos.</p> <p>viii) FLP Thermostats(Temperature Switch) : 4X2 Nos.(3 nos. in each cylinder cabinet, 1 no. in each heater tank)</p> <p>ix) Cables and accessories : Required quantity</p> <p>The system working is as follows :-</p> <p>For starting any gas turbine, system 1 or system 2 can be put in operation and for starting both the gas turbines simultaneously, system 1 & system 2 are to be put in operation.</p> <p>Before the system is switched on, selection shall be made whether one system is required for operation or both the systems are required through selector switch provided on the control panel for the purpose. The switch shall have following positions printed on the control panel:</p> <p>a) System 1 & 2 both in operation</p> <p>b) System 1 in operation</p> <p>c) System 2 in operation</p> <p>d) System OFF</p> <p>The control panel shall consist of necessary switch-gear, MCC, interlock equipment, signal processing & operating switches, indicating lamps to cater the total operation and monitoring. The following interlocked operational requirements shall be met:</p> <p>i) If temperature in any of the cylinder cabinets decreases below an adjustable set value (40°C) sensed by the thermostat. The corresponding heater shall be switched on.</p> <p>ii) When the temperature of air in any of the heater tanks reaches the adjustable set value (40°C) sensed by the thermostat, the corresponding blower and exhaust fan shall be switched on.</p>									
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<p>iii) If the temperature in the cylinder cabinet exceeds an adjustable set value (45°C), the corresponding heater, blower and exhaust fan shall get switched off.</p> <p>iv) If the temperature in any of the cylinder cabinets exceeds an adjustable very high temperature set value (55°C), a common group alarm with hooter shall be provided on the control panel with an additional changeover type potential free contact to connect GT C&I (PCC) for alarm there.</p> <p>In addition to above, ON & OFF push button switches shall be provided with indicating lamps for each heater, blower and exhaust fan. A common temperature indicator shall be provided to indicate the temperature (sensed by the RTDs) of the heater tanks and cylinder cabinets through a selector switch. Selector switches shall also be provided to select one of the redundant heaters in each tank into service. All the abovementioned switches, lamps & indicator shall have appropriate inscription plates on the control panel. While selecting the system1, system2 or system 1&2 both as described above, the service heaters are to be selected with the selector switches mentioned above. BHEL shall provide 380 V, 50 Hz power supply feeder. Other power supply requirement shall be provided internally in the control panel.</p> <p>For the proposed layout plan of this system refer annexure I. The other suitable layouts for this system can also be considered meeting all the requirements of the system.</p> <p>Refer drawing no. : 0-76233-02002 (GT House Layout) for information only. Contract layout drawing shall be made available before award of contract.</p> <p>3.2 Technical Requirements</p> <ol style="list-style-type: none"> Complete system shall be approved CMRS, Dhanbad for gas group II A, II B, as per IS -2148. Motors, panel, Instruments, Cables and cabling accessories shall conform to GT17001, GT17002, GT17003 and GT 17004 respectively. All equipments of the system shall be painted with Epoxy powder coated shade 692 of IS -5, if not coated with any other paint according to some applicable statutory requirement. Bidder shall consider the size of the cylinders as diameter 0.318m, height 600 mm. 6 The distance between centre lines of 2 consecutive cylinders in a cylinder cabinet shall be 500mm. A canopy shall be provided on the top of the control panel against Sun and rain. Vendor shall submit the temperature vs time curve for reaching 40°C 					
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SUPERSEDES INVENTORY No.		<p>- From ambient temperature (27 °C)</p> <p>- From 0°C (min.)</p> <p>7. Total power requirement of the system shall not be more than 12 KW.</p> <p>8. For the requirements of potential free contacts in the control panel for future signal exchange, refer annexure II.</p> <p>9. BHEL shall make available 3 phase supply of 380 Volt AC. Cable shall be 4 core x 16 mm².</p> <p>10. Cylinder cabinet shall be mounted on a frame of suitable height.</p> <p>11. Manual changeover facility from operating heaters to standby heaters shall be made available.</p> <p>Supplier shall inform civil requirements such as opening in the walls of ignition cylinder room (Cylinder room size is 3.5mx2.65mx2.5m).</p> <p>4 Scope of Supply</p> <p>As envisaged in the Functional description, clause 2.0 and General design requirements, clause 3.0.</p> <p>It shall include following:</p> <ul style="list-style-type: none"> i) All the equipments mentioned in clause 3.1 & 3.2. ii) Internally wired control panel iii) Interequipment control and power wiring iv) Any other requirement mentioned elsewhere in this specification v) Any equipment, device or the system not mentioned in this specification but are needed for the completeness of the system furnished by the bidder for meeting the intent and requirements of this specification. <p>Note: Power cable to control panel from PCC and control cable to/from control panel is in BHEL scope.</p> <p>5 Quality Requirements</p> <ul style="list-style-type: none"> i) The bidder shall submit the name of sub-suppliers of all equipments for purchaser's/owner's approval alongwith the offer. Preferably the supplier and his sub-suppliers should be certified as per ISO 9000 series. Copy of certificate(s) to be submitted. ii) The bidder shall submit their quality plan and field welding schedule in prescribed 			
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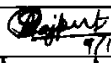
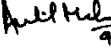
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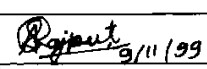
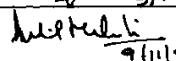
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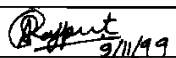
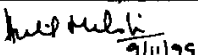
