

GENERAL SPECIFICATION

ROTATING MACHINERY

GS EP MEC 261

Packaged Reciprocating Compressors for Oil and Gas Production Services According to ISO 13631

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1. Scope

This specification clarifies how to use the recommendations of [ISO 13631](#) for the supply to Company of Packaged Reciprocating gas Compressors.

The purpose of this specification is to clarify the requirements of [ISO 13631](#) first edition, July 2002.

Technical proposal shall be supported by the data sheets DS EP MEC 262 included in Appendix 1.

This document modifies or complements some requirements of [ISO 13631](#), when deemed necessary considering Company experience.

The paragraph numbering is identified in the same way as in [ISO 13631](#).

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
1999/92/EEC (ATEX 118¹/ATEX 137²)	European Directive 1999/92/EEC (16/12/99) on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres
94/9/EC (ATEX 100a¹/ATEX 95²)	European Directive 94/9/EC (23/03/94) on the approximation of the laws of the Member State concerning equipment and protective systems intended for use in potentially explosive atmosphere
API Std 618	Reciprocating Compressors for Petroleum, Chemical, and Gas Industry Services
ISO 13631	Petroleum and natural gas industries - Packaged reciprocating gas compressors

¹ Reference to Articles 100/118 of the Treaty of Rome

² Reference to Articles 95/137 of the Treaty of Amsterdam

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Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

Reference	Title
GS EP COR 170	Materials for Sour Service (Upstream Applications). Specification for design
GS EP ECP 103	Process sizing criteria
GS EP INS 110	Instrumentation for package units
GS EP INS 900	Instrument hook-up diagrams
GS EP MEC 032	Rotating Machine Package Specification - Gas Engine or Electrical Motor driven Reciprocating Compressor
GS EP MEC 101	Driver Power Sizing
GS EP MEC 240	Special Purpose Couplings for Petroleum, Chemical, and Gas Industry Services according to API Standard 671
GS EP MEC 300	Noise and Vibration of Rotating Machine Packages
GS EP PVV 411	Shell and tube heat exchangers
GS EP PVV 412	Plate and frame heat exchanger
GS EP PVV 415	Design and fabrication of air cooler
GS EP STR 103	Design and fabrication of skids and equipment supporting structures

3. Comments to **ISO 13631- 1st Ed.**

ISO	GS
Introduction	
A bullet (●) at the beginning of a subclause or paragraph indicates that either a decision is required or further information is to be provided by the purchaser. This information should be indicated on the data sheets (see annex A).	Refer to Appendix 1 for data sheet template.
2. Normative references	
The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.	The standards, codes and specifications as listed in the Project requisition with their revision shall be those applicable.
3. Terms and definitions	
3.2 Combined rod load	
Algebraic sum of gas load and inertia force on the crosshead pin.	(Clarification) Combined rod load shall be determined for each compression stage with the piston speeds and expected internal pressures (taking into account the valve pressure drops) corresponding to: • The specified operating conditions • The maximum differential pressure which would be obtained if the compression stage suction pressure was at the minimum specified value and the compression stage discharge pressure was equal to the pressure safety valve setting.
3.11 Rated power	
(of the compressor) maximum power required of the compressor plus any shaft-driven	(Clarification) The Vendor shall clarify the expected values of pressure drop or power

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appurtenances for any of the specified operating conditions. Note: The rated power includes the effect of equipment such as pulsation suppression devices, process piping, intercoolers and separators. Driver and transmission losses are not included in the rated power of the compressor. Losses incurred in outboard bearings (e.g. as used to support large flywheels) are included.	requirement of the various elements of his supply (for information). The determination of rated power shall include any necessary margin associated with the expected values.
4. Statutory requirements	
The purchaser shall specify any applicable regulations. The purchaser and the vendor shall mutually determine the measures to be taken to comply with those regulations that are applicable to the equipment.	Codes and regulations that shall apply are listed in the Project Requisition, including ATEX rule requirements. The Vendor shall provide with his proposal a list of comments and exceptions to applicable codes, regulations and specifications.
5. General package requirements	
5.1 Compressor package performance curves	
If specified, the compressor package performance curves shall cover the range of operating conditions indicated by the purchaser. Any limitations such as rod load, available driver power, additional clearance required to meet the range of operating conditions, etc., shall be marked on the performance curves.	The Vendor shall provide performance curves or tables and shall assume complete responsibility for design, engineering and manufacture of the unit in such a way as to provide the guaranteed capabilities in industrial service. This responsibility also extends to the specification of the parts and accessories sub-contracted by the Vendor. Curves of compressor resisting torque and curve of driver starting torque versus speed in the specified starting conditions shall be supplied. Calculation of time for acceleration to full speed shall take into account necessary allowance over the expected parameters.
5.3 Drawings	
The vendor shall furnish plan and elevation drawings. Pre-fabrication approval or additional drawings may be specified by the purchaser.	Refer to Project Contract for details.

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5.4 Sound pressure level	
Control of the sound pressure level of all equipment furnished shall be the joint effort of the purchaser and the vendor. If specified, the equipment furnished by the vendor shall not exceed the maximum allowable sound pressure level required by the purchaser.	Refer to Project specification.
5.5 Electrical area classification	
Motors, electrical components and electrical installations shall be suitable the area classification (zone) specified by the purchaser, shall meet the requirements of IEC 60079 and other standards specified by the purchaser and shall comply with all applicable local codes and regulations.	Refer to Project specification.
5.6 Package installation	
The purchaser shall specify the site conditions (altitude, ambient temperature, etc.) and whether the installation is indoors (heated or unheated) or outdoors (with or without a roof) and the weather or environmental conditions in which the equipment must operate (including maximum and minimum temperatures, unusual humidity or dust problems). The unit and its auxiliaries shall be suitable for operation in these specified conditions. Purchaser shall specify dimensional limitations, if any.	Refer to Project specification.
5.7 Torsional analysis	
The vendor shall provide a torsionally sound system and perform an analysis to demonstrate this. When specified, a torsional analysis report shall be provided, and the vendor shall be responsible to coordinate with the compressor and the prime-mover manufacturers to produce such a report.	This paragraph is applicable.

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6. Compressor	
6.1 General	
6.1.1 Manufacturer's rated capacity	
The compressor shall be sized to handle not less than the quoted capacity with the gas analysis, suction pressures, suction temperatures, discharge pressures and site conditions specified by the purchaser. The number of stages of compression shall accommodate pressure limitations and gas additions or withdrawals as specified. The package design shall also allow for all pressure drops through the scrubbers, pulsation bottles (if any), coolers and piping from the inlet flange to the outlet flange on the skid.	Refer to Project specification data sheets. The specified operating points shall be understood "at limit of supply" and with no negative tolerance for flow and discharge pressure and no positive tolerance at suction pressure.
6.1.2 Performance calculations	
The vendor shall use the specified values of mass flowrate, the specified gas compositions to calculate average molar mass, ratio of specific heats (C_p/C_v), compressibility factors (Z) and inlet volume flowrate. The compressor vendor shall indicate his values on the data sheets with the proposal and use them to calculate performance data.	Refer to Project specification data sheets. In addition, the Vendor shall also calculate the isentropic compression coefficient and indicate the gas state equations used for determination of gas parameters. The Vendor may be required to use gas parameter values calculated by Company.
6.1.3 Compressor size	
If specified, the compressor shall be furnished with cylinders which, when operating at the specified operating condition(s), shall, as far as practical, load the gas engine to the limit specified in 8.2.1 or electric motor to the limit specified in 8.3.2. Note: Compressors driven by induction motors shall be sized at the motor operating speed.	This paragraph shall apply but within the limits indicated in GS EP MEC 101 .
6.2 Maximum allowable speeds	
The maximum allowable average piston speed (in meters per second) and the maximum allowable speed (in revolutions per minute) may be specified by the purchaser	The compressor average piston speed shall not exceed 5.5 m/s for lubricated cylinders or 3 m/s for non-lubricated cylinders.

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where experience indicates that specified limits should not be exceeded for a given service.	
6.3 Maximum allowable discharge temperature	
Unless otherwise specified or agreed, the maximum predicted discharge temperature shall not exceed 135°C. This limit applies to all specified operating and load conditions. If specified, the vendor the purchaser with both the predicted and adiabatic discharge temperature. Note: The actual discharge temperature will vary from the adiabatic depending on such factors as the power input to a cylinder, the ratio of compression, the size of the cylinder, the surface area of the cooling passages and the velocity of the coolant.	For PTFE rings, packing rings and valve discs, discharge temperature shall not exceed 135°C. For PEEK rings, packing rings and valve discs, discharge temperature shall not exceed 160°C. The Vendor shall indicate calculated adiabatic discharge temperatures and actual discharge temperatures. On each compression stage discharge, control devices shall be installed to generate alarm and shutdown signals when the temperature rises above the maximum expected value (typically alarm for 20°C excess, shutdown for 25°C excess).
6.4 Rod loads	
6.4.1 Allowable rod loads	
	Rod-load and gas-load charts shall be furnished for the worst (including no load) specified operating conditions and in case of operation of one cylinder against safety valve setting discharge pressure.
6.5 Compressor cylinders	
6.5.1 General	
	(Addition) Tandem cylinder arrangement shall be avoided.
6.5.2 Cylinder/crankcase appurtenance	
6.5.2.3 Bolting shall be furnished as specified in 6.5.2.3.1 through 6.5.2.3.4.	Nominal and maximum torque values for all studs and bolting shall be included in the Vendor's documentation.
6.5.3 Cylinder connections	
6.5.3.2 If specified, each cylinder shall be provided with a DN 12 (½ in) indicator tap at each end.	This paragraph is applicable.

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6.7 Pistons, piston rods and piston rings	
6.7.3 Piston wear bands	
Non-metallic wear bands, if required by the manufacturer or specified by the purchaser, shall not overrun valve ports or counter-bores by more than one-half the axial width of the wear band.	This paragraph is applicable.
6.8 Crankcases, crankshafts, connecting rods, bearings and crossheads	
6.8.2 Bearings	
Main bearings shall be replaceable sleeve type or of the tapered or spherical roller type. Roller bearing selection shall be based on an L10 rating equivalent to 44,000 h or greater as defined in ISO 281 at rated compressor speed and maximum allowable continuous combined rod load. Cylindrical roller or ball-type bearings are unacceptable. Crank pin bearings shall be replaceable sleeve type.	Roller bearings are not allowed. Minimum bearing life for operation under specified conditions shall not be less than 24,000 hours for high speed compressors (RPM > 750) and 32,000 hours for other compressors. For sour services application, bearing shall not include copper alloys. In addition, balancing of the connecting rod bearings shall be performed On compressors with two or more connecting rods, the rotating and reciprocating masses shall be indicated on all connecting rod bearings: the differences in mass between each moving assembly (piston + rod + connecting rod + crosshead + bearings) shall be less than 200 g. A weight report shall be supplied. All components in the rodding line shall be identified and marked.
6.8.5 Crankcases	
If specified, the crankcase shall be provided with relief devices to protect against rapid pressure rises. These devices shall incorporate downward-directed apertures (away from the operator's face), a flame-arresting mechanism, and a rapid-closure device to minimize reverse flow. The total throat area of these devices should be not less than 70 mm² for each cubic decimeter of crankcase free volume.	This paragraph shall apply.

