

Gas Industry Standard

GIS/SCREW1
2025

Specification for

**Gas Compressor Systems – Rotary Type Compressor
Packages (overlay to ISO 10440 part 1)**



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Foreword

Gas Industry Standards (GIS) are revised, when necessary, by the issue of new editions. Users shall ensure that they are in possession of the latest edition. Contractors and other users external to gas transporters shall direct their requests for copies of a GIS to the department or group responsible for the initial issue of their contract documentation.

Comments and queries regarding the technical content of this document shall be directed in the first instance to the contract department of the gas transporter responsible for the initial issue of their contract documentation.

This standard calls for the use of procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Compliance with this engineering document does not confer immunity from prosecution for breach of statutory or other legal obligations.

Mandatory and non-mandatory requirements

In this document:

- may:** indicates an option that is not mandatory;
- shall:** indicates a mandatory requirement;
- should:** indicates best practice and is the preferred option. If an alternative method is used then a suitable risk assessment shall be completed to show that the alternative method delivers the same, or better, level of protection.

Disclaimer

This engineering document is provided for use by gas transporters and such of their contractors as are obliged by the terms of their contracts to comply with this engineering document. Where this engineering document is used by any other party, it is the responsibility of that party to ensure that the engineering document is correctly applied.

Brief history

First publication December 2025	GIS/SCREW1
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Key changes

Section	Amendments

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Scope

This GIS specifies requirements for rotary type compressors be used for 'within grid gas compression', owned and operated by Gas Distribution Networks.

This procedure is part of a suite of documents for this application, as follows:

Tier	Type	Document No.	Title
1	Management Procedure	GDN/PM/COMP1	Gas Compression Systems – Selection & Design
2	Specification	GIS/COMP2	Gas Compression Systems – General Off-package requirements and scope of supply
		GIS/COMP3	Gas Compression Systems – General On-package requirements and scope of supply
3	Specification	GIS/RECIP1	Specification for reciprocating compressor packages (overlay to ISO13631)
		GIS/RECIP2	Specification for reciprocating compressor packages (Over to API 618)
		GIS/SCREW1	Specification for screw compressor (overlay to ISO 10440 part 1)
		GIS/CENTRIF1	Specification for centrifugal compressor (overlay to API 617)

Table 1 – Related documents

Supplement to ISO 10440 part 1 - Specification for Rotary Type Positive Displacement Compressors

This document specifies additional or modified requirements for packaged screw gas compressors as described in ISO 10440 part 1: 2007.

This supplement shall only be applied for:

- Gas compression packages within UK Gas Distribution Networks

The manufacture and procurement in accordance with this document shall in all respects conform to the requirements of ISO 10440-1, except where supplemented or amended by this document. The supplements and amendments detailed in this document shall take precedence over the corresponding guidance in ISO 10440-1. The supplements and amendments correspond to the applicable clause number in ISO 10440-1. Clauses in ISO 10440-1 that remain unchanged are not repeated in this document.

1 Scope

Add

Compressors in hydrogen service are included in this list (unless agreed with Purchaser through meeting Section 4.4.2 of GIS/COMP3)

2 Normative References

Add

If references below are dated, then the dated version only applies. If reference is not dated, then latest version of reference is applicable.

Add

Gas Distribution Network documents;

GDN/PM/COMP1 Gas Compression Systems – Selection & Design Process

GIS/COMP2 Gas Compression Systems – General Off-package requirements and scope of supply

GIS/COMP3 Gas Compression Systems – General On-package requirements and scope of supply

3 Terms and definitions

No Amendments

4 General

4.1 Pressure design code

Modify First Sentence to Read

Pressure design code shall be specified by Supplier and shall be subject to approval by Purchaser. The preferred pressure vessel design code is PD5500, with compliance to any Purchaser specific overlay provided.

4.3 Units of measurement

Modify to Read

Unless specified otherwise, Supplier data, drawings, documents, and nameplates shall be in the system of units specified on the data sheets.

5 Basic design

5.1 General

5.1.19 Add

- a. Noise data shall be submitted on data sheets with proposal.
- b. If Supplier cannot conform to limits without addition of noise attenuation features, noise levels with and without these features shall be stated in proposal. Noise attenuation measures proposed by Supplier shall not conflict with other requirements.

5.1.20 Add

Noise reduction measures shall be considered where possible.