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SUPERSEDES INVENTORY No.	<p>format attached as Annexure-III, along with the offer which shall be reviewed and approved by the purchaser/owner before starting of manufacturing activities. The Q.P. shall detail out all the tests/checks conducted by supplier at various stages including receipt of raw material, manufacturing, assembly, testing, packing and dispatch in compliance with the requirements of the applicable codes and standards.</p> <p>iii) In the approved Q.P., BHEL/Owner shall indicate Customer hold points (CHPs) beyond which the work shall not proceed without written permission/approval by BHEL. The supplier will give the inspection call to BHEL at CHPs atleast 15 days in advance.</p> <p>iv) The equipment shall be dispatched only after inspection and clearance of material by BHEL/Owner and approval of test certificate.</p> <p>v) The entire system shall be tested at site after erection and commissioning as per relevant national/international standards/codes to demonstrate the fulfillment of all the requirements of this specification. The list of these standards shall be furnished alongwith the offer.</p> <p>vi) The minimum test/checks to be carried out on the system as envisaged by BHEL are given below and elsewhere in this specification, however it is not intended to form a comprehensive testing programme as it is supplier's responsibility to prepare the detailed quality plan which should also include test/checks carried out by the supplier as a part of their normal practice. This quality plan is subject to the approval of BHEL/Owner. BHEL/Owner reserves the right to ask for any more checks at the time of quality plan finalisation.</p> <p>a) Irrespective of design conditions, all the weldments should be subjected to minimum 10 % radiographic examination.</p> <p>b) Testing of motor, panel, Instruments, Cable and cabling accessories as per GT17001, GT17002, GT17003 and GT 17004 respectively or any other approved applicable National/International standard.</p> <p>c) All tests/checks shall be carried out on blowers, fans and heaters as per applicable standards, the same shall be informed to BHEL/Owner.</p> <p>6 Performance testing and Guarantees</p> <p>i) All necessary tests at site shall be carried out on equipments/components or the entire system as a whole so as to establish that the system totally conforms to the design and service requirements of the system. Particulars of the testing procedure shall be submitted to BHEL for approval before conducting any test. The testing agreed upon shall also include the requirements of statutory authorities having jurisdiction on the equipment/system. Irrespective of design conditions, all the</p>			
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<p>weldments should be subjected to minimum 10 % radiographic examination.</p> <p>ii) After completion of erection and before being put into operation, each equipment/system shall be thoroughly cleaned and then inspected by supplier, under the supervision of the purchaser/owner for Correctness and Completeness of installation and acceptability for placing in operation.</p> <p>iii) The supplier will be responsible for supervising the operation of his system during the period commencing with startup and extending through trial operation and all performance tests. During this period, the supplier will furnish the supervisory personnel plus any calibration devices, special test instruments, etc. pertaining to his system, required to prepare for and conduct the performance tests. The Owner will make available operating personnel and the system electrical load. Supplier's supervisory personnel shall conduct training for the Owner's personnel prior to and during this period and shall train them so that they will be able to operate and maintain the new equipment satisfactorily after acceptance by the Owner.</p> <p>iv) Equipment shall be guaranteed for a minimum period of 36 months from the date of supply or 18 months from the date of commissioning at site, whichever is earlier.</p> <p>v) If general requirements of the specification are not fulfilled and if the values fall short of that guaranteed by the supplier, the supplier shall make good that deficiency by rectifying/replacing the defective part. The supplier shall bear the whole cost of repair/replacement of defective part.</p> <p>vi) If during erection at site any deficiency is observed in any of the parts of the equipment supplied by the supplier, BHEL's representative shall prepare the assessment report and a copy of the same shall be forwarded to the supplier. The supplier shall replace/repair the defective part free of charge within one week after the receipt of assessment report. The supplier if he so desires may depute his representative at site at his own cost to assess the defect. However the decision of BHEL's representative shall be final and binding in case of difference of opinion.</p> <p>vii) The supplier shall repair/replace the defective parts at his own cost during the guarantee period.</p> <p>viii) Supplier shall furnish guarantee certificates after the award of contract.</p> <p>ix) During performance testing following minimum shall be demonstrated for system 1 & 2 meeting all functional requirements as per approved procedures.</p> <p>a) Time taken to reach 40°C (This shall match with the time vs. temperature curve furnished by the supplier and corrected to the actual ambient conditions at the site during testing).</p> <p>b) Functioning of all indications</p> <p>c) Leaktightness of the system</p> <p>d) Operation of the systems by changing over to spare heaters in each air heater tank.</p>				
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<p>7 Codes and Standards</p> <p>i) Bidder shall submit a list of the national/international codes and standards, being followed, alongwith the offer.</p> <p>ii) At the time of proceeding with manufacturing, latest version of codes and standards, applicable, shall be followed.</p> <p>iii) All equipment covered by this specification shall comply with all applicable laws and regulations of Owner's county.</p> <p>8 Project Monitoring Schedule</p> <p>The supplier shall submit, within 30 days after the date of notice of award of Contract, PERT network covering various key phases of the work such as design, procurement, manufacturing, shipment, erection, commissioning, and interface facilities to be provided by purchaser/supplier. This PERT network shall be periodically reviewed to ascertain the completeness of Contract within specified time schedule.</p> <p>9 Maintenance & Availability Considerations</p> <p>i) Equipment/work offered shall be designed for high availability, low maintenance & ease of maintenance and bidder shall specifically state in the offer the aspects of design viz. criteria for selection and sizing of all equipment and systems, design margins etc. incorporated to achieve these features. The bidder shall also furnish details of availability records in plants stated in his experience list.</p> <p>ii) Bidder shall state in his offer the various maintenance intervals, spare parts and manhour requirements during such operation.</p> <p>10 Documents, Data and Drawings to be furnished by Supplier</p> <p>i) The supplier shall submit detailed engineering documents, data and drawing submission schedule clearly identifying the Category of submission i.e. for review, information, approval etc. within the period after award of Contract as per the requirements of this specification or mutually agreed.</p> <p>ii) Each document, submitted by the supplier shall be in English and marked with the name of OWNER, unit and equipment/system designation and the name of the project.</p> <p>iii) No. of prints, microfilms and reproducibles to be submitted for review /approval/final submission shall be as per the specification or mutually agreed prior to award of Contract.</p> <p>iv) The following documents shall be furnished alongwith the offer in triplicate for</p>				
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		CHECKED BY: A. Mehrotra  9/11/99		