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6.9 Distance pieces	
6.9.1 Design	
● 6.9.1.1 Distance pieces shall conform to types 1, 2 or 3 as specified by the purchaser. Type 1 (short, close-coupled, without compartment) is used where it is desired to keep overall width of the compressor to a minimum. Type 2 (single compartment) is used when physical separation of the pressure and wiper packing is desired. Type 3 provides double compartments for varying degrees of purging when required	Refer to API Std 618 paragraph 6.12 and associated schematics, and Project specification data sheet. If there are no additional requirements set out in the Project specification, the minimum below shall apply: • Type C or D two compartment distance pieces shall be provided. • The distance piece adjacent to the cylinder shall be fitted with a vent connected to the flare or to the processing system, and a drain, also connected to the flare or to a sewer system. These connections shall be provided specifically according to the sewer system of the installation. • The distance piece adjacent to the casing shall be fitted with an air vent with no low point giving out into the open air in a safe area, and a drain to be connected to the hydrocarbon sewer or general sewer system. • Injection of Nitrogen with, where appropriate, extraction of Nitrogen and process gas mixture shall be provided.
● 6.9.1.2 If specified, Slinger rings shall be provided to types 2 or 3 distance pieces to prevent migration and mixing of oil between the crankcase and the compressor cylinders, in which case the respective compartment will be of the long type.	This paragraph shall apply.
6.9.2 Openings	
Openings of adequate size to permit servicing of the pressure packing case shall be provided and shall have bolted access covers, a bottom drain connection, and a top vent connection. See 11.17.1 for drain and vent specifications.	Access openings shall be fitted with gasketed solid metal covers, in case of toxic or flammable gas.

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6.10 Packing cases and pressure packings	
	(Addition) Methods of detection of pressure packing leakage shall be proposed as an option by the compressor vendor.
6.11 Compressor crankcase lubrication system	
	Compressor crankcase lubrication system shall be as per API Std 618 Appendix Figure G5.
6.11.3 Lubrication oil pumps	
6.11.3.2 For each unit having a nominal rating of more than 225 kW, the vendor shall provide a separate, independently driven auxiliary oil pump.	The auxiliary lubrication oil pump driver shall be sized for the pump power and the required starting torque at an oil viscosity corresponding to the lowest ambient temperature.
6.11.6 Oil Level control	
If cylinder lubrication oil is taken from the crankcase, then a compressor crankcase oil-level control device shall be furnished (See 6.12.2). If specified by the purchaser, the vendor shall furnish a storage tank with level gauge and compressor crankcase oil-level control device.	This paragraph shall apply.
6.11.7 Lubricating oil heater	
If specified by the purchaser, a lubricating oil heater shall be furnished by the vendor. When an internal heater is used, it shall be fully immersed even at minimum oil level and its surface heat flux shall not exceed 2 W/cm².	Based on specified minimum ambient conditions, the vendor shall determine if electric oil heaters are necessary and supply them accordingly. Compressor packages without a heater shall not have any operating limitation due to minimum ambient temperature.
6.12 Compressor cylinder lubrication	
6.12.1 Cylinder lubrication	
	Pump-to-point lubrication system shall be furnished for lubrication compressor cylinder ring travel bore and piston rod packing.

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6.12.2 Oil supply	
The force-feed lubrication system shall be complete with automatic oil replacement. The oil supply should be from a separate reservoir in preference to filtered oil from the compressor crankcase. A storage tank with level gauge shall be furnished if specified by the purchaser.	The separate oil reservoir shall be provided with a minimum capacity of 2 weeks consumption (cylinders and packing).
6.14.2 Couplings	
Flexible shaft couplings shall be non-lubricated, steel disc type, except when torsional analysis requires a torsionally soft coupling or for low-speed applications. Couplings shall be selected for the maximum continuous power rating of the prime mover plus the coupling manufacturer's standard service factor for reciprocating compressor applications. The material shall be suitable for the ambient conditions specified in 5.6. Flexible couplings shall comply with ISO 10441 or ISO 14691.	Flexible couplings shall comply with GS EP MEC 240.
7. Capacity control	
7.1 General	
The compressor capacity may be controlled on the basis of the suction pressure, discharge pressure, flow, or some combination of these parameters. The required capacity variation shall be specified by the purchaser. The control system may be mechanical, pneumatic, hydraulic, electric or any combination thereof. The purchaser shall specify the parameter to be used for control. If the control signal is from a source furnished by the purchaser, then the purchaser shall specify the source, sensitivity and range of the control signal to be utilized by the vendor.	Refer to Project specification data sheets. The Vendor shall clearly indicate with their proposal any limitation or particular procedures for partially or fully unloaded operation resulting from specified points, starting or stopping sequences.
7.2 Method of capacity control	
Capacity control can be obtained by speed variation, clearance variation, bypass, single acting of double acting compressor cylinders, valve unloaders, or any combination thereof.	Refer to Project specification data sheets.

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Control operation shall be either automatic with manual over-ride or manual as specified by the purchaser on the data sheets. Some of these methods may require unit shutdown and depressurizing to effect a change. The purchaser shall specify if such unit shutdowns are acceptable. If any of these methods are implemented by other than the compressor manufacturer, then they shall be approved by the compressor manufacturer.	
7.3 Speed variation	
If specified by the purchaser, capacity control can be achieved by prime mover speed variation.	Refer to Project specification data sheets.
7.4 Clearance variation	
7.4.2 Clearance pockets	
Clearance pockets may be specified by the purchaser and be either the fixed type (pocket clearance is fixed and the pocket is either open or closed) or the variable type (pocket clearance is variable over the range from fully open to closed). Variable-volume clearance pockets shall have a non-restricted vent line provided to vent the back side of the variable pocket piston to the suction port of the compressor cylinder, to the suction piping or to the vent system.	Refer to Project specification data sheets.
7.4.3 Valve spacers	
Valve spacers (high clearance assemblies or split valve yokes) used to raise the valve a pre-determined distance above the cylinder valve port may, if specified by the purchaser, be provided by the compressor manufacturer to meet an operating condition.	Refer to Project specification data sheets.
7.4.4 Clearance bottles	
If specified, clearance bottles for capacity control may be added to the compressor cylinder. They should be designed for the maximum allowable working pressure of the compressor cylinder and according to the specified applicable pressure vessel code.	Refer to Project specification data sheets.

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7.5 Bypass system	
7.5.2 Start-up bypass	
● If specified by the purchaser, a manually operated hot gas bypass (from the discharge of the final stage to the inlet side of the compressor with no cooling of the gas) shall be provided for start-up purpose. A hot-gas bypass shall not be utilized for capacity control.	Refer to Project specification data sheets.
7.5.3 Capacity control bypass	
● When specified by the purchaser, a manual or automatic cold gas bypass system (from downstream of the aftercooler or discharge separator, if furnished, back to the inlet separator) shall be furnished for capacity control.	Refer to Project specification data sheets.
7.6 Valve removal or unloading	
7.6.2 Valve unloaders	
Compressor cylinder capacity control can be accomplished with valve depressors or plug-type unloaders. Valve depressors, when used, shall be installed on all suction valves of the cylinder end involved.	Use of unloaders shall be subject to Company approval.
7.6.3 Automatic valve unloading	
● If specified, the vendor shall provide a system of properly sequenced unloader operation. Otherwise, a definition of acceptable operating configurations and sequences shall be supplied by the vendor. Pneumatically operated unloaders with no manual over-rides shall be piped by the vendor in such a manner that inadvertent non-sequenced operation shall not occur.	Refer to Project specification data sheets.
7.7 Suction pressure control	
● If specified by the purchaser, a suction pressure-reducing valve shall be used to limit the suction pressure to a set value in order to limit the load on the unit.	Refer to Project specification data sheets.

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8. Prime mover	
8.1 General	
The type of prime mover (gas engine or electric motor) shall be specified by the purchaser.	Refer to Project specification data sheets. When several operating conditions are specified, the Vendor shall determine the worst case (operation and starting) for sizing the driver accordingly. Load on driver in case of operation of a compression stage against safety valve setting discharge pressure shall be evaluated.
8.2 Spark-ignited gas engine	
8.2.1 Engine rated power	
Unless otherwise specified by the purchaser, the gas engine shall be sized for the compressor rated power plus transmission losses and plus engine accessories for the specific location, without exceeding the engine manufacturer's standard published rating criteria for continuous duty service. The engine manufacturer's continuous duty service is defined as the load and speed which can be applied without interruption after taking into consideration site conditions of altitude, temperature and fuel gas composition as listed on the data sheet. Note: A margin of 10% on the engine rated power has been demonstrated to result in better operating reliability.	GS EP MEC 101 shall apply for engine power sizing.
8.2.3 Starting systems	
8.2.3.2 Air or gas starting system	
b) If required, a regulator to provide proper starter pressure. purchaser shall specify source and minimum/maximum pressure of air or gas available for the starting system.	Refer to Project specification data sheets.
8.2.3.3 Electric starting systems	
b) If specified, a battery set with sufficient capacity to start the engine at the lowest specified ambient temperature.	Refer to Project specification data sheets.
c) If specified, a charging alternator of	Refer to Project specification data sheets.

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sufficient capacity to charge the battery set furnished.	
8.2.4 Air Intake systems	
● 8.2.4.6 A pressure drop indicator shall be provided if specified by the purchaser.	This paragraph is applicable.
8.2.6 Engine ignition system	
● For outdoor installation or if specified by the purchaser, all components shall be of weather-protected design or fitted with weather covers to prevent rain from directly contacting or accumulating in system components.	Refer to Project specification data sheets.
8.2.7 Engine emissions	
8.2.7.1 General	
● Compliance with any imposed exhaust gas emission regulation is the responsibility of the purchaser. To assist the purchaser in the selection of equipment as well as supplying the applicable regulatory body with accurate emission data, the vendor shall provide either manufacturer's performance data or actual stack tests data if specified by the purchaser. The purchaser shall furnish the fuel composition and the known emission level limits and their units for the installation on the data sheets when requesting emission data.	Refer to Project specification data sheets. Emission sampling port adequately located on the exhaust stack shall be provided with access platform and ladder.
8.2.7.2 Emission data	
● If specified by the purchaser, emissions data shall be supplied by the vendor for the following compounds at specified engine load conditions: ● Nitrous Oxides ● Carbon Monoxide ● Non-Methane Hydrocarbons ● Sulfur Dioxide.	Refer to Project specification data sheets.
● a) The engine shall be loaded to either its rated power shown on the data sheets or the engine manufacturer's nameplate rating, as specified by the purchaser.	Refer to Project specification data sheets.

