

## GAS TURBINE COMPRESSOR CONTROL SPECIFICATION

(For including in RFQ to GT vendor)

FOR

### GAS TURBINE DRIVEN CENTRIFUGAL COMPRESSOR PACKAGE, GAIL GANDHAR

#### Scope

This specification covers the Hardware and software requirements of fully engineered, manufactured, assembled and tested GT + Compressor Control system for Gas Turbine driven compressor, including commissioning spares and mandatory spares as per contract specifications for Gandhar CPP.

#### B.1 Detailed scope

GT+ Compressor control Hardware and software required to meet all requirements as per contract specifications for Gandhar project.

Important contract requirements are given as follows. Major relevant extracts from specifications is also attached below.

**Note: 1 Set of the following required as there is 1xGT+Compressor envisaged for this project.**

Sl No	Description	Qty. (1x GT)
1	Fully engineered, Manufactured assembled and tested GT + compressor control panel ( <b>Excluding anti-surge control &amp; protection</b> ) along with Supply of all Hardware/ Software and accessories required for control, monitoring and protection of Gas Turbine and auxiliaries fully conforming to end customer specifications.	1 Set
2	Operator Workstation and Engineering workstation and its Accessories  EWS and OWS, Printers and its accessories required as per contract specification. Engineering station and operator stations should be pre-loaded with package software required for control, monitoring and protection of the Gas Turbine.  No of HMIs: a) 1 No. OWS & 1 No. OWS cum EWS for GT in control room. b) 1 No. A3 Laser Printer for alarm & Logger c) 1 No. A3 Laser jet colour printer	1 Set (Pl refer attached schematic diagram B240-910-16-51-SK-0001-Model & B240-910-16-51-SK-0002-Model)
4	Network system Network switches and cables for interconnection of all devices and peripherals of GT Control system	1 Set

	Network switches to be housed in freestanding / wall mount enclosures	
5	Vibration & temperature Monitoring System for Gas Turbine	1 Set
6	Commissioning spares * (see note 1)	1 Set
7	Mandatory spares	1 Set (As per attachment B240-910-80-42-SL-5010)
8	Recommended spares	1 Set
9	Factory Acceptance Test	
10	Training- The courses and their duration, number of attendees in each course and location where such courses will be held that the vendor would recommend OWNER to consider.	At Vendor works: 7 days for 2 person At Site works: 7 days, Two batches of 6 person
11	Documentation- To be provided for GT+ compressor control panel to BHEL, Hyderabad as part of supply.	Refer attachment B240-910-16-51-VDR-5010

**Notes**

1. All spare items required for commissioning shall be supplied by contractor *like spare fuses, lamps, terminals etc.*
2. Gas Turbine control shall be envisaged by GT vendor to meet compete operational requirement as per tender specification.
3. *For Compressor controls IO list is attached.*

**B.3. General Instructions:**

- 1) GT vendor shall be fully and solely responsible for design, engineering, procurement of materials, manufacture and assembly at shop, inspection, testing at shop, FAT, packaging and delivery of the Gas Turbine Control system and their associated systems for the project. The system shall be engineered to meet all bid specification requirements.
- 2) Although this RFQ specially outlines the scope of supplies, spares, services, technical and quality requirements, etc., the underlining intent is full-fledged responsibility of GT vendor for qualifying the model & meeting the requirement of end customer specifications.
- 3) Pertaining to GT vendor's scope of supply, GT vendor shall be responsible for providing all required details at any stage of the contract execution until the issues are resolved and closed by end customer and provide all necessary data as required within stipulated time.
- 4) GT vendor to supply any other equipment which is not explicitly mentioned as in GT vendor's scope of supply but is required for smooth and satisfactory operation of the Gas turbine and Generator package.
- 5) GT vendor shall provide detailed breakdown BOM for complete scope of supply.
- 6) GT vendor shall ensure and facilitate witness of testing of equipment as agreed and finalized with BHEL.

- 7) GT vendor shall be responsible for compliance with complete specification issued by customer including all standards as specified therein.

**EXTRACTS FROM THE BID SPECIFICATION FOR GT+ Compressor CONTROL SYSTEM**

**Note:** These are the minimum requirements that has to be complied by GT vendor for all applicable clauses for GT +Compressor control system & GT VMS.