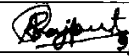
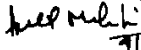
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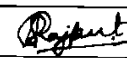
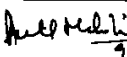
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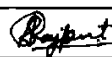
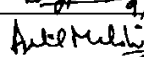
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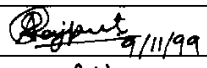
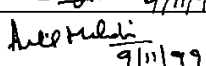
SIGN & DATE		PRODUCT STANDARD GAS TURBINE ENGINEERING DIVISION		GT 57001	
				Page 12 of 22	
SUPERSEDES INVENTORY No.					
<p> this specification/any other similar application: a) Single line diagram b) Schematic diagram of the system. c) Dimensional drawing/technical details of all the equipments of the system mentioned in clause 3.1. d) Logic diagram e) GA drawing/layout plan of the system f) Time – temperature curves as per clause 3.2. g) Write up of the system h) Catalogues of all bought out equipments i) CMRS approval for exhaust fan, air blower, control panel and thermostat j) Comprehensive bill of material for the complete system indicating type, make and other technical parameters. k) List of spares l) List of references m) Quality plan n) Information/data/documents as required elsewhere in this specification v) The following documents in triplicate shall be furnished within one month of release of purchase order for approval and 8 copies after approval: a) All the documents submitted under clause iv (a) to (h),(i) alongwith offer shall be submitted in 8 copies for approval after incorporating all the comments/modifications suggested during tendering stage. b) Erection/commissioning/operation/maintenance manual shall be submitted for approval. All these manuals should be prepared in such a way that purchaser/owner can carry out these activities without presence of supplier. c) All the approval documents shall bear the name of the power plant, customer and BHEL in the title block. d) Dimensional drawing of control panel e) Wiring diagrams of control panel and inter-equipment control and power wiring f) Detailed erection drawing and schedule of erection/commissioning activities g) Any other document/data needed to be approved as required by this specification or mutually agreed during pre-award stage. h) 3 Nos. of the Software floppy/CDROM with programmer </p>					
INVENTORY No.	SIGN & Date	WORKED BY: A. S. Rajput  9/11/99			
		CHECKED BY: A. Mehrotra  9/11/99			

