



SCOPE OF SUPPLY (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

**SCOPE OF SUPPLY
FOR
GAS TURBINE DRIVEN CENTRIFUGAL COMPRESSOR PACKAGE**

Notes:

- (i) Bidder shall furnish all equipment, drivers, auxiliary systems, instruments and controls and safety devices as per the enquiry document. Anything required over and above what is specified, for safe and satisfactory operation of the equipment package shall be included by the vendor in his scope.
- (ii) Bidder's offer shall be completely inline with scope indicated. No deviation w.r.t. scope shall be accepted.
- (iii) Bidder's scope of supply shall include but not be limited to the following for the Gas turbine driven Centrifugal compressor package:

SECTION-A: ROTATING EQUIPMENT

SECTION-B: ELECTRICAL

SECTION-C: INSTRUMENTATION

SECTION-D: PIPING

SECTION-A: ROTATING EQUIPMENT			
Sl. No.	Description	Required (Yes/No)	Remarks
1.0	Compressor (Refer equipment data sheets and job specification for full details)		
1.1	Centrifugal Compressor as per Chapter-1 & 2 of API Standard 617, 7 th edn. & EIL Std. Specification 6-42-0005 Rev. 2 along with matching companion flanges, gaskets, fasteners etc. at all terminating points requiring owner's interface.	Yes	
1.2	Dry Gas Seals (Tandem Type with internal labyrinth)	Yes	
1.3	Gear Unit as per API Standard 613 [If Required]	Yes	
1.4	Couplings (non-lubricated type) as per API 671 with spacers and non-spark guards	Yes	
1.5	All associated auxiliary piping/tubing etc. prefabricated and duly mounted on the equipment/base-plate.	Yes	
1.6	Fabricated Steel Base Plate: Compressor and Gear unit & Gas Turbine Driver.	Yes	Bolted & dowelled at site
2.0	Gas Turbine and Associated System (Refer equipment data sheets and job specification for full details)		
2.1	Gas Turbine (GG & PT) as per API 616, 5 th edn. & EIL Std. Specification 6-43-0041 Rev. 2 complete with all necessary auxiliary equipments and control systems as per inquiry document	Yes	With DLE/DLN combustors (w/o water injection)
2.2	Acoustic Enclosure to limit noise level within 85 dBA @ 1m alongwith ventilation system for Enclosure including ventilation fans (1W+1S), air inlet filter, inlet and exhaust ducting, silencers, Expansion joints, flanged connections and transition pieces etc. as required along with necessary instrumentation.	Yes	
2.3	Air intake system complete with suction weather-hood, bird screen, louvers, silencers, inlet air filter as per Job spec., filter housing, Pre-fabricated air inlet ducting, Expansion joints, flanged connections and transition pieces etc. as required along with necessary instrumentation.	Yes	
2.4	Turbine exhaust system including 30 meter high Stack/Chimney and complete with exhaust collector,	Yes	

SECTION-A: ROTATING EQUIPMENT

Sl. No.	Description	Required (Yes/No)	Remarks
	exhaust silencer, expansion joints, flanged connections, transition pieces etc., as required along with necessary instrumentation.		
2.5	Fire suppression system for GT enclosure using Clean agent (i.e. CO ₂) complete with Clean Agent Cylinders etc.	Yes	
2.6	Portable trolley mounted Gas Turbine washing and cleaning system complete with reservoir, driver, interconnecting flexible hose piping (10 m each at each port), hose-storage-wheel, valves, motor cable of approximately 30 m length & plug to suit the area classification & necessary instrumentation & controls.	Yes	If required for the quoted Gas Turbine model
3.0	Fuel Gas conditioning system (Refer equipment data sheets and job specification for full details)		
3.1	Fuel Gas conditioning skid as per Clause no. 5.8 of 6-43-0041 Rev. 2 and Job Specification B240-910-80-42-SP-5010 attached with the inquiry document complete with the following	Yes	
	- Twin Knock-out Pots with Demister pads.	Yes	
	- Twin strainers.	Yes	
	- Twin filters	Yes	
	- Continuous flow transfer valves.	Yes	
	- Twin fuel gas super heater(s), (one working & one standby).	Yes	
	- All Instrument and Controls duly mounted including all necessary control valves, safety valves, Gas & heater skin temperature controls, temperature and pressure gauges, fuel piping upto skid etc.	Yes	
	- All Stainless steel interconnecting, Pre-fabricated piping/tubing for fuel gas line duly installed.	Yes	
3.2	All Stainless Steel supply piping/tubing between Fuel Gas conditioning skid and GT duly fabricated.	Yes	
3.3	All Stainless Steel Vent/Flare piping/tubing from Fuel Gas conditioning skid to safe height or flare header.	Yes	
3.4	Matching companion flanges, gaskets, fastners etc. at all terminating points requiring Owner's interface.	Yes	
4.0	Lube Oil System for Compressor, Gear Box and Gas Turbine (GT) (Refer equipment data sheets and job specification for full details)		
4.1	Lube oil Console complete with the following:		
	- Stainless Steel Oil reservoir	Yes	
	- Electric motor (AC) driven Main oil pump with external pressure relief valve.	Yes	Shaft driven pump is not allowed
	- Electric motor (AC) driven Standby oil pump with external pressure relief valve.	Yes	
	- Shaft Driven/Electric motor (AC) driven main Hydraulic Oil Pump with external pressure relief valve.	Yes	
	- Electric motor (AC) driven Standby Hydraulic Oil Pump with external pressure relief valve.	Yes	