An option shall be supplied to reduce the noise to 60 dB(A) at 1m from the acoustic enclosure

- a. Noise attenuating enclosures shall be used only if there is no alternative form of noise control.
- b. Enclosure designs shall be such that operation and maintenance are not compromised.
- c. Instrumentation and controls shall be either:
 1. Mounted externally to enclosure.
 2. Clearly visible and controllable from outside of enclosure.
- d. Enclosures shall be ventilated and cooled.
- e. Instrumentation, sensors, and cables installed inside enclosures shall not be subjected to an environment that causes component to be operated outside Supplier specified ambient temperature limits.
- f. Area classification within an enclosure should be a Zone 2 subject to agreement by Purchaser responsible engineer.

5.2 Pressure casing

5.2.10 Add

Joint compound shall be recommended by Supplier and shall be compatible with process gas.5.2.17 Add

- a. Studded connections shall be provided with studs installed.
- b. Blind stud holes shall only be drilled deep enough to allow the preferred tap depth of 1 1/2 times major diameter of stud.

5.3 Casing connections

5.3.2 Modify Last Sentence to Read

Flanged connections may be integral with the casing or, for casings of weldable material, may be formed by a butt welded pipe nipple or transition piece and shall terminate with a welding neck flange.

5.3.3 Add

Welded connections shall be attached prior to casing heat treatment.

5.3.4 Add

Casing drains shall have valves and flanges, and shall not be manifolded.

5.3.8 Modify to Read

Pipe nipple shall have a welding neck flange.

5.4 External forces and moments**5.4.1 Add**

Actual forces and moments acting on each nozzle shall be calculated, presented in tabular form along with allowable limits, and shall be less than the allowable limits set by Supplier. The party responsible for calculating the actual forces and moments shall be subject to agreement by Purchaser. The Supplier shall at the very least furnish the Purchaser with maximum allowable forces on all process connection interfaces.

5.5 Rotating elements**5.5.1 Rotors****5.5.1.3 Delete from First Sentence**

“If specified or”

5.6 Shaft seals**5.6.1 General****5.6.1.4 Add**

Shaft seals and ancillary systems shall be designed for operation at pressures up to maximum allowable working pressure.

5.6.2 Seal support systems**5.6.2.3 Delete from First Sentence**

“If specified”

5.7 Dynamics**5.7.3 Vibration and balance****5.7.3.6 Add**

- a. Magnitude of vibration during start-up and acceleration to operating speed shall not exceed 150% of limits in Table 4 or Table 5.
- b. Limits of Table 4 or Table 5 shall also apply if compressor is in service at site.

5.8 Bearings**5.8.1 General****5.8.1.5 Modify to Read**

- a. For hydrodynamic radial and thrust bearings:
 1. Dual element RTD shall be installed

2. Supplier's standard temperature measurement arrangement may be used subject to approval by Purchaser.
 3. If standard bearing temperature measurement proposed, Supplier shall include full details of the arrangement in the proposal.
- b. Active and inactive thrust bearings shall have two dual element RTDs, each located at pad 75/75 trailing edge position and allowing from 0,13 mm to 0,25 mm (0,005 in to 0,010 in) backing material between probe and babbitt.
 - c. Instrumented pads shall be installed π radians (180 degrees) apart with one pad in highest oil temperature zone.
 - d. Drilling through babbitt face to install RTDs shall not be used.
 - e. RTD leads shall have PTFE cover and flexible stainless steel over-braiding from couple to terminal strip mounted on equipment.
 - f. Terminal strips shall have extension leads routed in flexible conduit to terminal strip externally mounted in accessible junction box.

Add

- 5.8.1.6 Unless the machine has features to prevent reverse rotation, radial and thrust bearings shall withstand reverse rotation for short periods of time without damage.

5.8.3 Hydrodynamic bearings

5.8.3.2.1 Add

Inactive and active sides of the thrust bearing shall have equal load carrying capacity.

5.8.3.2.2 Add

Faces of thrust collar shall not have more than 8 μm (0,3 μin) total indicated runout.

