

TECHNICAL SPECIFICATIONS

- MECHANICAL -

2. Rotary Machines

2. Compressors

4. Rotary type screw compressor

1. GENERAL

1.1 Scope

1.1.1 This specification covers the minimum requirements for dry and flooded helical lobe rotary type screw compressors, used for vacuum or pressure or both in petroleum, chemical, and gas industry services. It does not cover portable air compressors, liquid ring compressors, and vane-type compressors.

1.1.2 This specification does not exonerate the Vendor from the responsibility of being able to deliver the appropriate equipment that ensures safety and efficient operation of the project.

1.1.3 The unit is generally ordered and delivered mounted on common mounting plate with drivers, coupling, shaft-sealing systems, pipe and instrument connections. Completion of Datasheets should utterly cover these package requirements.

1.1.4 Vendor of the complete unit is fully responsible for the adequate operation of the complex unit as well as for the guaranteed operation of the units obtained from a third party.

1.1.5 API compressors should be applied for fire hazard and liable to explode, poisonous, and corrosive medium independent from pressure rate.

1.2 Alternative Designs

1.2.1 If the Vendor's offer differs from the project specification or from the bid but is equivalent, it can be acceptable with the written permission.

1.3 Conflicting Requirements

1.3.1 In case of conflict between this specification - or the project specification and the content of the delivery contract, the contract shall govern.

2. REFERENCES

2.1 Standards

2.1.1 This specification refers the following American and International Standards and European Directives, which express the minimum requirement.

a) API 619 Rotary type positive displacement compressors for Petroleum, Petrochemical, and Natural Gas Industries (Screw compressors)

b) API 613 Special Purpose Gear Units for Petroleum, Chemical and Gas Industry Services:

c) API 614, ISO-ISO 10438 Lubrication Shaft-Sealing and Control-Oil Systems for Special-Purpose Applications,;

d) API 671 Special-Purpose Couplings for Refinery Service.

e) API 677 General Purpose Gear Units for Petroleum, Chemical and Gas Industry Services

f) Machinery Directive: 2006/42/EC,

g) Potentially Explosive Atmospheres (ATEX): 2014/34/EU,

h) standard specifications:

General requirements (Rotary machines)

Machines monitoring

Requirements of inspection and checking for Rotary type
positive displacement compressors

c motors

The specification system to be employed shall be always precisely fixed in the contract.

3. DEFINITIONS

3.1 The terms used in this specification are defined in API 619 last edition.

4. BASIC DESIGN

4.1 General

4.1.1 The equipment (including auxiliaries) covered by this specification shall be designed and constructed for a minimum service life of 20 years and at least 3 years of uninterrupted operation. It is recognized that this is a design criterion.

4.1.2 The Vendor shall assume unit responsibility for all equipment and all auxiliary systems included in his scope of the order.

4.1.3 The _____ will specify the equipment's normal operating point.

4.1.4 Equipment shall be designed to run to the trip speed, specified maximum differential pressure and 11 percent of relief valve settings without damage.

4.1.5 Unless otherwise specified, cooling water systems shall be in accordance with API 619.

4.1.6 The _____ shall approve the arrangement of the equipment, including piping and auxiliaries. The arrangement shall provide adequate clearance areas and safe access for operation and maintenance.

4.1.7 All equipment shall be designed to permit rapid and economical maintenance. Major parts such as casing components and bearing housings shall be designed (shouldered or cylindrically doweled) and manufactured to ensure accurate alignment on reassembly.

4.1.8 Spare parts for the machine and all furnished auxiliaries shall meet all the criteria of this specification.

4.1.9 Oil reservoirs and housings that enclose moving lubricated parts (such as bearings, shaft seals, highly polished parts, instruments, and control elements) shall be designed to minimize contamination by moisture, dust and other foreign matter during periods of operation and idleness.

being moved.

4.3.3 Flanges shall conform to ASME, except as specified in API St. 619.

4.4 External Forces and Moments

4.4.1 The compressor shall be designed to withstand external forces and moments on each nozzle API St. 619. The Vendor shall furnish the allowable forces and moments for each nozzle tabular form.

4.4.2 Casing and supports shall be designed to have sufficient strength and rigidity to limit distortion of coupling alignment due to pressure, torque, and allowable forces and moments to 50 micrometers.

4.5 Rotating Elements

4.5.1 Rotors

4.5.1.1 Shafts shall be forged steel unless otherwise approved by the

4.6 Shaft Seals

4.6.1 General

4.6.1.1 Shaft seals shall be provided to restrict or prevent process gas leakage to the atmosphere and, for dry screw, seal fluid leakage into the process gas stream over the range of specified operating conditions, including start-up and shutdown. Seal operation shall be suitable for specified variations in suction conditions that may prevail during start-up, shutdown, or setting out, and during any other special operation specified by the

The maximum sealing pressure shall be at least equal to the settling out pressure. The shaft seals and seal system shall be designed to permit safe compressor pressurization with the seal system in operation prior to process start-up.