SECTION-A: ROTATING EQUIPMENT

Sl. No.	Description	Required (Yes/No)	Remarks
	- Electric motor (DC) driven Emergency-oil pump for equipment cool-off.	Yes	
	- Twin Oil-filters.	Yes	
	- Continuous flow transfer valves.	Yes	
	- All instruments & controls duly mounted.	Yes	
	- Skid mounted Local Gauge Board with all instruments mounted on it.	Yes	
	- All Stainless Steel interconnecting, pre-fabricated piping/tubing duly installed	Yes	
4.2	Oil cooler (Air cooled type) with adequate number of fans with 100% spare capacity, complete with interconnecting piping between Oil Cooler and the Oil Console.	Yes	
4.3	Emergency overhead Lube oil run down tank (sized for equipment coast down) along with all necessary piping, instrumentation and controls.	Yes	
4.4	All Stainless Steel supply/return piping/tubing between lube oil console and Compressor/Gear Unit/GT.	Yes	
4.5	Matching companion flanges, gaskets, fasteners etc at all terminating points requiring Owner's interface/tie-in points.	Yes	
4.6	Necessary Instrumentation and Controls.	Yes	
4.7	Gas generator Lube Oil system as recommended by GT manufacturer.	Yes	If separate system is recommended by Gas Turbine manufacturer
4.8	One no. Portable trolley mounted emptying/Fill oil Pump for Lube Oil reservoir complete with Driver, flexible hose piping (10 m each at suction & discharge), hose-storage-wheel, valves, motor cable of approximately 30 m length & plug to suit the area classification.	Yes	
4.9	One no. Portable trolley mounted oil purifier complete with flexible hose piping (10 m each at suction & discharge), hose-storage-wheel, valves, motor cable of approximately 30 m length & plug to suit the area classification & necessary instrumentation and controls.	Yes	
5.0	Buffer Gas Supply System for Dry Gas Seals (Refer equipment data sheets and job specification for full details)		
5.1	Buffer Gas Skid complete with the following:	Yes	
	- All instruments & controls duly mounted	Yes	
	- All Stainless Steel interconnecting, pre-fabricated piping duly installed	Yes	
5.2	Seal Gas Booster	Yes	If required for the seal gas conditions
5.3	All Stainless Steel supply piping/tubing between buffer gas skid & compressor	Yes	
5.4	All Stainless Steel vent/flare piping/tubing from compressor to safe height/flare header.	Yes	
5.5	Matching companion flanges, gaskets, fasteners etc. at all terminating points requiring Owner's interface.	Yes	
5.6	Provision of automatic change-over from normal to emergency Seal gas supply along with all the necessary	Yes	