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8.2.9 Oil level control	
A crankcase oil level control device shall be furnished by the vendor. A storage tank with level gauge shall be furnished by the vendor if specified by the purchaser.	This paragraph is applicable.
8.2.10 Fuel gas system	
e) Fuel gas filter/separator, if specified, installed downstream of the high pressure regulator.	This paragraph is applicable. In addition, a gas heater may be required.
8.2.11 Fuel gas composition	
The fuel gas composition and pressure, if different than the compressed gas, shall be shown in the data sheets. Any contaminants shall be listed by the purchaser and the engine manufacturer shall be consulted for fuel treatment requirements and special precautions. If several fuel gas sources can be used (e.g. start-up case, emergency, etc.), it should be mentioned in the data sheet, with indication of the changeover time. WARNING - Use of an alternative gas with low methane index can result in detonation and possibly engine destruction.	Refer to Project specification data sheets.
8.3 Electric motors	
8.3.1 Motor type	
The purchaser shall specify the motor type on the data Sheets, including electrical data, starting conditions, type of enclosure, area classification, type of insulation, service factor, ambient temperature, elevation, and accessories such as temperature detectors, vibration sensors, heaters and instrumentation.	Refer to Project specification data sheets. Electric motors shall be suitable for direct starting with the compressor pressurized but unloaded. The starting voltage shall be assumed as 80% of nominal voltage at motor terminals.
8.3.2 Rated power	
The motor power rating, including service factor if any, shall be a minimum of 110% of the compressor rated power. Unless otherwise specified, the design of the motor shall conform to IEC 60034, IEC 60079 and	GS EP MEC 101 shall apply for motor power sizing. For the design of the motor, refer to Project specification and data sheet.

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IEC 60529.	
8.3.3 Motor current variation limits	
The purchaser shall provide the vendor with the electrical system data necessary for proper design.	Refer to Project specification data sheets.
9. Cooling system	
9.1 General	
This International Standard is not applicable to shell-and-tube type and plate-type coolers.	GS EP PVV 412 shall apply for plate-type coolers and GS EP PVV 411 for shell-and-tube type coolers.
9.3 Compressor	
9.3.1 Circulated coolant	
• 9.3.1.3 Sight flow and temperature indicators	
Sight flow and temperature indicators shall be furnished if specified by the purchaser.	This paragraph is applicable.
9.3.5 Gas cooling	
Gas intercooling shall be provided as required, and gas aftercooling shall be provided as specified by the purchaser.	Refer to Project specification data sheets.
9.4 Type of coolers	
9.4.1 Air-cooled heat exchangers	
Note: Information on air-cooled heat exchangers is provided in ISO 13706 and in API 661.	GS EP PVV 415 shall apply for air-cooled heat exchangers.
9.5 Air-cooled heat exchanger	
9.5.4 Pressure design code	
The cooler shall be designed and constructed in accordance with the pressure design code specified or agreed by the purchaser.	Refer to GS EP MEC 032.
9.6 Arrangement and construction	
9.6.8 Air flow control	
If specified by the purchaser, air cooled heat exchangers shall have automatic temperature control. This control may be	Refer to Project specification data sheets. Based on specified ambient temperature variation conditions, the Vendor shall

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accomplished by means of louvres, variable-speed fans, variable-pitch fans, bypass valve or any combination of these. Manual louvres shall be adjustable from ground level. Louvres that cannot be seen from ground level shall have position indicators clearly visible from the ground level.	determine if an automatic temperature control system is necessary to avoid any risk of hydrate formation, and supply it accordingly. In this case, the Vendor shall describe proposed arrangement in his proposal.
9.6.9 Screens and guards	
If specified by the purchaser, insect screens and hail guards shall be furnished. They shall be sufficiently large to minimize any pressure drop into the cooler and be easily removable for cleaning. Unless otherwise specified, insect screens shall be 3.25 mm (# 10 swg) galvanized screen mesh and hail guards shall be 12 mm (½ in) to 20 mm (¾ in) expanded metal.	Refer to Project specification for environment details. If the compression unit is to be installed offshore or in a coastal environment, screens and support material shall be AISI 316L Stainless steel.
10. Pressure vessels	
10.1 General	
10.1.1 Code	
Pressure vessels shall be designed and constructed in accordance with the pressure design code specified or agreed by the purchaser.	Refer to Project specification.
10.1.5 Threaded connections	
Use of threaded connections shall be held to a minimum and not be used for gas piping, except for thermowell and directly plugged applications. If used, threaded connections shall not exceed DN 50 (2 in). Only manufactured threadolets shall be employed. Pipes threads shall be tapered in accordance with ISO 7-1 or ASME B1.20.1, as specified, and be minimum class 3000. Threaded connections shall not be used in toxic gas service.	Refer to Project specification, and particularly to piping classes.
10.2 Separators	
10.2.5 Equipment	
The minimum equipment furnished on	Refer to Project specification, GS EP ECP 103 paragraph 7 "Vessels sizing

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separators shall be as follows: - Manual drain - Automatic drain valve with liquid level controller - High-level shutdown device.	design criteria" and GS EP INS 900 . Separator sizing calculations shall be submitted to Company for review and approval. Separators shall be equipped with bolted full diameter end closure.
If an external liquid-level gauge is specified, it shall be equipped with isolating, vent and drain valves. If a pressure gauge is specified, it shall be equipped with isolating and vent valves.	Refer to Project specification data sheets and GS EP INS 900 .
10.2.6 Diameter	
The purchaser shall specify the separator service class required. The diameter of a vertical separator shall be based on the separator class specified, using the following procedure, unless otherwise specified by the purchaser.	The required separator service class shall be class C.
10.3 Pulsation suppression devices	
10.3.1 Pulsation control	
Pulsation control and pulsation studies shall be as specified by the purchaser and shall be quoted separately by the vendor. Mechanical natural frequencies and acoustic (organ-pipe) frequencies should not be coincident with pulsation frequencies generated by the compressor.	Pulsation control studies shall be as per API Std 618 4th edition - Approach 3 Appendix M including M2 to M8, and shall be an integral part of the scope of supply. Drawings and information on the equipment immediately upstream and downstream of limits of supply shall be transmitted by purchaser for incorporation in the calculation of the pulsation suppression devices. The Vendor shall review and comment these documents and request further details if necessary.
10.3.2 Size	
If volume bottles are specified by the purchaser, and a special pulsation dampening design is not specified, then volume bottles shall be furnished on the suction and discharge of each stage. The bottle volume shall be determined by the sum of all the cylinder-swept volumes connected to it, multiplied by the factor specified in annex B.	This paragraph is not applicable.

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Note: If the cylinder is double-acting, then the swept volume is the sum of both ends of the cylinder.	
11. Piping and appurtenances	
11.1 General	
11.1.4 Gas Piping and appurtenances	
The extent of gas piping to be supplied by the vendor shall be specified by the purchaser. If specified by the purchaser, or required by the vendor, the piping and appurtenances shall be designed and arranged to allow heat tracing and insulation.	Refer to Project specification data sheets. The Vendor shall supply all process and auxiliary piping within the scope of supply.
11.1.5 Drawings	
If specified, the purchaser shall review the arrangement drawings of all piping and appurtenances (pulsation suppression devices, inter-coolers, after-coolers, separators, knockouts, air intake filters, expansion joints, vessels, etc.) immediately upstream or downstream of the compressor prior to fabrication.	This paragraph is applicable. The Vendor shall be in charge of piping connections and supports design (calculation notes to be handed over to Company for review). See 11.2.
11.2 Design	
	In case of hydrocarbon or water condensation risks, process piping shall be heat traced and insulated between separator outlet and compressor inlet (pulsation bottles included)
11.8 Pipe material and sizes	
Stainless steel piping and all piping carrying the process gas shall be seamless. Piping shall conform to appropriate recognized standards, such as ASTM A 106 or ASTM A 132, or as specified by the purchaser. Pipe wall thickness shall be in accordance with Table 4.	Refer to Project specification piping class.
11.10 Valves	
Valves in flammable or toxic service shall be steel and, when specified, valves shall have bolted or welded bonnets, bolted glands.	Refer to Project specification data sheets.

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ISO	GS
11.13 Start-up screens	
If specified, the vendor shall supply removable spool pieces that accommodate temporary start-up screens. Sufficient pressure taps to allow monitoring of the pressure drop across the screen shall be provided.	This paragraph is applicable, this strainer shall compulsory be removed after start up. The compressor suction strainers shall be designed, provided and installed with associated spool piece by the compressor vendor. According to the piping rating and flange type (RF or RJ), the compressor vendor shall also provide additional RJ or RF mating rings to be used with the same spool piece when the temporary strainer is removed. The compressor vendor shall have the full responsibility on the mechanical design of these suction strainers, in terms of sizing, maximum allowable delta P resistance, holes sizing, etc. These temporary suction strainers shall consist of: - Spool piece made of steel, built and designed as per Project piping specifications. - Fabricated internal basket made of stainless steel 316L drilled plate holding a 316 stainless steel wire mesh provided with three guides at 120° in accordance with the AWS requirements. Free through flow area size of both strainers, wire mesh and plate drilled holes, shall be as per Supplier recommended standards to be provided to Company. - The basket shall be supported by a ring to be installed between spool piece and main process piping flanges. This ring shall be made of stainless steel 316L and welded to the basket. - Tapping points upstream and downstream the basket. These strainers shall be equipped with a differential pressure indicator to be provided by Supplier.

ISO	GS
11.14 Lubricating oil piping requirements	
11.14.2 Material	
If specified, pressurized lubricating oil lines downstream of the filter (with the exception of cast-in-frame lines or passages) shall be made of series 300 stainless steel. For either tubing or piping, bends shall be used to minimize the number of fittings wherever possible. Steel fittings shall be furnished with stainless steel tubing. Pressure piping downstream of oil filters shall be free of internal obstructions or pockets (such as those created by socket weld fittings) that could accumulate dirt at pipe joints. Non-consumable back-up rings and sleeve type joints shall not be used. Other piping fittings shall be of the socket weld or butt weld type. When butt welds are necessary, such precautions as internal grinding of joints and use of gas tungsten-arc welding for the first weld pass shall be taken to prevent weld splatter inside the lines. After fabrication, oil lines shall be thoroughly cleaned and preserved. In addition, Carbon steel piping shall be pickled passivated.	This paragraph is applicable. Stainless steel shall be AISI 316L, as a minimum.
11.15 Coolant piping requirements	
11.15.1 Coolant piping	
If coolant piping is specified to be furnished by the vendor, the vendor shall supply a piping system for all equipment mounted on the skid, including radiators and coolers. The piping shall be arranged to provide a single inlet connection on the bottom and a single outlet connection on the top for each coolant circuit operating at different inlet temperature levels and shall include a coolant control valve.	Refer to Project specification data sheets.
11.17 Drain and vent piping	
11.17.2 Common distance piece vent header	
If specified by the purchaser, a common distance piece vent header terminating at the edge of the skid shall be furnished by the	API Std 618 Appendix I is applicable.