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SUPERSEDES INVENTORY No.	<p>Examination of the pre approval documents by BHEL shall not relieve the manufacturer and his subcontractor, of their responsibilities. The approval document shall form the basis for the order. No changes shall be allowed without approval by BHEL.</p> <p>vi) Following documentation except specified otherwise shall be submitted before dispatch:</p> <ul style="list-style-type: none"> a) Test certificate of the material indicating the test results, NDT, Performance and other tests as specified elsewhere and as per applicable code shall be furnished in triplicate. b) Conservation Instructions c) Guarantee Certificate <p>11 Material of Construction</p> <p>Material utilised for various components shall be those which are already established for use in such applications and shall be informed during offer stage for purchaser's acceptance. However during detailed engineering stage if it is established that materials, informed by bidder, is inferior than present practices, same shall be changed by supplier without any commercial implications.</p> <p>All materials used or supplied shall be accompanied by valid and approved material certificates, tests and inspection report. These certificates and reports shall indicate the heat numbers or other such acceptable identification numbers of the material. The material certified shall also have the identification details stamped on it.</p> <p>All materials used for equipment manufacture including castings and forging etc, shall be of tested quality as per relevant codes/standards. details of results of the tests conducted to determine the mechanical properties, chemical analysis and heat treatment procedure recommended and actually followed shall be recorded on certificates and time temperature chart. Test shall be carried out as per applicable material standards.</p> <p>12 Tools & Tackles</p> <p>The bidder shall submit a list of erection, commissioning and maintenance special tools & tackles to be supplied along with the offer and their detailed description and function alongwith the supply.</p> <p>13 Instruction Manuals</p> <p>The supplier shall submit six sets of preliminary instruction manuals covering drawings of all the equipments, storage instructions, erection and testing procedures, equipment operation and maintenance procedure and spare parts catalogue of all within 6 months</p>				
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SIGN & DATE		PRODUCT STANDARD GAS TURBINE ENGINEERING DIVISION		GT 57001
				Page 14 of 22
SUPERSEDES INVENTORY No.	<p>after award of Contract. Final instruction manuals shall be submitted atleast 3 months prior to commencement of pre-commissioning activities & all revised sheets thereafter.</p>			
COPYRIGHT AND CONFIDENTIAL <small>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.</small>	<p>The operating and maintenance instructions of the equipment shall be in sufficient details to enable the Owner to maintain, dismantle, reassemble and adjust all parts of the equipment. They shall give a step by step procedure for all operations likely to be carried out during the life of the plant/equipment including erection, testing, commissioning, operation, maintenance, dismantling, repair and assembly. Each manual shall also include a complete set of approved drawings together with performance/rating curves of the equipment and test certificate wherever applicable. The contract shall not be considered to be completed for purposes of taking over until such instructions and drawings have been supplied to the Owner.</p>			
	<p>14 Welding, Welding Materials and Consumables</p> <p>If the manufacturer has special requirements relating to the welding procedures for welds at the terminals of the equipments to be performed by others the requirements shall be submitted to the Engineer in advance of erection work.</p> <p>The properties of welding materials and consumables to be employed (mechanical, thermal, long term performance etc.) shall be matched to the base metal. The supplier shall ensure that the welding materials and consumables have national & international approval for the intended application.</p>			
SIGN & Date	<p>15 Rating Plates, Name Plates & Labels</p> <p>Each main and auxiliary item of the system shall have permanently attached to it in a conspicuous position, a rating plate of non-corrosive material upon which shall be engraved manufacturer's name, equipment, type or serial number together with details of the ratings, service conditions under which the item of plant in question has been designed to operate, and such diagram plates as may be required by the Owner.</p> <p>Each item of system shall be provided with name-plate or label designating the service of the particular equipment. The inscriptions shall be approved by the Owner.</p> <p>Such name plates or labels shall be of white nonhygroscopic material with engraved black lettering or alternately, in the case of indoor circuit breakers, starters, etc. of transparent plastic material with suitably coloured lettering engraved on the back.</p> <p>Items of system such as valves, which are subject to handling, shall be provided with an engraved chromium plated name-plate or label with engraving filled with enamel.</p>			
	INVENTORY No.	WORKED BY:	A. S. Rajput	 9/11/99
INVENTORY No.	CHECKED BY:	A. Mehrotra	 9/11/99	