SECTION-A: ROTATING EQUIPMENT

Sl. No.	Description	Required (Yes/No)	Remarks
	instrumentation and controls. <i>Note: During start-up/Emergency external Seal Gas shall be made available by the Purchaser at the Vendor's battery limit for further distribution by vendor. Start-up/Emergency Seal gas Details are as given in Compressor datasheet.</i>		
6.0	Pressure Vessels and associated systems <i>(Refer equipment data sheets and job specification for full details)</i>		
6.1	Process Vessels	No	
6.2	Other vessels forming part of Auxilliary systems	Yes	
7.0	Heat Exchangers and Associated systems <i>(Refer equipment data sheets and job specification for full details)</i>		
7.1	Heat Exchangers forming part of Auxilliary systems (i.e. Air-Cooled Oil cooler same as Sl. No. 4.2 above).	Yes	Air-cooled heat exchangers
8.0	Piping <i>(Refer piping specification, PMS for details)</i>		
8.1	Permanent type Process Gas Suction Strainers at inlet of compressor along with spool piece(s).	Yes	
8.2	Temporary Process Gas Suction strainer for the commissioning of the Compressor package.	Yes	
8.3	Complete interconnecting piping within and between various skids (i.e. main equipment skid and various auxiliary skids such as L.O. Console Skid, Buffer Gas Skid and Fuel Gas conditioning Skid etc.)	Yes	
8.4	Complete inter-connecting piping from and/or to Purchaser's battery limit including Vent, Flare, Drain, Utility piping (i.e. Inst. Air, Plant Air, Inert Gas etc.)	Yes	
8.5	All other items as per Piping scope of supply in Section-D	Yes	
9.0	Electrical Equipment <i>(Refer electrical data sheet & specs. for full details)</i>		
9.1	All items as per Electrical scope of supply in Section-B	Yes	
10.0	Instrumentation and controls <i>(Refer also Eqpt. And instrumentation datasheets, related to specifications & P&IDs for full details)</i>		
10.1	All items as per Instrumentation scope of supply in Section-C	Yes	
11.0	Spares and Special Tools & Tackles Spares for the compressor package including Mechanical, Electrical, Instrumentation etc:		
11.1	Mandatory spares, as specified in Doc. No. B240-910-80-42-SL-5010	Yes	
12.1	Commissioning spares as recommended by the equipment manufacturer	Yes	
11.2	Quotation for vendor recommended spares for 2 year normal operation.	Yes	Including Mech./Elect./inst. Spares
11.3	Special tools and tackles required, if any, for erection, site assembly and maintenance of each equipment of compressor package as recommended by the equipment manufacturer including Hydraulic tightening device with	Yes	

SECTION-A: ROTATING EQUIPMENT

Sl. No.	Description	Required (Yes/No)	Remarks
	low pressure and high pressure Pumps if required & GT manufacturer's recommended special tools including also Boroscope & Alignment tools. Also, refer Clause no. 13.3 of Job Specification for Centrifugal Compressor (Doc. No. B240-910-80-42-SP-5010) for Special tools and tackles to be mandatorily supplied.		
11.4	Spreader Bars/Slings/Shackles for lift of GTC skid for transportation/erection	Yes	
11.5	Torque Wrenches/Bolt Tensioners	Yes	
12.0	Inspection & testing:		
12.1	Shop inspection and Testing:		
	• Mechanical Run Test for Compressor with Main Rotor as per API Std. 617 & EIL Standard Spec. 6-42-0005 at Compressor manufacturer's works.	Yes	
	• Mechanical Run Test for Compressor with Spare Rotor as per API Std. 617 & EIL Standard Spec. 6-42-0005 at Compressor manufacturer's works.	Yes	
	• Performance Test for Compressor (with main rotor) as per Type 2 ASME Code PTC-10 at Compressor Manufacturer's works.	Yes	
	• Mechanical run test for the Gas Turbine with main rotor (Industrial type GT) / Gas generator (Aero-derivative type GT) as per API Std. 616, PTC 22 & EIL Standard Spec. 6-43-0041 at Gas Turbine Manufacturer's works.	Yes	
	• Mechanical run test for the Gas Turbine with spare rotor (Industrial type GT) / Gas generator (Aero-derivative type GT) as per API Std. 616, PTC 22 & EIL Standard Spec. 6-43-0041 at Gas Turbine Manufacturer's works.	Yes	
	• Performance Test for Gas Turbine main rotor (Industrial type GT) / Gas generator (Aero-derivative type GT) as per API Std. 616 and EIL Standard Spec. 6-43-0041 at Gas Turbine Manufacturer's works.	Yes	
12.2	Field trial run test for 72 hours at site	Yes	During commissioning of GTC package
12.3	Site performance test of GTC package (Optional price to be quoted)	Yes	During plant performance guarantee test
12.4	Other Shop inspection and Testing for all items under vendor's scope of supply, as specified in the inquiry document.	Yes	
13.0	Vendor Data & Drawings		
13.1	The Proposed layout(s) enclosed with the inquiry document indicates tentative equipment layout. Bidder shall confirm that the Proposed equipment package is	Yes	