ISO	GS
vendor.	
11.17.3 Common distance piece drain header	
If specified by the purchaser, a common distance piece drain header terminating at the edge of the skid shall be furnished by the vendor.	API Std 618 Appendix I is applicable.
11.17.4 Common packing vent header	
If specified by the purchaser, a common packing vent header terminating at the edge of the skid shall be furnished by the vendor.	API Std 618 Appendix I is applicable.
11.18 Relief valves	
11.18.3 Relief valve sizing	
If specified, the vendor shall furnish relief valves that are to be installed on equipment of in piping that the vendor supplies. The purchaser shall specify if additional suction relief valve capacity is required to protect the package for conditions other than rated. Other relief valves shall be furnished by the purchaser. Relief valves for all operating equipment shall comply with all relevant local codes and regulations and shall meet the limiting relief valve requirement given in ISO 4126-1 and in API RP 520, parts I and II, provided these requirements do not conflict with the above codes and regulations. The vendor shall determine the size and the set pressure of all relief valves related to the equipment. The vendor's proposal shall list all relief valves and shall clearly indicate those to be furnished by the vendor. Relief valve location and setting, including accumulation, shall take into consideration all possible type of equipment failure, mal-operation and the protection of piping systems. Note: For the purpose of this provision, API Std 526 is equivalent to ISO 4126-1.	This paragraph is applicable.

ISO	GS
11.18.6 Relief valve venting	
- Each relief valve shall be connected to a vent pipe. The vent pipe shall vent released gas either upward at a safe location into the atmosphere or into a common vent header terminating at the edge of the skid as specified by the purchaser. - If specified atmospheric vents shall have weep holes at the lowest point near the relief valve. The effect of back pressure should be considered when selecting and sizing relief valves and vent systems, because back-pressure can prevent relief valves from relieving at their set pressure.	The vent pipe shall be manifolded at skid edge and connected to a flare header.
11.19 Blowdown valve	
If specified by the purchaser, a package blowdown valve shall be furnished by the vendor. The vent pipe shall vent released gas either upward at a safe location into the atmosphere or into a common vent header terminating at the edge of the skid or elsewhere as specified by the purchaser.	The blowdown pipe shall be manifolded at skid edge and connected to a flare header.
12. Electrical systems	
12.2 Power supply	
If electrical equipment is to be supplied by the vendor, electrical power supply characteristics for motors, heaters, and instrumentation shall be specified by the purchaser.	Refer to Project specification data sheets.
12.5 Insulation	
All electrical materials including insulation shall be corrosion-resistant and non-hygroscopic insofar as possible. - If specified for tropical locations, all materials shall be treated as follow: - All parts (such as coils and windings) shall be protected against fungus attack. - Materials subject to corrosion shall be suitably protected.	Refer to Project specification data sheets.

ISO	GS
12.6 Conduits and cable runs	
All wiring, including that for power and instrumentation, within the limits of any skid area, shall be protected against mechanical damage, properly bracketed to minimize vibration and isolated or shielded to prevent interference between voltage levels. When used, conduits may terminate (and in the case of temperature-element leads, shall terminate) with a flexible metallic conduit of sufficient length to permit access to the unit for maintenance without removal of the conduit. Flexible metallic conduits, if used, shall be liquid-tight and suitable for the specified area classification.	In addition, different voltage levels (power and instrument) shall be segregated in different cables, different cable trays and different junction boxes (Refer to GS EP INS 110).
13. Instruments and controls	
13.1 General	
13.1.1 Compressor control systems	
Compressor control systems may be pneumatic, hydraulic, electrical or electronic and may be operated either manually or automatically. The purchaser shall specify the control signal (purpose or function), the type of control system (manual, automatic or programmable) and control range. The purchaser shall specify which process sensing lines, handling flammable, toxic, corrosive or high temperature fluids require transduced signals to the instrumentation. The purchaser shall also specify the source of the control signal and its sensitivity and range. The vendor shall describe the complete control system (including alarm and shutdowns) in his scope of supply by means of logic diagrams in accordance with IEC 60848. If the control system is supplied by others, the vendor shall provide logic diagrams of the critical functions associated with the compressor operation (starting, stopping, capacity control, shutdown, etc.). Examples of typical logic diagrams are given in Annex C.	Refer to Project specification data sheets. The compressors shall always be started unloaded. If they are in automatic-starting service, they shall be equipped with automatic unloading devices. The Vendor shall clearly indicate the maximum time the compressors can withstand unloaded operation.

ISO	GS
For corrosive gases see clause 20.	
13.2 Instrument and control panel	
13.2.2 Panel construction	
Unless otherwise specified by the purchaser, panels shall be made of steel plate at least 3 mm ($\frac{1}{8}$ in) thick, reinforced, self-supporting, and closed on the top and sides. If specified, the backs of panels shall be enclosed to minimize electrical hazards, to protect equipment from tampering, or to allow purging and venting for safety and corrosion prevention. All flush-mounted instruments shall be mounted on the front of the panel and all fasteners shall be of corrosion resistant material. Each panel-mounted instrument shall be identified by an engraved name plate.	This paragraph is applicable.
13.2.3 Panel mounting	
Control and instrument panels shall be free-standing, skid-mounted or off-skid as specified by the purchaser. Any skid-mounted instrument panel must be securely supported to minimize vibration, to prevent undue forces on piping, and to prevent damage during shipment, storage, operation and maintenance. The mounting location shall not block access doors or covers that must be removed for inspection or maintenance. Lifting rings shall be provided on panels weighing in excess of 50 kg.	Refer to Project specification data sheets. Access doors or covers shall be fitted with lifting rings if in excess of 30 kg.
13.2.4 Panel wiring	
If more than one wiring point is required on a unit for control or instrumentation, the wiring to each switch or instrument shall be provided from a single terminal box with terminal posts. The box shall be mounted on the unit (or its base, if any). Wiring within panels shall be installed in conduit or supported on cable trays. All wiring outside enclosed panels and terminal boxes shall be run in metal conduit or be in the form of armoured cable supported in cable trays as specified by the purchaser.	Wiring shall be supported on cable trays.

ISO	GS
All instruments, leads and posts on terminal strips and switches shall be provided with permanent non-corrosive tags or labels for identification.	
13.2.5 Remote panel wiring	
If off-skid-mounted control panels are used, all connections shall be brought to one point of the skid with provision for ease of access. All leads and posts or terminal strips, switches, and instruments shall be tagged for identification. Splicing of wiring inside conduits shall not be allowed. Wiring shall be installed in metal conduit or be in the form of armoured cable supported in cable tray, as specified by the purchaser.	Wiring shall be supported on cable trays.
13.3 Instrumentation	
13.3.1 Tachometers	
A tachometer shall be provided in the panel if specified. The type and range shall be stated by the purchaser on the data Sheets. Digital-readout tachometers with continuous readout may be used maximum continuous speed. When a variable-speed driver is used, the driver vendor shall furnish the speed sensor and indicator(s).	Refer to Project specification data sheets.
13.3.2 Temperature measurement	
Temperature indicators shall be furnished and mounted locally or on a panel, as specified on the data sheets. Locally mounted dial-type temperature gauges shall be heavy duty, corrosion-resistant and mounted in stainless steel thermowells. Heat-transfer compound shall be used between thermowells and sensing elements.	Refer to Project specification data sheet.
If specified by the purchaser, liquid filled gauges shall be furnished by the vendor. Black printing on a white background is standard for gauges. Metal-case, glass-front, stem-type mercury or bi-metallic thermometers shall be furnished in locations subject to vibration.	This paragraph is applicable.

ISO	GS
13.3.4 Pressure measurement	
Pressure indicators shall be furnished and mounted locally or on a panel as specified on the data Sheets. When pressure indication in services other than pneumatic control signals is by means of gauges (direct-acting devices), these shall be furnished with austenitic stainless steel bourdon tubes and stainless steel movements. Black printing on a white background is standard for gauges.	Refer to Project specification data sheets.
If specified, liquid filled gauges shall be furnished in location subject to vibration. Gauge ranges shall be selected so that the normal operating pressure is at the middle of the gauge's range. The maximum reading on the dial shall not be less than the applicable relief-valve setting plus 10%. Each pressure gauge shall be provided with a device such as disc insert or blowout back designed to relieve excessive case pressure.	This paragraph is applicable.
13.3.5 Fuel gas metering	
If specified, a fuel gas meter shall be furnished by the vendor.	This paragraph is applicable.
13.3.6 Valving	
If shut-off valves are specified for shutdown sensing devices, the vendor shall provide a means of locking the valves in the open position. All pressure gauges shall be furnished with isolation and bleed valves.	Refer to Project specification data sheets.
14. Shutdowns, alarms and annunciators	
14.1 General	
An alarm/shutdown system shall be provided which initiates an alarm if any one of the conditions specified by the purchaser as alarm conditions reaches an agreed alarm level This system shall also initiate shutdown of the compressor when any of the conditions specified or recommended as shutdown conditions reaches an agreed shutdown level	

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ISO	GS
Shutdown and alarm systems shall be designed to operate in a fail-safe mode • The systems may function hydraulically, pneumatically, electrically or in any combination, as specified by the purchaser • Unless otherwise agreed, for every shutdown function an alarm function shall be provided and set at a value which represent a deviation from the normal condition and less than the setting of the shutdown Additional alarms, not associated with shutdowns, shall be provided as specified	Refer to Project specification data sheets. This paragraph is applicable.
14.3 Additional alarms and shutdowns	
• The extent to which the alarm and shutdown systems shall be supplied by the vendor shall be specified by the purchaser on the data sheets. Low oil-level alarms in the engine and compressor crankcases are recommended. Note: Information on vibration and temperature monitoring is provided in API Std 670.	Refer to Project specification data sheets. Low oil-level alarms in the engine and compressor shall be provided.
14.6 Emergency shutdown system	
14.6.3 Compressor	
• If specified by the purchaser, the blowdown valve shall open automatically on shutdown.	Refer to Project specification data sheets.