SIGN & DATE		PRODUCT STANDARD GAS TURBINE ENGINEERING DIVISION		GT 57001
				Page 15 of 22
SUPERSEDES INVENTORY No.				
<p>All such plates, instruction plates, etc. shall be bi-lingual. One language shall be English and another shall be intimated before award of contract.</p>				
<p>16 Cleaning, Painting, Conservation and Dispatch</p>				
<p>i) The equipment shall be suitably conserved before packing for long storage at site. Supplier shall furnish the exact details of internal/external surface protection to BHEL/its owner for their review and approval alongwith bid.</p>				
<p>ii) The supplier shall pack and conserve all the equipment in such a manner as to protect them from deterioration and damage during rain and road transportation to site and storage at site till the time of erection. The supplier shall be held responsible for all damage due to improper packing and conservation. Conservation instructions if any to be used at site during storage shall be furnished. Supplier shall furnish the packing list for each package in advance.</p>				
<p>iii) Suitable lifting bolts/eyes shall be provided on the packing boxes to facilitate easy loading/unloading and shifting of the packages.</p>				
<p>iv) All surfaces which are not easily accessible after the shop assembly shall before hand be treated and protected for the life of the equipment.</p>				
<p>v) Dispatch instructions shall be issued by BHEL after the system is tested and found satisfactory in presence of representative from BHEL/its owner.</p>				
<p>17 Design Co-ordination meeting</p>				
<p>Supplier shall attend the meeting on his own cost, whenever felt necessary, called by purchaser / owner to clarify the subject matter to them during engg., erection, commissioning, and any stage prior to handling.</p>				
<p>18 Training of Personnel</p>				
<p>Bidder shall suggest in the offer complete details of special training, if required, for owners personnel in the areas of operation and maintenance. The field, number of personnel & man days shall be mutually agreed between supplier & owner/ purchaser.</p>				
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SUPERSEDES INVENTORY No.	19 Spares 19.1 Commissioning and start-up spares The vendor shall supply all consumables and spares required for successful erection and commissioning of the equipment at site. List of commissioning spares shall be furnished alongwith the offer. Vendor shall indicate quantity of each item with unit price. 19.2 Recommended Spares List of spares generally recommended by the bidder for 2 years successful operation shall be furnished alongwith the main offer. The vendor shall also furnish their quotation indicating break up of prices for each item on unit basis. 19.3 General Technical requirements for Spares i) The spares shall be treated and packed for long storage under the climate conditions prevailing at the site e.g. small items shall be packed in sealed transparent plastic bags with dessicator packs as necessary. ii) Each spare shall be clearly marked or labeled on the outside of the packing with its description. When more than one spare part is packed in a single case, a general description of the contents shall be shown on the outside of such case and detailed list enclosed. iii) All cases, containers and other packages must be suitably marked and numbered for the purpose of identification. iv) All cases, containers or packages are liable to be opened for examination as may be considered reasonable by purchaser/owner. v) The quality plan and the inspection requirement finalised for the main equipment will also be applicable to the corresponding spares. 20 List of cross Referred Specifications & Drawings 20.1 BHEL Specifications & Drawings i) GT17001 : Specification of Motor ii) GT17002 : Specification of switch gear, control gear, and its panel iii) GT17003 : Specification of instrumentation iv) GT17004 : Specification of cables and cabling accessories v) 0-76233-02002 : GT House Layout			
INVENTORY No.	SIGN & Date	WORKED BY: A. S. Rajput <i>Rajput</i> 9/11/99 CHECKED BY: A. Mehrotra <i>A. Mehrotra</i> 9/11/99		