5.9 Bearing housings

5.9.6 Delete from First Sentence

"If specified"

5.9.7 Delete from First Sentence

"If specified"

5.9.8 Delete from First Sentence

"If specified"

Add

- 5.9.9
- a. If separate seal and lube oil systems are used, seal and bearing housings shall have positive separation to ensure cross flow of seal oil into lubricating system and that vice versa cannot occur.
 - b. This shall be performed without external purge gas.
 - c. Separation of oil streams shall be demonstrated during shop test.

5.10 Lube-oil and seal-oil systems**5.10.1 General**Add

- 5.10.1.3 a. Seal oil systems of compressors shall can be common with lube oil systems.
- 5.10.1.4 Seal oil systems of compressors handling flammable gases shall be separate from lube oil system of HV motors 3 kV and above unless Ex d or Ex p construction.
- 5.10.1.5 a. Unless it is certain that seal oil contaminated with process gas will remain fit for direct reuse, the seal inward (contaminated) flow shall not exceed 50 litres (13 US gal) per seal day.
- b. This shall apply even if seals are buffered by clean non-contaminating gas.
- c. Methods to degas and clean contaminated seal oil to restore flash point, viscosity, and other properties shall be stated in proposal.
- d. Such systems shall include storage facilities for at least 3 days of normal consumption.

5.10.3 Flooded screw compressors**5.10.3.2 Oil filters**Add

Oil filter bodies shall be designed in conformance to pressure design code in 4.1.

5.10.3.3 CoolersAdd**5.10.3.3.4**

Cooler bodies shall be designed in conformance to pressure design code in 4.1.

5.10.3.5 Oil separatorsAdd**5.10.3.5.4**

Separators shall be designed in conformance to pressure design code in 4.1.

5.11 Materials**5.11.1 General****5.11.1.2** Add

Cast iron shall not be used.

5.11.1.15 Add

Bolting shall be permanently marked with standard designations, including material grade.

5.11.2 CastingsAdd

- 5.11.2.1.5 For compressor greater than 750 kW (1 000 bhp) tensile and keel blocks shall be cast at the end of pour with minimum thickness equal to thickest section of main casting and

these blocks shall be tested for tensile strength, and hardness and microscopically examined.

5.11.4 Welding

5.11.4.2 Add

- a. Pressure containing castings shall only be repaired subject to approval by Purchaser.
- b. Before performing repair, Supplier shall submit sketches to Purchaser showing defective area, proposed method of repair, materials to be used, welding procedure, and approval request.
- c. Repairs shall be documented for permanent Purchaser record.

5.11.4.11 Add

- a. Casing welds shall be 100% radiographed, unless approved otherwise by Purchaser responsible engineer.
- b. Root passes on casing welds shall be dye penetrant inspected.

5.13 Quality

Add

The quality management system shall conform to ISO 9001, API Specification Q1, or other agreed internationally recognised standard to ensure that the products and services provided conform to the requirements for supplier quality identified in the Purchase Order.

6 Accessories

6.1 Drivers

6.1.1 General

6.1.1.1 Modify to Read

Electric motor shall be specified with variable speed capacity control as the prime mover. Driver size depends on operating conditions that might be encountered by compressor. The electric motor shall be sized at 110% of maximum power required.

6.1.2 Motors

6.1.2.2 Modify to Read

- a. The motor shall conform to the following as a minimum: IEC 60034, IEC 60072, IEC 60079 and IEC 60529. Larger motors shall comply with API 541 or API 546. Motors below the power of API 541 and API 546 shall comply with IEEE 841.

Variable speed drives in addition to the above shall conform to the following as a minimum:

1. For low voltage variable speed drive - IEC 61800-2, EN ISO 13489
2. For high voltage variable speed drive - IEC 61800-3, IEC 61800-4, 61800-5-1
3. For medium voltage variable speed drives - IEEE 1566

Motor and variable speed drive specifications shall be confirmed by Purchaser before final tender.

- b. Exclusive of service factor, motor nameplate shall be minimum 110% of maximum power required to cover full compressor operating envelope at 100% slide valve setting and discharge pressure at relief valve setting plus 10% accumulation.
- c. Driver shall be able to drive compressor at relief valve set pressure (including accumulation) under worst combination of specified utility, ambient, and process conditions without margin.

6.1.2.3 Modify to Read

- a. Motor starting torque shall start the compressor under full suction pressure against closed discharge check valve, with bypass valve open or compressor slide valve in 90% unloaded position.
- b. Motor shall start and accelerate to full speed in no more than 15 s with starting voltage level 80% of normal voltage as specified on data sheets.