ISO	GS
15. Skids	
	Anchor bolts shall be provided by the Vendor, unless otherwise agreed. Anchor bolts supplied by another supplier shall require the Vendor's review and approval. For compressor sets mounted on skids, the use of epoxy grout or concrete to wedge the frames and drivers on the skid shall not be permitted. For compressor sets mounted on skids or in modules for offshore structures, the Vendor shall specify the maximum permissible deflection during lifting operations. Directives to limit stressing of the baseplate during lifting operations must be passed on to the Purchaser. For compressor sets with skids resting on a metal structure or on an offshore platform, the Vendor shall specify the maximum deflection of the skid, in operation, to assess whether the assembly needs to be supplied mounted on a self supporting skid supported by three jointed points. Skid design shall comply with GS EP STR 103 requirements. Vibration studies shall comply with GS EP MEC 300 requirements.
15.4 Walkways, stairs and platforms	
Walkways, stairs and platforms, if specified by the purchaser, shall be provided with handrails on all sides except those bounded by equipment not presenting a safety hazards. Handrails shall be complete with midrail and toeplate. The surface areas of walkways, stairs and platforms shall be of a non-slip design and open construction such as expanded grating.	This paragraph is applicable.

ISO	GS
16. Paint and painting	
16.2 Surface preparation	
If specified by the purchaser in the data Sheets, surfaces should be prepared for painting in accordance with Table 8.	Refer to Project specification.
16.6 Air-cooled heat exchanger	
For a severely corrosive environment, ducting and structure of the air-cooled heat exchanger may be hot-dipped galvanized in lieu of painting. Header may be galvanized or painted as specified by the purchaser.	Ducting, structure of the air-cooled heat exchanger shall be in carbon steel and painted. Header shall be in carbon steel and painted.
17. Inspection and testing	
17.1 General	
17.1.3 Purchaser participation	
- The purchaser shall specify in the vendor's quality plan or in any other applicable documents whether the inspection and testing program will be: - Witnessed, in which case a hold point shall be applied to the production schedule and the inspection or test shall be carried out with the purchaser or his representative in attendance. For mechanical running or performance test, this requires, with or after the advance notification, confirmation of successful preliminary tests carried out by the vendor. - Observed, in which case the purchaser shall be notified of the timing of the inspection or test; however, the inspection or test shall be performed as scheduled, and if purchaser or his representative is not present, the vendor shall proceed to the next step.	A preliminary quality plan, including inspection and testing program shall be provided with the proposal for review by the purchaser. Inspection and testing program shall be mutually agreed between the purchaser and the Vendor prior to the order.
17.1.6 Advance notification period	
The purchaser shall specify the required advance notification period prior to any witnessed or observed inspection point.	Refer to Contract Terms and Conditions.

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ISO	GS
17.2 Material inspection	
17.2.1 Inspection codes	
● If radiographic, ultrasonic, magnetic-particle or liquid-penetrant inspection is required or specified, radiography shall be in accordance with ASME Section VIII, Division 1, UW-52; ultrasonic inspection shall be in accordance with ASME Section VIII, Division 1, Appendix 12; magnetic-particle inspection shall be in accordance with ASME Section VIII, Division 1, Appendix 6; and liquid-penetrant inspection shall be in accordance with ASME Section VIII, Division 1, Appendix 8. If specified, forged parts shall be ultrasonically inspected in accordance with ASTM A 503.	Refer to Project specification data sheets.
17.3 Testing	
17.3.4 Gas leak tests	
● 17.3.4.2 Assembled package	
If specified by the purchaser, the assembled package shall be tested for piping leaks. Details of this test shall be mutually agreed by the purchaser and the vendor.	This paragraph is applicable.
17.4 Mechanical running tests	
17.4.2 Package unit	
Unless otherwise specified, the packaged unit, including all auxiliaries, shall undergo the vendor's/sub-vendor's usual shop running test prior to shipment. The test shall prove mechanical operation of the compressor, driver, mechanical accessory equipment, instruments, control system and skid mounted coolers as a complete unit. The compressor does not have to be pressure-loaded for this test.	Refer to Project specification.

ISO	GS
17.4.4 Inspection	
The purchaser shall specify if dismantling for inspection (other than that required by evidence of malfunctioning during test) is required.	This point shall be mutually agreed between the purchaser and the Vendor prior to the order.
19. Preparation for shipment	
19.3 Shipment and storage	
Equipment shall be suitably prepared for the type of shipment specified including blocking of the crankshaft. The preparation shall make the equipment suitable for six months of outdoor storage from the time of shipment. If storage for a longer period is specified, the purchaser shall consult with the vendor regarding recommended procedure to be followed. The vendor shall provide the purchaser with the instructions necessary to preserve the integrity of the storage preparation after the equipment arrives at the Project site and before start-up. It is recognized that failure to follow these instructions can jeopardize the successful operation of the equipment.	Refer to Contract Terms and Conditions.
19.4 Crating	
19.4.1 Crating and handling	
The equipment shall be packed for domestic or export shipment as specified. Lifting, load-out, and handling instructions shall be securely attached to the exterior of the largest package in a well-marked weatherproof container. If special lifting devices, such as spreader bars, are required, the supply of these shall be subject to agreement. Upright position, lifting points, weight, and dimensions shall be clearly marked on each package. Lifting points and the centre of gravity shall be clearly identified on the equipment package. The vendor shall recommend the lifting arrangement.	Refer to Contract Terms and Conditions.

ISO	GS
20. Corrosive gases	
20.2 Hydrogen sulfide	
All material exposed to hydrogen sulphide gas service as defined in NACE MR 0175 shall be in accordance with the requirements of that standard	Materials shall also comply to GS EP COR 170 requirements.
21. Offshore and marine environment	
21.1 General	
21.1.3 Corrosive agents	
The purchaser shall specify the presence of corrosive agents in the environment on the data sheets.	Refer to Project specification data sheets.
21.2 Air-cooled heat exchangers	
The cooler structures shall be hot-dipped galvanized. The cooler header shall be galvanized or painted as specified by the purchaser.	Ducting, structure of the air-cooled heat exchanger shall be in carbon steel and painted. Header shall be in carbon steel and painted.
21.9 Valves in gas service	
21.9.3 Block valves	
If specified by the purchaser, the vendor shall furnish the suction and discharge block valves. The purchaser shall also specify type and whether manual or pilot operated.	Refer to Project specification data sheets for details.



General Specification		GS EP MEC 261
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Appendix 1

Appendix 1 Data sheets

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Appendix 1

Exploration & Production

Data Sheet

Date: 01/2011

DS EP MEC 262

Rev: 04

Ref clause	ISO 13631 - Packaged reciprocating compressor – Data sheet					Rev. No.
Service conditions (to be completed by purchaser)						
GENERAL INFORMATION						
1	Company:					
2	Address:					
3	Contact:					
4	Tel: Fax: E-mail:					
5	Project: No: Service: No required:					
6	Issued for: Inquiry [] No: Date: Purchase order: [] No: Date: xx/xx/xx					
PROPOSAL REQUIREMENTS						
7	Furnish No of copies indicated: Proposal: Reports: Drawings: Data books: Curves: Misc:					
8	Performance curves: YES [] NO [] Indicate range: Torsional report: YES [] NO []					
9	5.1/5.7					
10	5.3 Drawings: Approval: YES [] NO [] As-built: YES [] NO [] Misc.: YES [] NO [] Type:					
11						
12						
13						
OPERATING CONDITIONS						
14						
15	6.1.1	CASE NO:	Normal	Alternative 1	Alternative 2	Alternative 3
16		Service				
17		GAS COMPOSITION Mol %				
18		Methane – CH ₄				
19		Ethylene-C ₂ H ₄				
20		Ethane – C ₂ H ₆				
21		Propylene – C ₃ H ₆				
22		Propane – C ₃ H ₈				
23		Iso-butane – C ₄ H ₁₀				
24		Normal butane – C ₄ H ₁₀				
25		Iso-pentane – C ₅ H ₁₂				
26		Normal pentane – C ₅ H ₁₂				
27		Hexane – C ₆ H ₁₄				
28		Heptane				
29		Octane				
30		Nonane				
31		Decane				
32		C ₁₀ +				
33		Water vapour – H ₂ O				
34		Oxygen – O ₂				
35		Nitrogen – N ₂				
36		Hydrogen – H ₂				
37		Hydrogen sulphide – H ₂ S				
38		Carbon monoxide – CO				
39		Carbon dioxide – CO ₂				
40		Benzene – C ₆ H ₆				
41		Toluene – C ₇ H ₈				
		Oxylene – C ₆ H ₄ (CH ₃) ₂				
42		Méthylmercaptan – CH ₄ S				
43		Mixture MW or SG				
44		Cp/Cv (k) @ 65°C				
45		Relative humidity %				
46		Number of stages				
47		Suction temperature °C				
48		Suction pressure (abs) bar				
49		Discharge pressure (abs) bar				
50		Req'd capacity MMSCFD/SCFM				
SIDESTREAMS						
51						
52		Service				
53		Number of stages				
54		Suction temperature °C				
55		Suction pressure (abs) bar				
56		Discharge pressure (abs) bar				
57		Req'd capacity Standard m ³ /h				
58		Max allowable cylinder discharge temperature °C		Max allowable aftercooler discharge temperature:		°C
59						
60						