SECTION-A: ROTATING EQUIPMENT

Sl. No.	Description	Required (Yes/No)	Remarks
	accommodated within the space allocated for the specified units. Bidder in his proposal shall include in his proposal suggested detailed equipment layout indicating main equipment as well as auxiliary equipment various consoles, local panels/local gauge board etc. along with their dimensions and levels at which the same are to be placed. The Bidder shall also indicate weights of equipment, maintenance space required, crane capacity (recommended) and crane hook approach from the grade level etc. The data/information shall be adequate for designing of the Compressor house (Shelter). General Arrangement Drawing(GAD)/Equipment layout of all equipment located inside compressor house including main equipment, auxiliaries heat exchangers and routing of piping etc. <i>(based on the indicative layout drawing provided in the inquiry)</i> shall be provided by the vendor along with the proposal.		
13.2	Detailed manufacturing, installation drawings & bill of material for self supporting exhaust steel stack with suitable ladder/ staircase for maintenance of the same & with connections/tappings for measuring emission levels.	Yes	Exhaust stack supply by Bidder. Assembly & Installation by others
13.3	Detailed fabrication, installation drawings & bill of materials for structural supports, access/maintenance platforms, ladders for of the following : - Inlet Air filters & Inlet Air Ducting - Ventilation Fans & Ventilation Air Ducting - Lube Oil Run Down Tanks - Exhaust Stack/Chimney	Yes	Fabrication, Supply, Installation of supports, platform and ladders by others
13.4	All data & drawings as required per Vendor data requirements, data sheets, specifications and referenced codes and standards.	Yes	
14.0	Erection & Commissioning		
14.1	Supervision of Erection for Compressor package	Yes	Quote per diem rates
14.2	Supervision of Commissioning for Compressor package	Yes	Quote per diem rates
15.0	Miscellaneous		
15.1	All Foundation/Anchor Bolts for the complete scope of supply of GTC package	Yes	To be supplied for all skids/chimney/supports
15.2	Chemical Cleaning, Pickling, Passivation etc. of vendor Supplied piping	Yes	
15.3	Surface Cleaning, environment primer etc. of all Pressure vessels & Heat Exchangers.	Yes	
15.4	Painting, Preparation of Shipment and export quality packaging	Yes	
15.5	Customer Training (15 no. of persons x 02 Weeks=30 man weeks) at Gas Turbine and Compressor Works and at Site.	Yes	
15.6	Participation of Purchaser's personnel during assembly	Yes	

SECTION-A: ROTATING EQUIPMENT

Sl. No.	Description	Required (Yes/No)	Remarks
	and other important activities (no. of Persons x days)		
15.7	All other items as per P&IDs and specifications.	Yes	
15.8	Additional items (including mechanical, electrical and instrumentation and controls) not specified by Purchaser but recommended by vendor for safe, smooth and efficient operation of complete Compressor Train.(Vendor to include separate list of such items in his proposal along with their unit prices)	Yes	

SECTION-B: ELECTRICAL

1.	Electrical Equipment	Required (Yes/No)	
1.1.	All MV motors IE2 efficiency class minimum (AC/DC Ex d)/ heaters (Ex d) as required for the auxiliary drives.	Yes	
1.2.	415V GTMCCs for feeding all the loads of package equipment envisaged at substation1.	Yes	
1.3.	VFD system if required (including input and output transformers, as applicable)	Yes	
1.4.	Local control station/ local control panel for local operation of motors with Start, Stop push buttons, ammeter etc. It shall also contain other devices like selector switches, indications, etc as per operational/ process requirements. (Separate local control station (LCS) shall be provided for motors/ heaters located away from LCP)	Yes	
1.5.	Earthing for bidder supplied equipments within the skid and Earthing terminals for connection to main plant earth grid to be provided on Motor/Skid.	Yes	
1.6.	Cabling for skid mounted equipment including supply and termination within the skid.	Yes	
1.7.	Cable trays withing the skid	Yes	
1.8.	Cable accessories / installation materials such as flameproof double compression cable glands, cable lugs etc., and all other associated accessories and hardware for all bidder supplied equipment.	Yes	
1.9.	Lighting of turbine enclosure and other skid mounted equipment.	Yes	
1.10.	Testing and commissioning of VFDs at site is included in vendor's scope & this work shall be executed/ carried out by VFD manufacturer, i.e. OEM only. Vendor shall certify readiness of system fit for commissioning. Vendor's scope shall also include supply of all specialised tools & tackles/ instruments and commissioning spares required for above service.	Yes	
1.11.	Heat tracing for Fuel Gas conditioning skid if required.	Yes	
1.12.	UPS	No	Existing UPS 110V shall be utilised. Refer Instt part of MR.
1.13.	Battery(Ni-Cd), Battery Charger, DCDB, DC Motor starter panel and cell booster to cater instrumentation loads (If		