4.6.1.2 For low-temperature services system shall have provision for maintaining the seal oil above its pour-point temperature at the inner-seal drain.

4.6.2 Labyrinth Type

4.6.2.1 The labyrinth seals shall made by suitable for API 619.

4.6.3 Restrictive-Ring Type

4.6.3.1 Restrictive-ring-type seals (see API 619) shall include rings of carbon or other suitable material mounted in retainers or spacers. The seals may be operated dry, as in the labyrinth type, or with a sealing liquid, if it is mechanical type.

4.6.3.2 If any ejector system is used, it shall be provided with automatic control to maintain the desired seal chamber pressure. The motive fluid shall be inert gas or compressor discharge gas, as specified.

4.7 Bearings

4.7.1 General

4.7.1.1 Hydrodynamic radial and thrust bearings shall be required under the following conditions:

- a) On screw compressors with drivers rated greater than 225 kW, unless specific approval is obtained from the purchaser.
- b) b. Where antifriction-bearing dmN factors exceed the limit in Table 2 of API 619

4.7.1.2 When specified Long-life anti-friction bearings shall be used only.

4.8 Bearing Housings

4.8.1 Bearing housings for pressure-lubricated hydrodynamic bearings shall be arranged to minimize foaming. The drain system shall be adequate to maintain the oil foam level below shaft end seals. The rise in oil temperature through the bearing and housings shall not exceed 30 °C under the most adverse specified operating conditions. The bearing outlet oil temperature shall not exceed 80 °C. When the inlet oil temperature exceeds 50 °C special consideration shall be given to bearing design, oil flow, and allowable temperature rise. Oil outlets from thrust bearings shall be tangential and in the upper half of the control rings, or, if control rings are not used, in the thrust bearing cartridge. Oil connections on bearing housings shall be in accordance with API 619.

4.8.2 Compressors shall have bearing-housing shaft seals at the drive end to prevent oil leakage.

4.8.3 Above 200 kW rated performance, thrust bearings and radial bearings shall be fitted with bearing-metal temperature sensors installed in accordance with API Standard 670.

4.8.4 Screw compressors shall be fitted with two radial vibration probes on each bearing, one axial position probe on each rotor and a one-event per revolution probe. The probe installation shall be in accordance with API Standard 670.

4.8.5 When specified, bearing housings shall have a threaded connection(s) for permanently mounting vibration transducers in accordance with API Standard 670. When metric fasteners are supplied, the threads shall be M8.

4.8.6 When specified, a flat surface at least 25 millimetres in diameter shall be supplied for the location of magnetic-based vibration measuring equipment.

4.9 Lube-Oil and Seal-Oil Systems

4.9.1 Unless otherwise specified, bearings and bearing housings shall be engineered for hydrocarbon oil lubrication.

4.9.2 Unless otherwise specified, a pressurized oil system shall be furnished to supply oil at a suitable pressure or pressures, as applicable, to the following:

- a) The bearings of the driver and or the driven equipment (including any gear).
- b) The governing and control oil system.
- c) The seal oil system, if combined with the lube oil systems.
- d) Rotor internal cooling.
- e) Rotors of oil-flooded compressors including slide valve if applicable.

4.9.3 Unless otherwise specified, for dry screw compressors pressurized oil system shall conform to the requirements of API Standard 614.

4.9.4 Where oil is supplied from a common system to two or more machines (such as a compressor, a gear, and a motor), the oil's characteristics will be specified by the _____ on his basis of mutual agreement with all Vendors supplying equipment served by the common oil system.

4.9.5 Pressure lubrication systems other than thus described in API Standard 614 shall consist of a separately driven oil pump with a suction strainer, a supply and return system, and oil cooler (when required), a full-flow filter, low lube oil pressure shutdown switches, and other necessary instruments.

The oil system shall be designed to provide sufficient on flow at required pressure under all operating, transient and standstill conditions including pre-lubrication, start switching auxiliary oil pump, rundown, post-lubrication, and maintain seal oil pressure at standstill when specified. The requirements of API 619 shall apply.

5.7 Mounting Plates

5.7.1 Base plates

5.7.1.1 When a base plate is specified, the _____ will indicate the major equipment to be mounted on it. A base plate shall be a single fabricated steel unit, unless the _____ and the Vendor mutually agree that it may fabricate in multiple sections. Multiple section base plate shall have machined and doweled mating surfaces to ensure accurate field reassembly.

5.7.1.2 Unless otherwise specified, the base plate shall extend under the drive-train components so that any leakage from these components is contained within the base plate.

5.7.1.3 Additional requirements to be followed for design of base plate shall be in accordance with API 619.

5.7.2 Soleplates and sub soleplates

5.7.2.1 When soleplates are specified, they shall meet the requirements of API 619

5.7.2.2 When sub soleplates are specified, they shall be steel plates at least 25-millimeters thick. The finish of the sub soleplates mating surfaces shall match that of the soleplates (see API 619)

5.8 Controls and Instruments (See _____ Specification)