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Appendix 1

Exploration & Production

Data Sheet

Date: 01/2011

DS EP MEC 262

Rev: 04

61		SITE INFORMATION				Rev.
62		Location (address):				
63	5.4	Maximum allowable sound pressure level:				
64	5.5	Electric power available: YES ☐ NO ☐ Voltage: Phases: Frequency Hertz: Hazardous: YES ☐ NO ☐ Electrical area classification:				
65	5.6	Ambient temperature: Max: °C: Min: °C: Design: °C:				
66		Elevation: m. Barometric pressure: mbar. Relative humidity: %				
67		Tropical ☐ Arctic ☐ Desert ☐ Inland ☐ Coastal ☐ Offshore ☐ Inland water ☐ Sand ☐ Dust ☐				
68		Attended ☐ Partially attended ☐ Unattended ☐				
69		Size limitation (if any): Length: m. Width: m. Height: m.				
70						
71		MATERIAL REQUIREMENTS – COMPRESSOR				
72	6.1.3	Prime mover loading:				
73	6.2	Maximum allowable average piston speed: m/s Maximum allowable prime mover speed RPM				
74	6.3	Furnish predicted actual ☒ and/or calculated adiabatic ☒ compressor cylinder discharge temperatures.				
75	6.5.3.2	Furnish plugged indicator taps: YES ☐ NO ☐				
76	6.7.3	Furnish non-metallic piston wear bands YES ☒ NO ☐				
77	6.8.5	Crankcase relief devices required YES ☒ NO ☐				
78	6.9.1.1	Furnish Type 1 ☐ Type 2 ☐ or Type 3 ☒ distance pieces.				
79	6.9.1.2	Furnish slinger rings YES ☒ NO ☐				
80	6.11.6	Furnish oil storage tank YES ☐ NO ☐ Capacity litres.				
81	6.11.7	Furnish lube oil heater YES ☐ NO ☐				
82	6.12.1	For block cyl lube system. Furnish: Line filters YES ☐ NO ☐ lube meter YES ☐ NO ☐ Fault indicators YES ☐ NO ☐				
83	6.12.2	Furnish lubricator oil storage tank YES ☐ NO ☐ Capacity litres				
84	6.14.2	Coupling material: Steel ☐ or stainless steel ☒				
85	6.14.5	Aluminium guards prohibited YES ☐ NO ☐				
86		CAPACITY CONTROL				
87	7.1	Capacity control to be furnished: YES ☐ NO ☐				
88		Controlled parameter: Suction pressure ☐ Discharge pressure ☐ Flow rate ☐				
89		Controlled range: from bar to: bar. Or capacity variation from: % to %				
90		Control system to be: Mechanical ☐ Pneumatic ☐ Hydraulic ☐ Electrical ☐				
91		Control signal by Vendor ☐ or Purchaser ☐ Source: Range: Sensitivity				
92	7.2	Control operation: Automatic with manual over-ride ☐ Manual ☐ Unit shutdowns acceptable YES ☐ NO ☐				
93	7.3	Control by prime mover speed variation YES ☐ NO ☐				
94	7.4.2	Clearance pockets: YES ☐ NO ☐ Fixed ☐ Variable ☐				
95	7.4.3/7.4.4	Valve spacers (if required to meet operating condition) YES ☐ NO ☐ Clearance bottles YES ☐ NO ☐				
96	7.5.2/7.5.3	Start-up bypass YES ☐ NO ☐ Capacity control bypass YES ☐ NO ☐ Manual ☐ Automatic ☐				
97	7.6.3	Automatic valve unloading YES ☐ NO ☐				
98	7.7	Suction pressure reducing valve YES ☐ NO ☐ by Purchaser ☐ or Vendor ☐ Max suction pressure: bar				
99		PRIME MOVER				
100	8.1	Type of prime mover: Gas engine ☐ Electric motor ☐				
101	8.2.3.1/8.2.3.2	Gas engine starting by: Electric ☐ Air ☐ or Gas ☐ Air/Gas from: Max/Min gauge press.: / bar				
102	8.2.3.	Battery for electric start YES ☐ NO ☐ Capacity: ampere-hour Charging alternator YES ☐ NO ☐				
103	8.2.4.2/8.2.4.6	Engine air filter: Vendor's st'd ☐ Other ☐ Details: Press drop indicator YES ☐ NO ☐				
104	8.2.5.5	Exhaust silencer: Vendor's st'd ☐ Other ☐ Details: Spark-arresting YES ☐ NO ☐				
105		Sound attenuation req'ts: Personnel protection req'ts:				
106	8.2.6	Ignition weather protection required: YES ☐ NO ☐				
107	8.2.7	Exhaust gas emission levels required YES ☐ NO ☐ Based on: Manufacturer's perf. data ☐ Actual stack tests ☐ Based on: Quotation rated power ☐ or Manufacturer's nameplate rating ☐				
108		Site emission level limits: NO _x CO SO ₂ Non-methane hydrocarbons				
109	8.2.9	Crank case oil storage tank required YES ☐ NO ☐ Capacity: litre				
110	8.2.10	Fuel gas filter/separator required YES ☐ NO ☐				
111	8.2.11	Fuel gas: Sweet ☐ Sour ☐ Dry ☐ Rich ☐ LHV kJ/kg Supplied at gauge pressure of:				
112	8.3.1	Electric motor prime mover. Type Volts: Phases: Hertz: Service factor: Area classification: Enclosure type: Insulation type: Starting conditions:				
113		Motor starter by: Vendor ☐ or Purchaser ☐ Starting at full ☐ or reduced voltage ☐				
114		Space heater YES ☐ NO ☐ by Vendor ☐ or Purchaser ☐				
115		Instrumentation required: Temperature detectors ☐ Vibration Transmitter ☐				
116		Other instrumentation:				
117		COOLING SYSTEM				
118	9.3.1.3	Cylinder jacket cooling: Sight flow indicators required YES ☐ NO ☐ Temperature indicators YES ☐ NO ☐				
119	9.3.5	Gas aftercooling required to °C Gas cooler design code:				
120	9.6.8	Auto control of coolers by: Louvers ☐ Variable-pitch fan ☐ Variable-speed fan ☐ Recirculation ☐ Other ☐ Details:				
121	9.6.9	Insect screens required YES ☐ NO ☐ Hailguards required YES ☐ NO ☐				

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122		PRESSURE VESSELS	Rev.
123	10.1.1	Pressure vessel design code:	
124	10.2.5	Separators, Furnish: external level gauge with cocks and check valves []; press. indicator with valve []	
125	10.2.6	Suction separator required YES [] NO [] Diameter based on service class A [], B [] or C [X] Interstage separator(s) required YES [] NO [] Diameter based on service class A [], B [] or C [X] Discharge separator required YES [] NO [] Diameter based on service class A [], B [] or C [X]	
126	10.3.1	Pulsation control and studies required YES [X] NO [] Type: Scope:	
127	10.3.2	Suction and discharge volume bottles required YES [X] NO []	
128		PIPING AND APPURTENANCES	
129	11.1.4	Vendor to supply complete piping from package suction flange to package discharge flange YES [] NO []	
130		Vendor to supply suction piping from: Suct. Separator []; Suct. pulsation suppressor []; Compressor nozzle []; Other [] Details:	
131		Vendor to supply sidestream piping from: Interstage sept'r []; Pulsation suppressor []; Compressor nozzle []; Other: [] Details:	
132		Vendor to supply discharge piping from: Aftercooler []; Pulsation suppressor []; Compressor nozzle []; Other: [] Details:	
133		Vendor to supply complete interstage piping system YES [] NO []	
134		Piping, vessels and thermowells designed and arranged for: Lagging [] and/or Heat tracing []	
135	11.1.5	Purchaser to review/approve arrangement drawing prior to fabrication YES [] NO []	
136	11.8	Piping design code: ASTM A106 [] ASTM A312 [] Other []	
137	11.10	Valves to be furnished: Suction block valve []; Discharge block valve []; Check valve []; Blow down valve []	
138		Valves to have: Bolted or welded bonnets []; Bolted glands []; and be "fire-safe" (metal-to-metal seated) []	
139	11.13	Temporary start-up screens required YES [X] NO [] Removable spool piece required YES [X] No []	
140	11.14.2	Oil pipework downstream of filter to be 316 L stainless steel YES [X] NO []	
141	11.15.1	Complete on-skid coolant system to be furnished YES [] NO []	
142	11.17.2	Common distance-piece vent header, terminating at the edge of the skid required: YES [X] NO []	
143	11.17.3	Common distance-piece drain header, terminating at the edge of the skid required: YES [X] NO []	
144	11.17.4	Common packing vent header, terminating at the edge of the skid required: YES [X] NO []	
145	11.18.3	Vendor to furnish relief valves YES [X] NO [] Additional suction RV capacity req'd YES [] NO [] Sm ³ /h	
146	11.18.6	RV vent pipes to discharge to atmosphere [] or to a common header terminating at skid edge [X] or elsewhere []	
147		Atmospheric vents with weep holes at lowest point near relief valves YES [] NO []	
148	11.19	Package blowdown valve to discharge to atmosphere [] or to a common header terminating at skid edge [X] or elsewhere [] Details:	
149			
150			
151			
152		ELECTRICAL SYSTEMS	
153	8.3.3/12.2	ELECTRICAL POWER	
154		AC volts	
155		AC phases	
156		AC frequency	
157		DC volts	
158		Main prime mover	
159		Auxiliary motors	
160		UPS	
161		Instrumentation	
162		Alarm and Shutdowns	
163			
164			
165			
166			
167			
168			
169			
170	5.5	Instrument and control panel to be in accordance with Purchaser's specification YES [X] NO [] GS INS 110	
171	13.2.2/13.2.3	Panels to have enclosed backs YES [] NO [], to be free-standing on-skid [] or off-skid []	
172	13.2.5	Wiring: outside panels to be in conduits [] or cable trays [X] Wiring to remote panels in conduits [], cable trays [X]	
173	13.3.1	Tachometer in panel required YES [] NO [] Range to RPM MAX	
174	13.3.2/13.3.4	Liquid filled dial temperature gauges YES [X] NO [] Liquid filled pressure gauges YES [X] NO []	
175	13.3.5/13.3.6	Fuel gas meter YES [] NO [] Fuel shut-off valve YES [] NO []	

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180	SHUTDOWNS, ALARMS AND ANNUNCIATORS										Rev.
181	14.1	Shutdowns, alarms and annunciators shall be hydraulic [] pneumatic [] or electric [] and supplied as follows:									
182	13.3.2/ 13.3.4/ 14.1/14.3	Note: X indicates the desired action type and location of annunciation and location of the sensor. Mark each box for multiple requirements	Desired action			Type and location of annunciation				Sensor location	
183			Shutdown	Alarm	Indicator	Visual	Audible	Panel	Remote	Panel	local
184		COMPRESSOR									
185		Suction gas pressure – first stage									
186			X	X	X	X		X			
187			X	X		X		X			
188		Suction gas pressure –interstage									
189				X							
190			X	X		X		X			
191		Discharge gas pressure interstage									
192				X							
193			X	X		X		X			
194		Discharge gas pressure final stage									
195				X							
196			X	X		X		X			
197		Lube oil pressure									
198		In-filter									
199		Out-filter									
200			X	X		X		X			
201		Lube oil temperature									
202				X							
203				X							
204		High									
205		Gas temperature – each stage									
206				X							
207				X							
208			X	X		X		X			
209		Lube oil level									
210			X	X		X		X			
211		Low – lubricator									
212			X	X		X		X			
213			X	X		X		X			
214		Cylinder coolant temperature									
215											
216											
217											
218		High									
219		GAS ENGINE									
220		Manifold pressure/vacuum – High/low									
221			X	X		X		X			
222		Coolant temperature									
223											
224				X							
225			X	X		X		X			
226		Lube oil temperature									
227											
228											
229		Lube oil pressure									
230											
231				X							
232			X	X		X		X			
233		Coolant pressure									
234											
235											
236											