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SUPERSEDES INVENTORY No.	20.2 National/International Specifications and Drawings i) IS-2148 ii) IS - 5 iii) ISO 9000			
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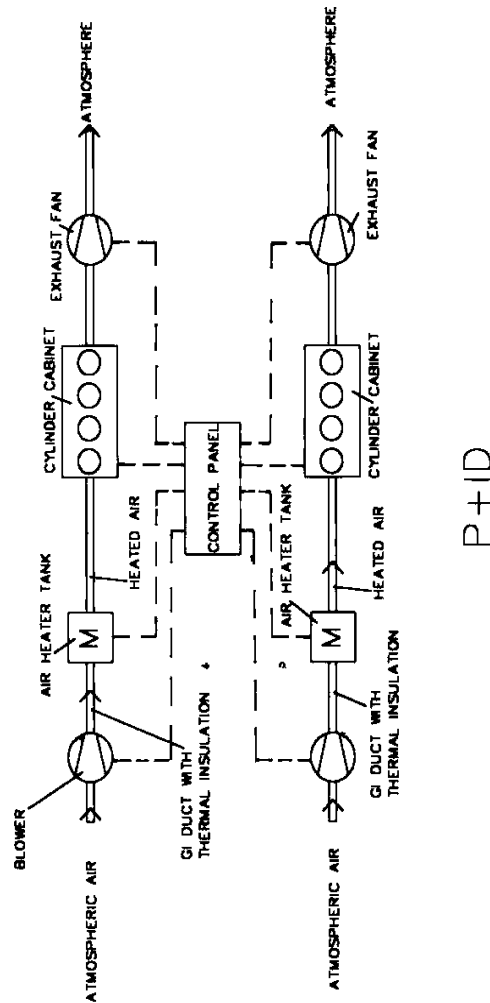
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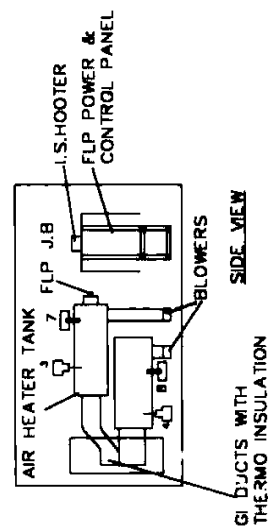
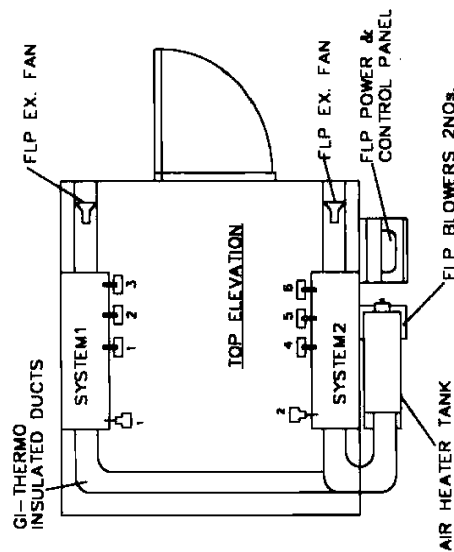
P-6190 20.11.99