6.1.3 **Steam turbines**

Modify to Read

Steam turbine as drivers for compressors shall not be selected.

6.2 **Couplings and guards**

6.2.2

Add

- a. Compressors shall be connected to driver or gearbox by dry, flexible disk, spacer type coupling.
- b. Couplings shall be dry disc or diaphragm.

6.3 **Mounting plates**

6.3.1 **General**

6.3.1.1 Modify to Read

The equipment shall be furnished with baseplates.

6.3.1.9 Add

- a. Levelness requirements shall be conformed to without clamping down baseplate and after welding to baseplate has been completed.
- b. Machined pad elevations shall require installation of no more than 6 mm (1/4 in) shim pack under each component once final alignment is achieved. Vertical placement of equipment shall be set to compensate for operating temperatures.
- c. Machine train shall have a tag that shows degree of misalignment from manufacture at factory.
- d. In compressor motor machine trains, no shims shall be located under compressor feet. In compressor gearbox motor trains, no shims shall be under gearbox feet.
- e. Shims shall:
 - 1. Straddle the hold down bolts.
 - 2. Not be tapered, stepped, or peelable.

- f. No more than three shims at each of the feet shall be supplied to achieve final alignment in Supplier shop.
- g. Shim materials for compressors in marine environment service shall be 316L stainless steel.

Add

6.3.1.13

- a. Compressor and driver shall be shop aligned prior to shipment.
- b. Acceptance criteria shall be that the driver corrective horizontal and vertical movements at the feet are within 0,05 mm (0,002 in).
- c. For machinery train without a gearbox, additional shim changes for final field alignment shall only be performed under driver. Driver shall be the movable element.
- d. For machinery train with a gearbox, the gearbox is a fixed element unless specified otherwise in Supplier's installation manual. Additional shim changes for final alignment shall be performed under both compressor and driver.

6.3.2 Baseplates

6.3.2.1 Add

Single continuous baseplate for compressor, gear unit, driver, and control panel shall be provided, unless impractical for shipping reasons.

6.3.2.2 Add

- a. Single piece common compressor, transmission gearbox and driver baseplates shall have drip lip or drain pan design.
- b. Low points on opposite ends of baseplate shall have NPT 2 (minimum) drain connections.

6.3.2.3 Delete from First Sentence

"If specified"

Add

6.3.2.10

- a. Load bearing components shall be full depth members.
- b. Equipment shall be mounted on load bearing components and secured by bolting.
- c. Baseplate shall be of welded construction.
- d. Welding shall be continuous for the components.
- e. Height of shaft centrelines shall be minimised consistent with compressor and driver bottom clearances and self draining configuration.
- f. Underside of fabricated baseplates beneath compressor, transmission gearbox and driver supports shall be welded to reinforcing cross members, and members shall be shaped at intersections to allow fitted (keyed) joints.
- g. Supports and braces shall not be attached to unsupported floor plate.

6.3.2.11

- a. Lifting connection shall be either "padeye" or "bollard" type.
- b. Four point lift shall be provided. Spreader beam shall be provided, if specified in Purchase Order. Both shall be specifically designed for baseplate being supplied

and shall be certified for safe working load to conform to local and national requirements.

6.4 Controls and instrumentation

6.4.1 General

6.4.1.1 Add

Supplier shall review proposed control systems to verify suitability for monitoring and sequencing compressor through pressurisation, start-up, operation, shutdown, and depressurisation. Compatibility with Supplier supplied control equipment shall also be verified.

6.4.2 Control systems

Add

6.4.2.6 Driver controls shall be integrated into same panel as compressor controls.

6.4.3 Instrument and control panels

6.4.3.1 Delete from First Sentence

"If specified"

Add

If no detailed specifications are provided in the Purchase Order, instrumentation, controls and solenoids, control panels, and installation shall conform to also API RP 551.

Add

6.4.3.5 Instrument panels shall contain indication of individual alarms, individual trips, and important instruments and controls for compressor, driver, transmission, and auxiliaries to facilitate rapid fault finding and safe control with minimum personnel.

6.4.3.6 The following instrumentation shall be minimum required for local panel. Particular installations may require additions if specified in Purchase Order.