	recommended by vendor.)		
1.14.	Battery, Battery Charger, DCDB, DC Motor starter panel and cell booster to cater load of Emergency Lube oil pump (As required and Emergency lighting of Turbine enclosure.	Yes	
1.15.	Electrics for any other equipment / items as specified elsewhere in the MR.	Yes	
1.16.	Heat Tracing within the battery limits (If applicable)	Yes	
1.17.	Special cables	Yes	
1.18.	All other electrical equipment, materials and work not explicitly mentioned but nevertheless required to fulfil the requirements shall be deemed to be included in the scope of the contractor with no additional cost and time implication to the owner/ EIL.	Yes	
1.19.	FLP Junction box (Ex-d) suitable for Gas group IIA/IIB, Temperature class: T3. If required in case of problem in termination of power cables	Yes	
1.20.	CCoE/PESO approval, Type test certificates, BIS Licence (applicable only for all Indigenous FLP items) for all bidder supplied equipment.	Yes	
1.21.	All data & drawings as required per Vendor data requirements, data sheets, specifications and referenced codes and standards.	Yes	
1.22.	Incoming 415V feeders for GTMCC	No	
1.23.	General Lighting within the compressor shed.	No	
1.24.	All power and control cables (other than cables within the skid);	No	
1.25.	Cable trays and accessories outside the skid	No	

SECTION-C: INSTRUMENTATION

S.No.	DESCRIPTION	Bidder	Purchaser
1.0	Scope of Design & Engineering		
1.1	Design and detailed engineering including residual engineering (note-1) of instrumentation & controls of Gas turbine driven Centrifugal Compressor based on P&ID's and other technical requirements described in various documents attached with this MR. This shall include detailed engineering including preparation of engineering drawings/ documents, specification data sheets, sizing, selection of materials, review of vendor drawings / documents for all supply items and preparation of engineering drawings/ documents for UCP and PLC.	Yes	
1.1.1	All type of field instruments identified and marked as "*" on P&ID's on process gas suction & discharge, starting gas, fuel gas, seal gas, gas recycle and vent gas lines such as pressure, Flow(DP), temperature, differential pressure, temperature transmitters, pressure & temperature gauges, temperature elements and thermowells, all types of control valves & shutdown valves with accessories, pressure relief valves, anti surge control valves, suction flow elements, gas detectors etc. and any other instruments including skid mounted instruments, local gauge board mounted instruments, control panel mounted Instruments required to complete the job in all respect.	Yes	
1.1.2	Unit control panel with Programmable Logic Controller based control system to be located existing control room, for entire Gas turbine driven centrifugal	Yes	

S.No.	DESCRIPTION	Bidder	Purchaser
	compressor and associated auxiliaries and station control system as per P&ID's.		
1.1.3	All skid mounted instruments related to compressor package including Turbine, compressor, seal gas system, fuel gas system, starting gas systems, air intake system, gas after coolers, lube oil system and auxiliaries etc.	Yes	
1.1.4	All controls for entire gas turbine compressor train including process gas suction & discharge, starting gas, fuel gas conditioning skid with metering system , seal gas, gas recycle and vent gas lines instruments to be executed in dedicated PLC based control system of the compressor .	Yes	
1.1.5	Local Gauge boards	Yes	
1.1.6	Antisurge controllers, Performance/Master controller and load sharing controller (if required)	Yes	
1.1.7	Vibration, temperature and Displacement monitoring system including monitors.	Yes	
1.1.8	Integration of Compressor control systems with existing DCS/PLC systems.	Yes	
2.0	Scope of procurement/ supply		
2.1	Supply of all items related to instrumentation & control system of Gas turbine driven centrifugal compressor and other station facilities as indicated in P&IDs and technical documents attached elsewhere in MR. The scope of supply shall include but not limited to following:		
2.1.1	All field mounted instruments including pressure, Flow(DP), temperature, differential pressure, temperature transmitters, temperature elements & thermowells, pressure & temperature gauges, all types of control valves & shutdown valves with accessories, pressure relief valves, anti surge control valves, suction flow elements, gas detectors etc. as marked “*” Gas turbine driven centrifugal compressor vendor scope and other station facilities as per P&ID's and compressor data sheets attached elsewhere in this MR and any other instruments required to complete the job in all respect.	Yes	
2.1.2	All controls system instruments for entire Gas turbine driven centrifugal compressor including process gas suction & discharge, starting gas, fuel gas, seal gas, gas recycle and associated other facilities. All instruments to be executed in dedicated PLC based control system		
2.1.3	Supply of Unit Control Panels for compressor and gas turbine controls and monitoring, including anti-surge, performance / master controllers, load sharing controller (if required) and panel mounted operator console (HMI) etc. These shall be located in control room.	Yes	
2.1.4	One no. HMI (Desk top PC with 21” TFT monitors) mounted in control room for control, monitoring and configuration of Integrated gas turbine compressor control system including all subsystems such as vibration, temperature, displacement, anti surge, performance / master controls. The HMI shall have	Yes	