P+ID and Layout Plan of
LPG Cylinder Heating SystemAPPENDIX I
SHEET 1 OF 1

SYMBOLS:

-□- 3 WIRE RTD SENSORS FLP TYPE-4 NOS.

-□- THERMOSTATES FLP TYPE-BNOS.



LAYOUT

WORKED BY A.S. RAJPUT
CHECKED BY A. MEHROTRA
 27/11/99
 27.11.99

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**SIGNAL EXCHANGE DIAGRAM – IGNITION GAS CYLINDER HEATING SYSTEM
CONTROL PANEL AND PCC(GT C & I)**

```

graph TD
    Supplier{SUPPLIER} -- "380 V AC BY BHEL" --> Panel[IGNITION GAS CYLINDER HEATING SYSTEM CONTROL PANEL]
    Panel -- "BINARY" --> PCC[PCC GT C & I]
    Panel -- "IGNITION GAS SYSTEM TEMP. VERY HIGH (IN ANY OF THE TWO IGNITION GAS CYLINDER CABINETS)" --> PCC
  
```

NOTES:

- A potential free change over contact shall be provided for indication of very high temperature in any of the two ignition gas cylinder cabinets.
- In addition to above, **two potential free contacts** shall be made available for future use.

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CHECKED BY:	A. MEHROTRA	<i>[Signature]</i> 21/11/99

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		PRODUCT STANDARD GAS TURBINE ENGINEERING DIVISION	
		GT 57001 PAGE 20 OF 22	
Annexure III Sheet 1 of 2			
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MANUFACTURING QUALITY PLAN			
PROJECT : PACKAGE : CONTRACT NO : CONTRACTOR :			
ITEM : QP NO. REV. DATE PAGE OF			
SUB-SYSTEM			
TYPE OF CHECK 5 QUANTUM OF CHECK 6 REFERENCE DOCUMENT 7 ACCEPTANCE NORMS 8			
CLASS 4			
CHARACTERISTICS 3			
SL. COMPONENT NO. OPERATIONS 2			
REMARKS			
AGENCY M C N D 10 11			
FORMAT OF RECORDS 9			
FOR NTPC USE DOC. NO.			
REVIEWED BY.			
NAME & SIGN OF APPROVING AUTHORITY & SEAL			
LEGEND: RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION M: MANUFACTURER/SUBCONTRACTOR C: CONTRACTOR/NOMINATED INSPECTION AGENCY N: CLIAIT INDICATE P PERFORM W WITNESS V VERIFICATION AS APPROPRIATE CHP NTPC SHALL BE IDENTIFIED IN COLUMN 'N'			
MANUFACTURER'S NAME & ADDRESS			
SIGNATURE			
CONTRACTOR			
WORKED BY: A. S. RAJPUT			
CHECKED BY: A. MEHROTRA			

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P-6190		20/11/99		20/11/99				PAGE 21 OF 22	
Format - 2 Project Contractor Package System				FIELD WELDING SCHEDULE				Annexure III Sheet 2 of 2	
Drawing no. Weld no. & identification of weld Material to be welded Material Spec. Dimensions Position of welding Type of weld Elect rode filler spec. WPS No. Min. pre heat temp Heat treatment Temp Time (H.T) NDT method EDT Spec no. quan tum ACC no. Ref Remarks				Rev No. : Welding Code : Page no. :					
Project Contractor Package System				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.					
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PRODUCT STANDARD GAS TURBINE ENGINEERING

GT 57001

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RECORD OF CHANGES

REV. CODE	NO. OF CHGS.	DOCU. NO.	SHEET NO.	SIGN	DATE	REV. CODE	NO. OF CHGS.	DOCU. NO.	SHEET NO.	SIGN	DATE
a	1	GTE-99-174	PAGE 4 SUPERSEDES OLD PAGE UNDER SAME NO.	<i>[Signature]</i>	24/12/99						
b	2	GTE-00-75	7, 19	<i>[Signature]</i>	28/01/2000						

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													✓				
DEPTT	AIX	MSX	CCX	FAX	TFX	TLX	TTX	TTX-ST	TTX-HT	TTX-EM	WT	QAX	QCX	PCM	WC 202	WC 205	WC 227
												✓	✓				
DEPTT	FBM BL II	HTM	STM	WC 632	ACM	CIM	FBM BLV	SUM	WWM	FBM BL VIII	GTE						
											✓						
REVISION	DRAWN										A.S. RAJPUT		<i>[Signature]</i>	9/11/99			
	WORKED										A. MEHROTRA		<i>[Signature]</i>	9/11/99			
	CHECKED										A. MEHROTRA		<i>[Signature]</i>	9/11/99			

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