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		Desired action			Type and location of annunciation				Sensor location		
		Shutdown	Alarm	Indicator	Visual	Audible	Panel	Remote	Panel	local	
237											
238											
239											
240		Fuel gas pressure		X							
241		High									
242		Low	X	X	X		X				
243		Starting air/gas pressure		X							
244		Vibration – High	X	X	X		X				
245		Lube oil level									
246		Low	X	X	X		X				
247		Overspeed	X		X						
248											
249											
250											
251		ELECTRIC MOTOR – IF FURNISHED									
252		Stator winding temperature		X							
253		High	X	X	X						
254		Vibration – High	X	X							
255		Bearings temperature									
256											
257		OTHER									
258		Cooler vibration – high									
259		Cooler coolant level		X							
260		Low	X		X						
261		Inlet separator liquid level – each stage		X							
262		High	X	X	X		X				
263		Low	X		X		X				
264											
265											
266	14.6.3	Blowdown valve to open automatically on shutdown: YES [] NO []									
267		SKID									
268	15.4	Skid to be provided with walkways, stairs and platforms: YES [X] NO []									
269		PAINT AND PAINTING									
270	16.2	The environment is: Normal [] or severely corrosive []									
271		Compressor: Vendor's/Manufacturer's standard [] or special [] Details:									
272		Prime mover: Vendor's/Manufacturer's standard [] or special [] Details:									
273		Package: Vendor's/Packager's standard [] or special [X] Details: Company GS EP COR 354									
274		Air-cooled heat exchanger: Ducting/structure: Vendor's/Manufacturer's standard [], Hot-dipped galvanising [] or special [] Details:									
275		Air-cooled heat exchanger: Headers: Vendor's/Manufacturer's standard [], Hot-dipped galvanising [] or special [] Details:									
276		INSPECTION AND TESTING									
277	17.1.3	Purchaser will participate YES [] NO [] Hold and witness points as vendor's standard quality plan YES [] NO []									
278	17.1.6	Advanced notification period: working days									
279	17.2.1/ 17.3.4.2	Ultrasonic inspection of forgings YES [] NO [] Assembled package leakage test YES [X] NO []									
280	17.4.4	Dismantle for inspection: YES [] NO []									
281		PREPARATION FOR SHIPMENT									
282	19.3	Type of shipment and expected duration of storage:									
283	19.4.1	Equipment to be packed for domestic [] or export []									
284		OFFSHORE AND MARINE ENVIRONMENT									
285	21.1.3	Corrosive environment: YES [] NO [] Details:									
286	21.2	Cooler headers: Vendor's/Manufacturer's standard paint [], Hot-dipped galvanising [] or special paint [] Details:									
287	21.9.3	Furnish manual [] or pilot-operated [] suction [] and/or discharge [] block valves: YES [] NO []									
288		OTHER REQUIREMENTS									
289											
290											
291											
292											

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Ref clause	ISO 13631 - Packaged reciprocating compressor – Data sheet Vendor's design				Rev No
1					
2	Company				
3	Address				
4					
5					
6					
7					
8	Telephone				
9	E mail				
10	Fax				
11	Contact 1				
12	Contact 2				
13	Cost estimate only ☐ For purchase ☐				
14	Project name: No: Service:				
15	Inquiry No: Proposal No: Date: xx/xx/xx No of units: Delivery quoted:				
16					
17	MISCELLANEOUS				
18	Copies furnished of: Proposal Reports Drawings Data books Curves Miscellaneous:				
19	5.1	Performance curves: YES ☐ NO ☐ Range:			
20	5.3	Drawings: Approval ☐ As-built ☐ Miscellaneous ☐ Details:			
21	5.4	Noise emission: Actual sound pressure level: dB(A)			
22	5.7	Torsional report: YES ☐ NO ☐			
23	COMPRESSOR				
24	Manufacturer: Model: Rated speed: rpm. Rated power: kW				
25	Stroke: ... mm. Av. piston speed: ... m/s. Piston rod diam. ... mm.				
26	Max allowable continuous combined rod load: compression/tension kN				
27	6.1.4	Unbalanced forces and moments		Primary	Secondary
28		Horizontal force: kN			
29		Vertical force: kN			
30		Horizontal moment: kNm			
31		Vertical moment: kNm			
32	6.9.1.1/6.9.3	Distance pieces: Type: 1 / 2 / 3 Pressure relief devices: YES ☐ NO ☐			
33	6.11.6/6.11.7	Crankcase lube system: ... l. storage tank; with Level gauge: YES ☐ NO ☐ Oil heater YES ☐ NO ☐			
34	6.12.1	Cylinder lube system: Block / Pump to point type. With: line filters ☐ flow meter ☐ fault indicators ☐			
35	6.12.2	Cylinder lubricator: ... l. storage tank. With level gauge YES ☐ NO ☐			
36	6.13.1.4	Proposed welding code:			
37	6.14.2	Coupling: Type: Manufacturer: Model: Disc pack: Steel / Stainless steel			
38	COMPRESSOR CONSTRUCTION FEATURES				
39	6	Service			
40		Stage			
41		Cylinder bore – mm.			
42	6.5.2.2	Cooled / non-cooled cylinder			
43		Materials			
44		Cylinder			
45		Cylinder liner (if furnished)			
46		Piston			
47		Piston rings			
48		Wear bands			
49		Piston rod			
50		Piston rod base metal hardness-HRC			
51		Piston rod coating			
52		Coating hardness – HRC			
53		Valve seats			
54		Valve guards			
55		Valve plates			
56		Valve springs			
57		Rod packing case			
58		Rod pressure packing rings			
59		Rod wiper packing rings			
60		Crankshaft			
61		Crankshaft main journal bearings			
62		Connecting rod			
63		Connecting rod bearings			
64		Crosshead			



General Specification

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65		Compressor construction features (continued)	Rev.
66		Crosshead pin	
67		Crosshead pin bushing	
68		Crosshead shoes (if furnished)	
69		Cylinder indicator connections	
70		COMPRESSOR PERFORMANCE	
71		Case	
72		Service	
73		Stage	
74		No of cylinders	
75		Cylinder bore mm	
76		Rated discharge gauge pressure bar	
77		Max allowable working temp °C	
78		Cylinder action (DA/SACE/SAHE)	
79		Flange size/rating/facing type	
80		Piston displacement/cylinder m³/s	
81		Molar mass kg/kmol	
82		C _p /C _v (k) value	
83		Critical pressure bar	
84		Critical temperature K	
85		Compressibility (Z) at suction	
86		Compressibility (Z) at discharge	
87		Suction pressure bar	
88		Discharge pressure bar	
89		Suction temperature °C	
90		Discharge temperature adiabatic °C	
91		Discharge temp estimate actual °C	
92		Required capacity m³/h	
93		Quoted capacity m³/h	
94		Compression power/stage kW	
95		Compression power total kW	
96		Accessories power kW	
97		Compressor rated power kW	
98		$\left(\frac{\text{Compressor rated power}}{\text{Engine site rated power}} \right) \times 100 \%$	
99		Rated speed rpm	
100		Average piston speed m/s	
101		Cylinder clearance HE %	
102		Cylinder clearance CE %	
103		Total cylinder clearance %	
104		Volumetric efficiency HE %	
105		Volumetric efficiency CE %	
106		Total volumetric efficiency %	
107		Rod load (gas) – compression kN	
108		Rod load (gas) – tension kN	
109		Combined rod load – compression kN	
110		Combined rod load – tension kN	
111		Clearance pocket position % open	
112		Valve spacers installed quantity/cyl	
113		Valve velocity – average m/s	
114		Valves/cyl end – suction/discharge	
115		Valve type and size mm	
116		Valve lift mm	
117		Valve area mm²	
118			
119		COMPRESSOR CAPACITY CONTROL	
120		PART LOAD OPERATION	
121		Case	
122		Service	
123		Stage	
124		Cylinder action – (DA/SACE/SAHE)	
125		C _p /C _v (k) value	
126		Critical pressure bar	
127		Critical temperature K	
128		Compressibility (Z) at suction	
129		Compressibility (Z) at discharge	

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130	Part load operation continued					Rev.
131	Suction pressure	bar				
132	Discharge pressure	bar				
133	Suction temperature	°C				
134	Discharge temperature	adiabatic °C				
135	Discharge temp estimate actual	°C				
136	Required capacity	m³/h				
137	Quoted capacity	m³/h				
138	Compression power/stage	kW				
139	Compression power total	kW				
140	Accessories power	kW				
141	Compressor rated power	kW				
142	$\left(\frac{\text{Compressor rated power}}{\text{Engine site rated power}} \right) \times 100 \%$					
143	Actual speed					
144	Cylinder clearance HE	%				
145	Cylinder clearance CE	%				
146	Clearance pocket position	% open				
147	Valve spacers installed	quantity/cyl				
148	Clearance plug	Yes/No				
149	Clearance bottle	Yes/No				
150	Valve unloaders	Yes/No				
151	Capacity control bypass	Yes/No				
152						
153	7.3	Speed variation	YES [] NO []	Range	to rpm	Manual [] Automatic []
154	7.4.2	Clearance pockets	Fixed (open/closed) [] Variable [] None []	Manual/Automatic	Cylinders	
155	7.4.3	Valve spacers	Head end: No Cyl	Crank end: Cyl		
156	7.4.4	Clearance bottles	YES [] NO []	Cylinders		
157	7.4.6	Clearance plugs	YES [] NO []	Cylinders		
158	7.6.2/7.6.3	By-pass system	Star-up [] Capacity control []	Manual [] Auto []	Hot [] Cold []	
159	7.6.2	Valve unloaders	YES [] NO []	Plate depressors [] Plug []	Manual [] Auto [] Cyl	
160	7.7	Suction pressure reducing valve	YES [] NO []			
161						
162		PRIME MOVER – GAS ENGINE				
163		Manufacturer:		Model:		
164		Site rated power:	kW	Max allowable speed	rpm	Min allowable speed rpm
165		No of power cylinders:	Bore: mm	Stroke: mm	Displacement: m³	
166		Turbo-charged []	Naturally aspirated []	Compression ratio:	Fuel consumption:	kJ/kWh
167	8.2.3	Starting system:	electric / air / gas	ampere-hour battery []	Charging generator YES [] NO []	
168	8.2.4.2	Air filter manufacturer's standard	dry type []	Other []	Details:	
169	8.2.4.6	Air filter pressure drop indicator	YES [] NO []			
170	8.2.5	Exhaust silencer	manufacturer's standard []	Other []	Spark arresting YES [] NO []	
171	8.2.7.1	Sound attenuation:		Personnel protection []	Details:	
172	8.2.7	Exhaust gas emissions	from manufacturer's performance test []	or from actual stack test data []		
173	8.2.7.3	NOx:	Non-methane hydrocarbons:	CO₂	SO₂	At rated power [], nameplate rating []
174	8.2.9	Crankcase oil storage tank	YES [] NO []	Capacity:	litre	
175	8.2.10/8.2.12	Fuel gas filter/separator	YES [] NO []	Crankcase pressure relief devices:	YES [] NO []	
176						
177		PRIME MOVER – ELECTRIC MOTOR				
178	8.3.1	Manufacturer:		Model:		IEC rating kW
179		Synchronous / Induction	Rated power:	kW	Rated speed:	rpm
180		Frame type:	Enclosure type:	Volts:	Phase:	Frequency: Hz
181		Electrical area classification:	Insulation:	Temperature rise:	°C above	°C
182		Space heater	YES [] NO []	Volts:	Phase:	Frequency: Hz
183		Starter	YES [] NO []	IEC rating:	Manufacturer:	Full voltage [] reduced voltage []
184		Variable speed:	YES [] NO []			
185		Accessories:	Temperature detectors []	Vibration sensing []	Other:	
186						
187		COOLING SYSTEM				
188		Manufacturer:		Model:		On compressor skid [] separate skid []
189		Vertical [] Horizontal []	Electric driven []	Vee-belt driven []	Fans: No:	diam. mm
190	9.3.1.3	Sight-flow [] and/or temperature indicators []	Gas after cooler to	°C	YES [] NO []	
191		MAWGP (bar):	Water side:	Gas side: 1 st stage:	2 nd stage:	3 rd stage:
192	9.6.8	Control:	Automatic [] Manual []	on interstage gas []	and/or final discharge gas []	
193		Control by:	Louvers []	variable pitch fans []	variable speed fans []	recirculation []
194	9.6.9	Cooler insect screens	YES [] NO []	Hail guards	YES [] No []	