S.No.	DESCRIPTION	Bidder	Purchaser
	operator cum engineering functionality with engineering facility password protected.		
2.1.5	One no Lap top computer with all necessary hardware and software and anti virus software for programming configuration of bidder supplied control system.	Yes	
2.1.6	Supply of AC and DC power supply distribution cabinets as required for as required for Centrifugal Compressor control systems, PLC, vibration monitoring system etc. in the control room and field instruments in the field.	Yes	
2.1.7	Local gauge boards with all instruments and accessories, duly mounted on them, if any.	Yes	
2.1.8	Any other skid mounted (Lube Oil System, dry gas seal system etc.) or panel mounted instruments required to complete the job in all respect for satisfactory operation of Compressor and Ancillary systems.	Yes	
2.1.9	Vibration, Temperature & Displacement Monitoring system including monitors.		
2.1.9.1	Vibration, axial displacement, key phaser and temperature probes etc as per compressor data sheets attached elsewhere in this MR.	Yes	
2.1.9.2	UCP mounted Monitors/ racks located in control Room. Vibration and temperature points shall also be configured in HMI including direct and GAP voltages and temperature indications.	Yes	
2.1.9.3	Panel/ cabinet for monitors/ rack in control room including terminals, barriers, I/O cards, and dual redundant power supplies etc., duly mounted on panel / cabinet.	Yes	
2.1.10	Antisurge controllers for compressor along with a dedicated Performance / master Controller, load sharing controller (if required) including terminals, barriers, I/O cards, and dual redundant power supplies etc., duly mounted & prewired in a Unit control panel located in control Room.	Yes	
2.1.11	Programmable Logic Controller (PLC) with dual redundant processor, communication and power supply and single I/O as per PLC data sheet no B240-910-YE-DS-5010 attached with this MR.	Yes	
2.1.12	Supply of Fire and Gas detectors including Detectors & Transmitters for Gas turbine enclosure. Fire and gas detection system shall be configured in the Centrifugal Compressor system PLC. On line data shall be displayed on HMI showing approximate locations of sensors	Yes	
2.1.13	Alarms, signals & power Junction boxes for following:		
2.1.13.1	For interconnection between skid mounted instruments in field and UCP in control room	Yes	
2.1.13.2	For interconnection between instruments supplied loose in field to be located on process gas compressor suction & discharge piping, Knock out drums, fuel gas /startup gas lines, gas vent lines, recycle gas lines as shown in P&ID and marked as "*" to Control Room and other associated facilities.		Yes
2.1.14	Cables (signal, alarm, thermocouple extension, RTD,	Yes	