Sl. No.	Document No/Page No/Clause No	Description of requirement	Remarks
1.	B240-910-80-42-SS-5010_Scope of supply	SECTION-C: INSTRUMENTATION (as applicable for GT+ compressor controls & GT VMS)	Vendor to confirm.
2.	Final Inst-Job Specification rev 2 B240 (B240-910-KA-MR-5010)	JOB SPECIFICATION INSTRUMENTATION (as applicable for GT+ compressor controls & GT VMS)	Vendor to confirm.
3.	B240 Data Sheet PLC (B240-910-YE-DS-5010)	DATA SHEET FOR PROGRAMMABLE LOGIC CONTROLLER	Vendor to confirm.
4.	B240-910-80-42-SL-5010	List of Mandatory spares for GT PLC, compressor controls & GT Vibration Monitoring system	Vendor to confirm & quote for spares.
5.	B240-910-16-51-SK-0001	Overall System configuration & interface schematic for Gas Turbine driven Compressor package	Vendor to confirm.
6.	B240-910-16-51-SK-0002	Capacity Control System Configuration for Gas Turbine driven Compressor package.	Vendor to confirm.
7.	B240-910-16-51-VL-5010	Vendor List-Instrumentation	Vendor to confirm.

**NOTES:**

1. Logic Diagram / Control Narrative / IO List etc. for BHEL scope instruments shall be provided to vendor for implementation in PLC during detail engineering.



# MANDATORY SPARES (GAS TURBINE DRIVEN CENTRIFUGAL COMPRESSOR PACKAGE)

**PROJECT** : Installation of New GTC Compressor at Gandhar,  
Gujarat,  
**OWNER** : Gas Authority of India Limited  
**PMC** : Engineers India Limited  
**JOB NO.** : B240

A	16.04.19	ISSUED FOR COMMENTS	AS	NK	NK
Rev. No	Date	Purpose	Prepared by	Checked by	Approved by

1.4.	<b>DC System</b>		one set of spare for each DC System
a)	Power Thyristors / Transistors / IGBT /IGCT	Set of each rating & type	1
b)	Control cards	No. of each type	1
c)	Power supply cards	No of each rating & type	1
d)	Power fuses	Each rating & type, whichever is more	20 % or one no (min)
e)	Control fuses / MCB	Each rating & type, whichever is more	10 no of each type and rating (min)
f)	Indicating lamps	No. of each color	10 % or one no (min)
g)	Indicating lamps covers	No. of each color	20 % or one no (min)
h)	Blocker Diode	Each rating & type	2 nos

### SECTION-C: INSTRUMENTATION

Mandatory spares shall be quoted and included in base price as per the following table:

Sl. No.	Part Description	Quantity Required
	Mandatory spares shall be quoted and included in base price as follows:	
<b>1</b>	<b>Field Instruments</b>	
	This includes all types of the following instruments excluding line-mounted instruments.	
I	Pressure gauges Temperature gauges	10%subject to minimum1No. of each type and size, range, rating and material wise whichever is higher.
II	Field transmitters for Pressure, Level, DP, Flow and Temperature etc.	10%subject to minimum1No. of each type and size, range, rating and material wise whichever is higher.
III	RTD/Thermocouple (with Thermowell), Thermowell etc.	10%subject to minimum1No. of each type and size, range, rating and material wise whichever is higher.
V	Gas detector, fire detector UV/IR Thermal/heat detectors with transmitter	10% subject to minimum 1 no of each type of sensor & transmitter, whichever is higher.
VI	Level gauge glasses	10% subject to minimum 1 no of glass of each size along with gasket set, whichever is higher.
VII	Instrument valve / 3-Way valve manifold / Tube fittings etc.	10% subject to minimum 1 no for each type/size, whichever is higher.
VIII	Speed transmitter probe	10% subject to minimum 1 no of each, which ever is higher.
IX	Beacons / Horns for gas detector	10% or minimum one number, whichever is higher.
<b>2</b>	<b>Line mounted instruments</b>	
I	Control valve, shutdown valve	a) 01No. seat plug assembly for each valve under cavitation and / or flashing and noise (for globe and angle valves).