- a. Suction and discharge temperature indication for each compressor stage.
- b. Suction and discharge pressure indication for each compressor stage.
- c. Annunciation of utility standby equipment automatically brought into operation.
- d. Bypass flow indication, if applicable.
- e. Instrumentation for lubricating and seal oil systems.
- f. Instrumentation for driver and transmission coordinated by Supplier.
- g. Vibration monitoring (Motor, gearbox and compressor casings)
- h. Temperatures pre and post any coolers / heat exchangers.

6.4.3.7 Additional instrumentation shall be included as specified on data sheets and as recommended by Supplier for safe operation and protection of compressor (for example, low oil pressure, high discharge temperature).

- 6.4.3.8
- a. Instruments shall have individual, permanently attached stainless steel identification tags.
 - b. Junction boxes, bulkhead plates, cable transits, and blind enclosures shall have individual, fixed identification tags.

- c. Instruments and controls shall be installed with isolation to allow removal while system is in operation. Pressure sensing instruments shall be provided with safe drain or vent facilities.

6.4.4 Instrumentation

6.4.4.2 Tachometers

Delete from First Sentence

"If specified"

6.4.4.3 Vibration and position detectors

6.4.4.3.1 Delete from First Sentence

"If specified"

6.4.4.3.2 Delete from First Sentence

"If specified"

Add

- 6.4.4.3.4 Vibration monitoring equipment, if provided, shall be standardised for complete set (driver, transmission, and compressor). Details shall be included in proposal.

6.4.4.4 Bearing temperature monitor

Delete from First Sentence

"If specified"

6.4.5 Alarms and shutdowns

6.4.5.1 General

6.4.5.1.2 Add

- a. The following alarms shall be minimum required, unless otherwise specified in Purchase Order:
 - 1. Gas discharge, high temperature (for each stage).
 - 2. Compressor suction vessel high level.
 - 3. Buffer gas differential pressure, low, if applicable.
 - 4. Alarms for lubrication, shaft sealing, and control oil systems.
 - 5. High lubricating oil temperature.
 - 6. Alarms for driver and transmission.
 - 7. Vibration across machinery rotating train
 - 8. High gas differential pressure.
- b. The following trips shall be minimum required, unless otherwise specified in Purchase Order:
 - 1. Manual, local on machine.
 - 2. Compressor suction vessel high-high level.
 - 3. Trips for lubrication, shaft sealing, and control oil systems.
 - 4. Trips for driver and transmission.

5. Gas discharge, high temperature (for each stage).

6.4.5.1.5 Modify First Sentence to Read

Unless specified otherwise, valving and switches or bridging links shall be provided to enable instruments and other components to be replaced with the equipment in operation.

6.4.5.3 **Event recorder**Delete from First Sentence

"If specified"

6.4.5.4 **Annunciator**6.4.5.4.1 Delete from First Sentence

"If specified"

6.4.5.5 **Alarm and trip devices**6.4.5.5.1 **General**Modify First Sentence to Read

Individual alarm and trip devices shall be transmitters unless specified otherwise.

6.4.5.5.2 **Locally-mounted switch initiation**6.4.5.5.2.2 Modify to Read

Switches shall be hermetically sealed, double pole, double throw, 5 A minimum at 120 VAC and 1/2 A minimum at 120 VDC. Mercury switches shall not be used.

6.4.5.5.2.3 Modify to Read

Electric switches installed to initiate both alarm and shutdown (trip) functions shall be closed (energised) during normal machine operating conditions and open (de-energised) to initiate alarm or trip action.

6.4.5.5.2.6 Add

An orifice shall be installed immediately before drain or vent facility for testing alarm and shutdown initiating pressure switches.

6.4.6 **Electrical systems**6.4.6.1 Add

Installations shall conform to Dangerous Substances and Explosive Atmosphere Regulations 2002 (DSEAR), The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 S.I. 2016 No. 1107 , BS7671 and shall be selected and installed in conformance to IEC 60079 -14.

6.5 **Piping**6.5.1 **General**6.5.1.1 Add

- a. Threaded and socket-welded piping shall not be used for gas service.
- c. Except for water, air and inert gas services, socket-welded piping connections shall not be used on piping systems. Piping connections and fittings shall be butt welded.