S.No.	DESCRIPTION	Bidder	Purchaser
	power supply, serial communication) for following: (Note - 2)		
2.1.14.1	Between field instruments and skid mounted junction boxes	Yes	
2.1.14.2	Multi-pair cables between junction boxes and UCP in control room [6P or 12P 1.5mm ² , For RTD and Gas detectors 8T(1.5mm ²) cable to be used].Distance between field and control room to be considered as 500m approximately.	Yes	
2.1.14.3	Between field mounted sensors of vibration & temperature, displacement, key phasor monitoring system and monitors/ racks located in control room	Yes	
2.1.14.4	All system cables between various systems such as vibration & temperature monitoring system, antisurge controllers, performance/master controllers and UCP PLC and HMI.	Yes	
2.1.14.5	Special cable between speed sensor in field and Turbine Speed Controller in UCP in control room	Yes	
2.1.14.6	Any other special cables from field to UCP in existing control room for compressor control system.	Yes	
2.1.14.7	All Interconnection cables between instruments supplied loose in field to be located on process gas compressor suction & discharge piping, fuel gas /startup gas lines, gas vent lines, recycle gas lines as shown in P&ID and marked as “*” to Control Room		Yes
2.1.15	Installation & Erection Materials:		
2.1.15.1	All installation and erection materials such as impulse tubes, pipes, valves, fittings, manifolds etc. for installation of all bidder supplied instruments and junction boxes (on skid instruments and other off skid instruments) as per approved installation standards.	Yes	
2.1.15.2	Instrument stanchions, supports and all types of consumables and accessories for mounting all bidder supplied instruments and accessories, gauge boards etc.	Yes	
2.1.15.3	Cable glands, and PVC sleeves (cable shrouds) for different types of cables	Yes	
2.1.15.4	Cable trays along with supports from instruments to junction box for skid mounted instruments	Yes	
2.1.15.5	GI/ copper earthing strip & earthing cables for earthing of all instrumentation items including junction boxes, field instruments, etc.	Yes	
2.1.15.6	Supply & installation of all cable trays and accessories for routing the cables with the GTC skid.	Yes	
2.1.15.7	All piping and pipe fittings, tubes and tube fittings for instrument air supply distribution for instruments supplied by Bidder.	Yes	
2.1.15.8	Insulation and painting of instruments and impulse lines, as applicable, in line with insulation and painting specifications attached elsewhere in MR.	Yes	
2.1.15.9	Installation material for junction boxes and power distribution boards.	Yes	
2.1.15.10	Any other installation material required for installation and commissioning of various instruments and systems supplied by Bidder.	Yes	

S.No.	DESCRIPTION	Bidder	Purchaser
2.1.16	Start-up and Commissioning spares	Yes	
2.1.17	Mandatory spares	Yes	
2.1.18	Supply of drawings and documents as listed in Vendor Data Requirement	Yes	
2.1.19	Any special tools or tackles for instrumentation	Yes	
2.1.20	Any additional instrument required in the opinion of bidder for meeting functional requirements, safe and efficient operation, which are not listed specifically in this document.	Yes	
2.1.21	One heavy-duty dot matrix type printer as per PLC data sheets as alarm cum log printer shall be supplied. And one no. laser jet colour printer A3 size shall be supplied.	Yes	
3.0	Factory testing & calibration		
3.1	Carrying out/ witnessing shop testing and calibration of all instruments and system oriented items as per approved Inspection Test Plan / FAT procedure.	Yes	Yes
4.0	Installation, field calibration/ testing and commissioning		
4.1	Installation of all instruments, junction boxes, and accessories and auxiliary systems (e.g. lube oil) on equipment skid.	Yes	
4.2	Installation of loose supply instruments on gas compressor process lines.		Yes
4.3	UCP in control room		Yes
4.4	HMI's in control room		Yes
4.5	Installation of local gauge board (mounted on bidder supplied skid)	Yes	
4.6	Laying & termination of all cables from bidder supplied instruments & junction boxes on skids to Bidder supplied UCP in control room.		Yes
4.7	Instrument air distribution for all bidder supplied instruments on skids	Yes	
4.8	Installation of all junction boxes and power distribution boards on skids.	Yes	
4.9	Supervision of installation, hookup, testing and commissioning of various instruments, local gauge board, antisurge controllers, performance controller, turbine speed controller, vibration and temperature monitoring system etc. supplied by Bidder.	Yes	
5.0	Coordination		
5.1	Coordination with - Purchaser, - Purchaser's Plant Control Station - Purchaser's station PLC contractor for loop checking, field testing of all items, calibration of all instruments for successful commissioning of the compressor package.	Yes	
6.0	Insulation and painting of instruments and impulse lines, as applicable, in line with insulation and painting specifications.	Yes	
Notes:			