Sl. No.	Part Description	Quantity Required
		<p>b) Grouping of balance valves with respect to size, rating, material &amp; trim type and 10% subject to minimum 1 no. of plug &amp; seat assembly of each group, whichever is higher (for globe &amp; angle valves)</p> <p>c) Grouping of valves with respect to size, rating &amp; material and 10% subject to min 1 no. ball &amp; seat, for each group whichever is higher (for ball valves).</p> <p>d) Grouping of valves with respect to size, rating &amp; material and 10% subject to min 1 no. of disk/rotary plug and seat of each group, whichever is higher (for rotary plug &amp; butterfly valves).</p> <p>e) Grouping of all valves with respect to size, rating, material &amp; trim type and 10% subject to minimum 1 no. whichever is higher of the following items group wise: -</p> <ol style="list-style-type: none"> <li>Gland packing</li> <li>Actuator Diaphragm.</li> <li>Valve positioner</li> <li>Bonnet gaskets (for all type of valves)</li> <li>Quick exhaust Valve (if any)</li> <li>Solenoid valves</li> <li>Limit switches.</li> <li>Smart Positioner.</li> <li>Air filter regulators</li> </ol>
II	Pressure Relief valve and pilot valve of pilot operated PRV	
	a) Spring, Nozzle, Seat	5% of total quantity of identical pressure relief valves or minimum one number which ever is higher.
	b) Gasket set, O-Ring set	20% of total quantity of identical pressure relief valves or minimum one number whichever is higher.
	c) Complete Pilot of Pilot operated pressure safety valves	5% of total quantity of identical pilot operated pressure relief valves or minimum one number whichever is higher
III	Self actuated regulators	<p>a) Grouping of valves with respect to size, rating, material &amp; trim type and 10% subject to minimum 1 no. of the following items of each group, whichever is higher: -</p> <ol style="list-style-type: none"> <li>Plug &amp; Seat Assembly</li> <li>Gland packing</li> <li>Actuator Diaphragm.</li> <li>Bonnet gaskets (for all type of valves)</li> </ol>
3	PLC	
I	Each type of modules used in PLC like I/O cards, processor cards, power supply cards, communication cards, interface cards, etc. as	5% of the total installed quantity subject to minimum one number, whichever is higher of each type.

Sl. No.	Part Description	Quantity Required
	being offered by the system	
II	IS isolator barriers	
	a) Analog input	5 % of total quantity
	b) Analog output	5 % of total quantity
	c) Digital input	5 % of total quantity
	d) Thermocouple / RTD	5 % of total quantity
III	Isolator/signal multiplier	5% of total installed quantity subject to minimum one number, whichever is higher of each type.
IV	IS mV/I converter	5% of total installed quantity subject to minimum one number, whichever is higher of each type.
V	IS RTD/I converter	5% of total installed quantity subject to minimum one number, whichever is higher of each type.
VI	Prefabricated cable	4 set with connecting plug for each type of peripheral and I/O hardware
VII	Keyboard	1 no of each type
VIII	Interposing relay	5% of total installed quantity subject to minimum one number, whichever is higher of each type.
IX	Push button	5% of total installed quantity subject to minimum one number, whichever is higher of each type.
X	Lamps	5% of total installed quantity subject to minimum one number, whichever is higher of each type.
XI	Selector switch	5% of total installed quantity subject to minimum one number, whichever is higher of each type.
XII	Switches	5% of total installed quantity subject to minimum one number, whichever is higher of each type.
XIII	Alarm cards (receiver switches)	5% of total installed quantity subject to minimum one number, whichever is higher of each type.
XIV	MCBs	5% of total installed quantity subject to minimum one number, whichever is higher of each type.
XV	System cabinet air filter	100%
XVI	Annunciator	
	- Power supply module	4 nos
	- Flasher module	4 nos
	- Tone generator card	2 nos
	- Lamps	5 dozen
	- Fuses	2 dozens
XVII	Termination panel/patch card, series resistor, isolator (for safe area signal)	5 % of total quantity
XX	Fuses (of each type)	100 %
<b>4</b>	<b>Vibration and Temperature monitoring system</b>	
I	Each type of module used in machine monitoring system like I/O cards, processor cards, power supply cards, communication card, interface card etc as being offered for system	5% of total installed quantity subject to minimum one number, whichever is higher of each type.
II	Probe of each type (vibration, temp, axial	10% or minimum 1 number, whichever

Sl. No.	Part Description	Quantity Required
	displacement keyphasor, etc)	is higher
III	Fuses of each type	100%
VIII	Selector switches	5% of total installed quantity subject to minimum one number, whichever is higher of each type.
<b>5</b>	<b>Compressor control system</b>	
<del>I</del>	<del>Anti-Surge Controller( If applicable)</del>	<del>01 No.</del>
II	Master /Performance Controller( If applicable)	01 No.
III	Load Sharing Controller ( If applicable)	01 No.

**Notes:**

1. The word 'Type' means the make, model no., type, range, size/length, rating, material as applicable.
2. Whenever % is identified, contractor shall supply next rounded figure.
3. Mandatory spares shall include sub-package items also.
4. Mandatory spares shall be supplied loose for use by client in future.



## IO COUNT

<b>SR. NO.</b>	<b>SYSTEM</b>	<b>COMPRESSOR PLC (excluding anti-surge controls &amp; protection)</b>							
1	<b>SIG TYP</b>	AI	AI	AO	AO	DI	DI	DO	DO
2	<b>IS N-IS</b>	IS	NIS	IS	NIS	IS	NIS	IS	NIS
3	<b>IO COUNT</b>	64	8	32	8	8	48	8	32
4	<b>20% INSTL SPARE</b>	13	2	7	2	2	10	2	7
5	<b>TOTAL</b>	77	10	39	10	10	58	10	39