6.5.1.5 Add

- a. Piping and conduit shall be designed for maintainability. Piping and conduit which interferes with maintenance, overhaul or equipment removal shall be removable. Non-removable piping shall not hamper removal of bearings, seals, or compressor internals.
- b. Piping for lubricating and seal oil systems shall be grouped for convenient connection to remotely located units.
- c. General accessibility for operation, maintenance, and thorough cleaning (including flushing) shall be met by flanged connections. Components requiring removal for maintenance shall also be flanged (for example, control valves).

Add**6.5.1.7**

- a. Piping shall terminate with flanged connections 50 mm (2 in) inside edge of base.
- b. Interconnecting piping between equipment groupings and off baseplate facilities shall be provided as specified in the Purchase Order.
- c. Flanges shall be provided at equipment connections to allow disassembly for inspection and maintenance.
- d. Piping that is to be shipped separately to field shall be fitted prior to shipment and clearly tagged for field reassembly.
- e. Tags shall be referenced to piping schematics.
- f. Piping tags and wire shall be metallic corrosion resistant construction.
- g. For socket welding, a 1,5 mm (1/16 in) gap shall be left between pipe and bottom of socket.
- h. Lube oil piping shall be butt welded flanged construction (no socket weld).
- i. Piping and piping connections to compressor shall be at least DN 20 (NPS 3/4).

6.5.2 Auxiliary systems pipingAdd**6.5.2.1**

For oil flooded screw compressors, components exposed to lubricating oil shall be of materials selected and designed for service that is exposed to both lubricating oil and process gas.

6.5.2.2

- a. Lube oil piping and valves shall be 316L stainless steel butt weld or flanged construction.
- b. Socket welds and slip on flanges shall not be used.

6.5.4 Process piping**6.5.4.1**Add

Materials for natural gas service only shall conform to the following table (for Hydrogen service, the supplier shall offer specification for agreement with Purchaser). The supplier may offer alternatives, but shall be agreed with the Purchaser prior to Purchase order being raised;

Material Restrictions for all Product Forms	
Construction materials	Carbon steels PD5500 Group 1.1 & 1.2
Carbon content	0.22% max

Carbon equivalent (IIW formula)	0.43 max
Charpy test temperature (max)	-20°C unless design dictates lower
Minimum charpy test value	40 J average, 30 J individual
Origin	European source only
Certification	EN 10204 Type 3.1 minimum requirement
Product forms	
Fittings	ASME B16.9, ASTM A420 WPL6 or ASTM A234 WPB (with impact testing)
Pipe (Seamless)	API 5L or BS EN 3183. PSL2 Quality Or ASTM A106B (providing material restrictions are complied with)
Forgings e.g. flanges, branch connections	ASTM A350 LF2 or ASTM A105N (with impact testing) Flanges to ASME B16.5 Reinforced Branch connection to MSS SP-97

Add

- 6.5.4.5
- Piping nipples DN 50 (NPS 2) and smaller that are welded to process piping or equipment shall be minimum Schedule 160 or one schedule heavier than piping schedule, whichever has the heavier wall. This requirement shall apply up to and including first valve, fitting, or flange.
 - Schedule 40 pipe nipples shall be used for sizes larger than DN 50 (NPS 2).
 - If carbon steel piping is used, fittings, valves, and flanged components shall be constructed of steel and shall conform to ASTM A105.
 - Flanges shall conform to ASME B16.5.
 - Unions shall be Class 3000 or Class 6000 (which ever is appropriate given design pressures)
 - Use of seamless stainless steel tubing shall be subject to approval by Purchaser. If permitted, fittings shall also be stainless steel.
 - Flareless fittings shall not be used above 149°C (300°F).
 - Internals of piping and appurtenances shall be accessible through openings or by dismantling for complete visual inspection and cleaning.
 - Slip on flanges shall not be used.

6.6 Intercoolers and aftercoolers6.6.3 Add

Heat exchangers shall comply with section 4.1.

6.6.12 Modify Second Sentence to Read

Inter-stage piping shall be supplied by the vendor and comply with section 6.5.4.1.

Add

- 6.6.13 Tubes in hydrogen service and in other services, as specified, shall be seal welded. Hydrogen service is defined as gas that contains hydrogen at partial pressure of 5 bar abs (72,5 psi abs) or higher.

6.7 Inlet air filters**6.7.1 Modify Second Sentence to Read**

High efficiency filters shall remove 97% of particles 1 micron (0,04 µin) or larger over the inlet capability range.

