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**Petroleum and natural gas industries—Reciprocating  
compressors**

**石油及天然气工业用往复压缩机**

(ISO 13707: 2000, MOD)

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## Foreword

This standard adopts ISO 13707: 2000 *Petroleum and Natural Gas Industries – Reciprocating Compressors* (English edition).

This standard is redrafted according to ISO 13707: 2000, while ISO 13707: 2000 was drafted in accordance with API Std 618, the fourth edition, 1995. Due to the requirements of law of our country and actual needs of industry, this Standard is modified at the time of adopting international standard. These technical differences are identified in the margin of the terms they involved in vertical mongline.

——In order to facilitate the implementation of this standard, all normative references adopt national or industrial standards of our country, where it is equal to or modify (formerly known as equivalent) or refer (formerly known as non-equivalent) to international or foreign advanced standards, the international or foreign standard number and degree of adoption are indicated in brackets following the standard name; the references of original international standards are listed in Annex R.

——Unit of measurement uses legal unit of measurement of our country, and deletes British unit of measurement in brackets.

——For modifications made considering the situation of China, the technical differences and reasons are given in Annex S.

In order to be convenient, the Standard also make the following editorial amendment:

- a) Change the word of “this international standard” to “this standard”;
- b) Use decimal point “.” to replace commas “,” using as decimal point;
- c) Delete the foreword of the International Standard.

Annex A and Annex B of this Standard are informative Annexes.

This standard was proposed by China Machinery Industry Federation.

This standard is centralized by the National Compressor Standardization Technical

Committee.

Units responsible for drafting this standard: Shanghai Compressor Co., Ltd.

Main drafters of this Standard: Wu Hui, Guan Lanling, Zhao Weimin, Zhou Heting, Zhou Rongfa, Ren Xilian and Xu Haiping.

## Introduction

This Standard is based upon the accumulated knowledge and experience of manufacturers and users of reciprocating compressors. The objective of this Standard is to provide a purchase specification to facilitate the manufacture and procurement of reciprocating compressors for general petroleum and natural gas industry services but its use is not limited to these services.

The purpose of this Standard is to establish minimum requirements for design and construction so that the equipment will be suitable for the purpose for which it is required. This limitation in scope is one of charter rather than interest and concern. Energy conservation and protection of environment are matters of increasing concern and are important in all aspects of equipment design, application and operation. The manufacturers and users of equipment should aggressively pursue alternative innovative approaches which improve energy utilisation and/or minimize the environmental impact without sacrificing safety or reliability. Such approaches should be thoroughly investigated and purchase options should increasingly be based on the estimation of whole life costs and the environmental consequences rather than acquisition costs alone.

This Standard requires the purchaser to specify certain details and features.

A bullet (•) at the beginning of a clause or sub-clause 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; otherwise it should be stated in the quotation request or in the order.

For effective use of this Standard and ease of reference to the text the use of the data sheets in annex A is recommended.

Users of this Standard should be aware that further or differing requirements may be needed for individual applications. This Standard is not intended to inhibit a vendor from offering, or the purchaser from accepting, alternative equipment or engineering solutions for the individual application. This may be particularly applicable where there is innovative



or developing technology. Where an alternative is offered, the vendor should identify any variations from this Standard and provide details.

# Petroleum and natural gas industries—Reciprocating compressors

## 1 Scope

This Standard covers the minimum requirements for reciprocating compressors and their drivers used in the petroleum and natural gas industries with either lubricated or nonlubricated cylinders (hereinafter referred to as “compressor”).

This standard is applicable to intermediate and low speed compressors for key facilities, as well as relevant lubricating systems, control, instruments, intercoolers, after-coolers, pulse devices and other auxiliary equipment.

This standard is not applicable to integral gas-engine driven compressors, packaged high-speed separable engine-driven reciprocating gas compressors, compressors with single-acting trunk-type (automotive-type) pistons that also serve as crossheads and either plant or instrument air compressors that discharge at gauge pressures of 0.9MPa or below. Also excluded are gas engine and steam engine drivers.

## 2 Normative References

The articles contained in the following documents have become this standard when they are quoted herein. For the dated documents so quoted, all the modifications (excluding corrections) or revisions made thereafter shall not be applicable to this Standard. For the undated documents so quoted, the latest editions shall be applicable to this Standard.