S.No.	DESCRIPTION	Bidder	Purchaser
1.	Residual engineering includes instrument sizing, Thermowell Wake frequency calculation, utility consumption, specifying derived data in process data sheets, type and material selection of instruments wherever required. Residual engineering shall also include actual transfer/ implementation of the information provided in the form of notes in P&ID and instrument data sheets/ equipment data sheets and other documents provided in MR. Bidder to note that turbine control systems indicated in P&ID attached is indicative. Bidder shall develop the P&ID considering monitoring and controls from UCP PLC and its HMI and interface with Purchaser's Plant Control Station .		
2.	Approximate cable routing distance between skid in field and Unit control panel located in existing Control room shall be considered as 500 meters for all interconnecting cable estimate as part of base quote of the Package. However bidder shall calculate the exact cable laying distance as per indicative		
3.	Instruments not mounted on skid but to be located on process gas compressor suction & discharge piping, fuel gas /startup gas lines, gas vent lines, recycle gas lines shall be supplied loose along with all required installation materials as per approved installation standards finalized during detailed engineering.		
4.	Installation & cabling between bidders supplied off skid loose instruments including supply of cables, junction boxes, cable glands, trays etc shall be by purchaser.		
5.	EIL/Owner shall witness testing of any or all items at various stages during manufacture and/or final stage before shipment as per approved Inspection Test Plan. All system oriented items like Integrated Compressor & Turbine Control system, Anti Surge controllers, Vibration and Temperature Monitoring System, F&G system, performance/master controllers etc. shall undergo factory testing and integrated factory acceptance test. Testing shall be carried out as per approved procedure. No such item shall leave manufacturer's works without factory acceptance test.		
6.	For instruments and accessories outside skid, supervision of installation, erection & commissioning shall be in bidder's scope, on per diem basis.		
7.	All bidder supplied instruments and junction boxes on various skids of package shall be pre-installed including cabling & termination within the machine skid.		
8.	Bidder shall provide required assistance to Purchaser's instrumentation contractor during loop checking of all Compressor instruments (mounted within skid or outside skid).		
9.	Any activity specifically not listed in this document, does not absolve the vendor of their responsibility to include such activities in their scope of work, which otherwise is necessary, to complete instrumentation work for compressor.		
10.	All such activities shall be carried out by the vendor without any implication. Instrument Job Specification shall be read in conjunction with scope of work.		
11.	Any items not covered in this section, which form part of the vendor's standard package and are required for ease of operation, control safety and interlock requirement shall be supplied by Bidder without any implication.		
12.	In case compressor and turbine vendors are two different vendors then also all the engineering and engineering drawings/documents shall be prepared by the sole bidder for entire control system of turbine and compressor and also other system as per this requisition.		

S.No.	DESCRIPTION	Bidder	Purchaser
13.	Following are excluded from bidder scope of work: - Installation of bidder supplied off skid loose instruments & junction boxes. - Laying & termination of single pair cables supplied by the bidder, from bidder supplied loose instruments to the bidder supplied junction boxes (if any). - Laying & termination of the single pair., multi-pair cables & special cables, supplied by the bidder, from machine skid junction boxes to respective control room. - Installation of all bidder supplied Unit control panels / cabinets in control rooms. - Laying & termination of all interconnecting cables including power supply cables between bidders supplied unit control cabinets / panels with in the control room. - These activities will be carried out by purchaser's field erection contractor and compressor package vendor shall coordinate with purchaser's field erection contractor and provide them necessary specifications, data, documents and drawings and any other information & assistance required for the above activities to complete the job within the agreed time schedule. Further bidder shall be fully responsible for proper commissioning of the package along with all associated instruments and control systems.		

SECTION-D: PIPING

BIDDER shall supply all Materials as per scope of work. The procurement and supply of all materials required shall be strictly in accordance with the requirements of P&ID's and PMS (B240-000-83-41-SP-0001) enclosed with the PR document. As a minimum, the following materials shall be supplied by BIDDER:-

- (i) All Piping materials (Pipes, fittings, flanges, valves, nuts, bolts, gaskets) for all systems mentioned in clause 2.1 & P & IDs.
- (ii) All companion flanges (including bolts, nuts, gaskets & adequate no. of Spare gaskets) at Battery Limits for process piping at all inlet/outlet connections of GTC Skids and Fuel Gas Conditioning Skid.
- (iii) Valves as indicated in P & IDs.
- (iv) Strainers for Compressor & Fuel Gas Skid; including mating Flanges (with Nuts, Bolts, Gaskets & adequate no. of Spare gaskets).
- (v) All Carbon Steel Ball valves (size 2" & above) shall be supplied as per Standard Specification for Pipeline Ball Valves (6-71-0014) and data sheets. All other valves shall be supplied as per Technical Notes for Valves (6-44-0052).
- (vi) All supporting material for all Piping (including vents) in Bidder's scope of supply.