6.8 Inlet separators**6.8.2 Modify First Sentence to Read**

The need for a high efficiency inlet separator, for installation upstream of the compressor, to remove free liquids and solid particles from the process gas stream shall be subject to agreement with the Purchaser. If required, the high efficiency inlet separator shall be provided by Supplier.

6.8.3 Modify First Sentence to Read

If an inlet filter or separator is specified, a differential pressure indicator and alarm shall be provided across the filter(s).

6.9 Pulsation suppressors/silencers for dry screw compressors**6.9.4 Modify Equation 3 to Read**

$$p_{pp} := \frac{28.6}{(p_{AM})^{\frac{1}{3}}}$$

Modify Equation 4 to Read

$$p_{pp} := \frac{15}{(p_{AM})^{\frac{1}{3}}}$$

6.9.5 Add Much of the noise emitted by rotary compressor installations is from pipework as a result of pressure pulsations. For this reason, silencers have most effect if placed as close as possible to the compressor. If silencers cannot be mounted on compressor, flange suction or delivery pipes might need to be insulated to reduce sound.

6.10 Special tools**6.10.2 Modify Second Sentence to Read**

Special tools shall be permanently marked with their part number, equipment tag number, and purpose.

7 Inspection, testing and preparation for shipment**7.1 General****7.1.2 Delete from First Sentence**

“If specified”

7.1.6 Modify to Read

Notice of at least 10 days (working) shall be provided for Purchaser observed or witnessed testing.

Add**7.1.7 Inspection and test plan**

- a. Prior to the start of manufacture, an ITP shall be submitted for approval by Purchaser (please reference GIS/COMP3 Appendix A for generic ITP).
- b. The ITP shall include inspection and testing activities to be performed, including those at sub-suppliers' works and shall make reference to all testing procedures, control documents, and resulting records and reports.

7.1.8 Inspection access

- a. Purchaser and any Purchaser appointed representative shall at all times have access to the workshops and testing facilities, including workshops of sub-suppliers engaged in supplying material or in fabricating the equipment for the purpose of inspecting the purchased equipment.
- b. Purchaser and any Purchaser appointed representative shall be granted permission to photograph the equipment in the scope of the Purchase Order during manufacturing, assembly and test.

7.2 Inspection**7.2.1 General****7.2.1.1 Modify f) to Read**

Final assembly, maintenance, and running clearances shall be documented and supplied to Purchaser in the operating and maintenance manual at time of shipment.

7.2.3 Mechanical inspection**7.2.3.3 Add**

Piping and components to be inspected by Purchaser for cleanliness shall be identified in the inspection and test plan.

Add

- 7.2.3.5 Flanged openings shall be inspected prior to shipment. Flange faces shall have no dents, scratches, gouges, or depressions.

7.3 Testing**7.3.1 General****7.3.1.2 Add**

Test procedure shall include:

- a. List of parameters to be measured, monitored, and recorded.
- b. Expected ranges for each point.
- c. Rejection level for each point.
- d. Test agenda.
- e. Personnel assignments and responsibilities.

7.3.2 Hydrostatic tests**7.3.2.4 Modify to Read**

Pressure containing parts or complex systems, subject to agreement by Purchaser responsible engineer, shall have a minimum test duration of 120 min, during which time neither leaks nor seepage through pressure containing parts or joints shall be observed.

- a. Hydrottest shall be certified.
- b. After testing:
 1. Water shall be totally drained.
 2. Standing water shall not be allowed to evaporate to dryness.
 3. Standing water shall be wiped dry.
 4. New seals, gaskets and O rings shall be used during any rebuilds or re-assembling.

7.3.3 Mechanical running test**7.3.3.1 Requirements prior to the mechanical running test****7.3.3.1.7 Add**

If contract driver is used, contract couplings shall be used.

7.3.3.3 Requirements during the mechanical running test**7.3.3.3.4 Delete from First Sentence**

"If specified"

7.3.3.4 Requirements after the mechanical running test is completed**7.3.3.4.3 Add**

This test shall be conducted after the post test inspection (see 7.3.4.10).