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195	10	PRESSURE VESSELS					Rev.
196	10.3.1	Pulsation study YES [] NO [] Details:					
197		Separators	Stage 1	Stage 2	Stage 3	Discharge	
198		Pressure vessel design code					
199		Inside diameter mm					
200		seam-to-seam length mm					
201		Design gauge pressure bar					
202		Design temperature °C					
203		Mesh pad/vane mist extractor					
204		Mist extractor material					
205		Manual drain YES/NO					
206		Type automatic drain control					
207		Type automatic drain valve					
208		Level gauge glass YES/NO					
209		Pressure indicator YES/NO					
210		Inlet flange size/rating/facing/type					
211		Outlet flange size/rating/facing/type					
212		Corrosion allowance mm					
213		Weld pads/saddles YES/NO					
214			Stage 1	Stage 2	Stage 3		
215		Suction pulsation/volume bottles					
216		Pressure vessel design code					
217		Volume m³					
218		Swept volume factor (Annex B)					
219		Inside diameter mm					
220		Seam-to-seam length mm					
221		Design gauge pressure bar					
222		Design temperature °C					
223		Inlet flange size/rating/facing/type					
224		Outlet flange size/rating/facing/type					
225		Corrosion allowance mm					
226		Type drain opening					
227		Weld pads/saddles YES/NO					
228			Stage 1	Stage 2	Stage 3		
229		Discharge pulsation/volume bottles					
230		Pressure vessel design code					
231		Volume m³					
232		Swept volume factor (Annex B)					
233		Inside diameter mm					
234		Seam-to-seam length mm					
235		Design gauge pressure bar					
236		Design temperature °C					
237		Inlet flange size/rating/facing/type					
238		Outlet flange size/rating/facing/type					
239		Corrosion allowance mm					
240		Type drain opening					
241		Weld pads/saddles YES/NO					
242							
243		PIPING AND APPURTENANCES					
244	11.1.4	Vendor will supply all piping from package suction to package discharge YES [] NO []					
245		Or piping supply shall be as follows:					
246		Suction: from separator [], pulsation suppression device [], compressor nozzle [], other []					
247		Details:					
248		Interstage: from separator [], pulsation suppression device [], compressor nozzle [], sidestream connection [], complete interstage piping system [], other []					
249		Details:					
250		Discharge: to cooler discharge [], pulsation suppression device [], compressor nozzle [], spool piece from final discharge cooler to discharge separator [], other []					
251		Details:					
252		Piping, Vessels and thermowells arranged for heat tracing and/or insulation YES [] NO []					
253	11.10	Valves in flammable or toxic service to have bolted or welded bonnets [], bolted glands [], be fire-safe []					
254	11.13	Temporary start-up screens YES [] NO []; Removable spool-piece YES [] NO []					
255	11.14.2	Oil piping downstream of filters: steel [] or austenitic stainless steel []					
256	11.15.1	Complete on-skid coolant piping system YES [] NO []					
257	11.17.2	Common distance piece vent header YES [] NO []					

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		Piping and appurtenances continued						Rev.
258								
259	11.17.3	Common distance piece drain header YES ☐ NO ☐						
260	11.17.4	Common packing vent header YES ☐ NO ☐						
261	11.18.6	Relief and blowdown valves vent to atmosphere ☐ , common header ☐ or other ☐						
262		Details:						
263	11.1-11.8	Process piping	Suction	1 st interstage	2 nd interstage	3 rd interstage	Discharge	
264		Piping I.D. mm						
265		Design gauge pressure bar						
266		Design temperature °C						
267								
268		Relief valve size mm						
269		Relief valve rating bar						
270		Relief valve setting bar						
271		Relief valve orifice mm						
272		Block valve size mm						
273		Block valve rating bar						
274		Check valve size mm						
275		Check valve rating bar						
276								
277								
278		ELECTRICAL SYSTEMS						
279	12.2	Electric motors						
280		Service						
281		Manufacturer						
282		Model						
283		Speed						
284		IEC rating						
285		Volts						
286		DC/AC phase/frequency						
287		Enclosure type						
288		Service factor						
289		Motor control manufacturer						
290		IEC rating						
291								
292	12.5	Electrical material suitable for tropical location YES ☐ NO ☐						
293								
294		INSTRUMENTS AND CONTROLS						
295	13.1.1	In addition to any capacity control the following control systems are included:						
296		Function						
297		Manual/Auto						
298	13.1.6	Pneumatic instrument supply: gas ☐ or instrument air ☐						
299	13.2.2/13.2.3	Panel: free-standing ☐ , skid-mounted ☐ , off-skid ☐ . With enclosed back YES ☐ NO ☐						
300	13.2.5	Wiring to remote panels: in conduit ☐ , armoured cable ☐ on cable trays ☐						
301	13.3.1	Panel mounted digital ☐ or analogue ☐ tachometer						
302	13.3.2-13.3.5	Liquid-filled temp indicators ☐ , liquid-filled pressure indicators ☐ , fuel gas meter ☐ , shut-off valves ☐						
303								
304								
305								
306		NOTES						
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Appendix 1

Exploration & Production

Data Sheet

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321		SHUTDOWNS, ALARMS AND ANNUNCIATORS										Rev.
322	14.1	Shutdowns alarms and annunciators: pneumatic [] ,hydraulic [] or electric [X]										
323		Note: X indicates the desired action type and location of annunciation and location of the sensor. Mark each box for multiple requirements	Desired action			Type and location of annunciation				Sensor location		
	14.3		Shutdown	Alarm	Indicator	Visual	Audible	Panel	Remote	Panel	local	
324		COMPRESSOR										
325		Suction gas pressure – first stage										
326		Low	X									
327		High										
328		Suction gas pressure –interstage										
329		Low										
330		High										
331		Discharge gas pressure interstage										
332		Low										
333		High	X									
334		Discharge gas pressure final stage										
335		Low										
336		High	X									
337		Lube oil pressure										
338		In-filter										
339		Out-filter										
340		Low	X									
341		Lube oil temperature										
342		In										
343		Out										
344		High										
345		Gas temperature – each stage										
346		Suction										
347		Discharge – each cylinder	X									
348		High – each cylinder										
349		Lube oil level										
350		Low – frame										
351		Low – lubricator										
352		Lubricator – no flow	X									
353		Vibration - high	X									
354		Cylinder coolant temperature										
355		In										
356		Out – each cylinder										
357		High										
358												
359												
360		GAS ENGINE – IF FURNISHED										
361		Manifold press/vacuum – High/low										
362		Coolant temperature										
363		In										
364		Out										
365		High	X									
366		Lube oil temperature										
367		In										
368		Out										
369		High										
370		Lube oil pressure										
371		In – filter										
372		Out – filter										
373		Low	X									
374		Coolant pressure										
375		In										
376		Out										
377		Low										

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Rev: 04

378	Shutdowns alarms and annunciators continued										Rev.		
379	Note: X indicates the desired action type and location of annunciation and location of the sensor. Mark each box for multiple requirements			Desired action				Type and location of annunciation				Sensor location	
				Shutdown	Alarm	Indicator	Visual	Audible	Panel	Remote	Panel	local	
380	Gas Engine continued												
381	Fuel gas pressure												
382	High												X
383	Low												X
384	Starting air/gas pressure												
385	Vibration – High												X
386	Lube oil level												
387	Low												
388	Overspeed												X
389													
390													
391	ELECTRIC MOTOR (if furnished)												
392	Stator winding temperature												
393	High												X
394	Vibration - High												X
395													
396													
397	OTHER												
398	Cooler vibration – high												X
399	Cooler coolant level												
400	Low												X
401	Separator liquid level												
402	High												X
403	Low												
404													
405													
406													
407	14.6.3	Furnish blowdown valve YES [] NO [] To open automatically on shutdown YES [] NO []											
408													
409	SKID												
410	15.1	Structural steel [], Pre/post stressed concrete [], Concrete filled structural steel [],											
411	Other [] Details:												
412	15.2.6	Number of foundation bolts per side:											
413	15.4	Beam: Flange mm Weight kg Floor plate: YES [] NO [] Walkways YES [] NO [] Stairs YES [] NO []											
414	Main skid												
415	Height: mm												
416	Width: mm												
417	Length: mm												
418	Weight: kg												
419													
420	PAINT AND PAINTING												
421	16.1	Package: Vendor's/Package's Standard [] Special [] Details:											
422	16.1	Compressor: Vendor's/Manufacturer's Standard [] Special [] Details:											
423	16.1	Prime mover: Vendor's/Manufacturer's Standard [] Special [] Details:											
424	16.6	Air cooler ducting/structure: Vendor's/Manufacturer's Standard [] Special [] Details:											
425	Heat exchanger: Hot-dipped galvanising [] Special [] Details:												
426	Headers: Vendor's/Manufacturer's Standard [], Hot-dipped galvanising [], Special [] Details:												
427													
428	INSPECTION AND TESTING												
429	17.13/17.3	Tests performed: Review of quality control [], Hydrostatic [], Mechanical run [], Package leak test []											
430	Other [] Details:												
431													
432													
433	PREPARATION FOR SHIPMENT												
434	19.4.1	Export crated YES [] NO [], Vendor storage YES [] NO [] Special shipment preparation YES [] NO []											
435	Details:												
436													
437													