7.3.4 Optional tests**7.3.4.1 General****Add**

The following tests shall be performed as a minimum:

- a. Performance test in conformance to 7.3.4.2 for first of each type.
- b. Complete unit test in conformance to 7.3.4.3.
- c. Helium test in conformance to 7.3.4.7 if the molar mass of the process gas handled is less than 12.
- d. Sound level test in conformance to 7.3.4.8 for first of each type.
- e. If proximity probes are installed, deceleration test shall be performed in conformance to 7.3.4.4.
- f. A post test inspection in conformance to 7.3.4.10. Scope of the inspection shall be agreed by Purchaser and included in the inspection and test plan.
- g. Tests shall be as specified on data sheets or agreed prior to Purchase Order placement.
- h. Sequencing of tests shall be subject to agreement by Purchaser.

7.3.4.2 Performance test

Add

If capacity control is by built in slide valve:

- a. Full performance test shall be required with slide valve set for maximum capacity.
- b. Operation of slide valve through full range of travel shall be demonstrated.
- c. Measurements shall be taken at reduced capacity to assess degree of turndown and control achievable.

7.4 Preparation of shipment

7.4.1 Modify Third Sentence to Read

The preparation shall make the equipment suitable for 12 months of outdoor storage from the time of shipment, unless specified otherwise in the Purchase Order, with no disassembly required before operation except for inspection of bearings and seals.

Add

- a. Preservation and packaging procedure shall be submitted with equipment proposal for Purchaser review.
- b. If the storage requirements are for more than 12 months storage, preservation and packing shall be reviewed by Purchaser responsible engineer to ensure that it conforms to the project requirements which will be more onerous.
- c. Equipment or materials that contain or are coated with regulated substances, such as the following, shall be prominently tagged at openings to indicate nature of contents and precautions for shipping, storage, and handling:
 1. Insulating oils.
 2. Corrosion inhibitors.
 3. Antifreeze solutions.
 4. Desiccants.
 5. Chemical substances.
 6. Hydrocarbon substances.
- d. Regulated substances shall have a MSDS.
- e. MSDSs shall:
 1. Conform to regulations for MSDS preparation specified by the entity that has jurisdiction
 2. Include a statement that the substance is considered hazardous by regulation.
- f. If a substance is exempt from regulation, a statement to that effect shall be included.
- g. Before shipment, MSDSs shall be forwarded to receiving facility.
- h. At shipment, MSDSs in protective envelopes shall be affixed to the outside of the shipment.

7.4.3 Add to a)

Final coat shall be applied following final testing.

Modify b) to Read

Except for corrosion resistant material, exterior machined surfaces shall be coated with thick film of rust preventive and wrapped, if feasible, with weatherproof tape.

Delete from First Sentence of g)

"If specified"

7.4.8 Delete

"If specified"

7.4.9 Delete from First Sentence

"If specified"

Add

7.4.10 Preparation of equipment for transportation shall conform to the packing, marking, and shipping instructions or other documents identified in the Purchase Order.

8 Vendor's data**8.1 General**Add

8.1.4 Referring to GIS/COMP3 Appendix B, the technical data, registers, documents, and drawings that together define the scope of the Purchase Order shall be agreed prior to purchase order placement.

8.2 Proposals**8.2.1 General**Add

- a. Proposal shall include either:
 - 1. Specific statement that equipment is in conformance to Purchaser specifications.
 - 2. Specific list, with explanation, of deviations from Purchaser specifications.
- b. Unless specific exception is recorded under heading "exceptions" in Supplier proposal, it shall be mutually understood that proposal is based on equipment that conforms to specifications.

8.2.3 Technical dataModify f) to Read

List of spare parts recommended for start-up, normal maintenance, and a major overhaul of the supplied equipment.

Add

- r) Acoustic enclosure design detail to verify ease of operation and maintenance.
- s) Built in volume ratio.
- t) Full details of metal bellows and their installation.
- u) Details of proposed methods for degassing and cleaning contaminated seal oil.
- v) Details of proposed vibration monitoring equipment.

- w) An itemised cost for qualified service technician to oversee installation and start-up of equipment.
- x) Ability of radial and thrust bearings to operate at full speed in reverse rotation under full differential pressure.

8.3 Contract data

8.3.2 Drawings and technical data

Add

Data required for prediction of performance on contract gas from test results shall be included in schedule of data. Data shall be provided before the performance test.

8.3.5 Installation, operation, maintenance and technical-data manuals

8.3.5.4 Technical-data manual

Delete

"If specified"