GB 150 Steel pressure vessels

GB 151 Tubular heat exchangers

GB/T 196 General purpose metric screw threads—Basic dimensions (GB/T 196-2003, ISO 724: 1993, MOD)

GB/T 197 General purpose metric screw threads—Tolerances (GB/T 197-2003, ISO 965-1: 1998, MOD)

- GB 755-2008 Rotating electrical machines — Rating and performance (idt IEC 60034-1: 2004)
- GB/T 3098.1-2000 Mechanical properties of fasteners—Bolts, screws and studs (ISO 898-1:1999, IDT)
- GB/T 3098.2-2000 Mechanical properties of fasteners—Nuts—Coarse thread (ISO 898-2:1992, IDT)
- GB/T 3098.4-2000 Mechanical properties of fasteners-Nuts-Fine pitch thread (ISO 898-6:1994, IDT)
- GB/T 3098.6-2000 Mechanical properties of corrosion-resistant stainless-steel fasteners-Part 1: Bolts, screws and studs (ISO 3506-1:1997, IDT)
- GB/T 3098.15-2000 Mechanical properties of fasteners-Nuts made of stainless-steel (ISO 3506-2:1997, IDT)
- GB 3836.1-2000 Electrical apparatus for explosive gas atmospheres--Part 1: General requirements (eqv IEC 60079-0: 1998)
- GB/T 3853 Displacement compressor—Acceptance tests (GB/T 3853-1998, eqv ISO 1217: 1996)
- GB 4208 Degrees of protection provided by enclosure(IP code) (GB 4208-1993, eqv IEC 529: 1989)
- GB 5310 Seamless steel tubes and pipes for high pressure boiler (GB 5310-1995, neq ASTM A335: 1990)
- GB/T 5677 Radiographic testing for steel castings
- GB/T 6391-2003 Rolling bearings—Dynamic load ratings and rating life (ISO 281: 1990, IDT)
- GB/T 6988.6-1993 Preparation of function charts for control systems (eqv IEC 848: 1988)

GB/T 7306.1~7306.2 Pipe threads with 55 degree thread angle where pressure-tight joints are made on the threads (GB/T 7306.1~7306.2-2000, eqv ISO 7-1: 1994)

GB/T 8163 Seamless steel tubes for liquid service (GB/T 8163-1999, neq ISO 559: 1991)

GB/T 8923-1988 Rust grades and preparation grades of steel surfaces before application of paints and related products (eqv ISO 8501-1: 1988)

GB/T 9112~9124 Steel pipe flanges (GB/T 9112~9124-2000, neq ISO 7005-1: 1992)

GB/T 9443-2007 Penetrant testing for steel castings

GB 9948 Seamless steel tubes for petroleum cracking

GB/T 11352-2009 Carbon steel castings for general engineering purpose (GB/T 11352-1989, neq ISO 3755: 1975)

GB/T 12716 Pipe threads with the thread angle of 60 (GB/T 12716-2002, eqv ASME B1.20.1: 1992)

GB/T 14976 Stainless steel seamless tubes for fluid transport

GB/T 15386 Air cooled heat exchanger

GB/T 17241 (All parts) Cast iron pipe flanges (GB/T 17241.1~17241.7-1998, neq ISO 7005-2: 1988)

GB/Z 19414 Enclosed gear drives for industrial applications (GB/Z 19414-2003, ISO/TR 13593: 1999, IDT)

GB 50235 Code for construction of industrial metallic piping engineering

JB/T 2773 PN 16.0~32.0 MPa Double end studs

JB/T 2774 PN 16.0~32.0 MPa Step-end stud bolts

JB/T 2775 PN 16.0~32.0 MPa nuts

JB/T 4365-1997 Lubrication Shaft-Sealing and Control-Oil Systems for Special-Purpose

Applications (eqv API Std 614-1992).

- JB/T 4730 Nondestructive testing of pressure equipments
- JB/T 5439 Ultrasonic examination for ductile iron parts of compressor
- JB/T 5440 Ultrasonic flaw detection of spare parts of forged steel of compressor
- JB/T 5441 Ultrasonic flaw detection of spare parts of cast steel of compressor
- JB/T 5442 Magnetic particle testing of importance parts of compressor
- JB/T 6431 Specification of gray pig iron for positive-displacement compressor
- JB/T 6441 Safety valves for compressor
- JB/T 6764 Steam Turbine General Purpose—Specification
- JB/T 6765 Steam Turbine Special Purpose—Specification
- JB/T 6908 Steel forgings for positive-displacement compressor
- JB/T 7912 General purpose screw threads - Selected sizes for commercial screws, bolts and nuts (JB/T 7912-1999, eqv ISO 262: 1973)
- JB/T 8466 Liquid penetration inspection method for steel forgings
- JB/T 9104 The technical specification for spheroidal graphite iron castings of displacement compressors
- JB/T 9559 Flexible coupling for industrial steam turbine (JB/T 9559-1999, neq API 671: 1979)

*Supervision Regulation on Safety Technology for Pressure Vessel*

### **3 Terms and definitions**

For the purposes of this Standard, the following terms and definitions apply.

#### **3.1**

**acoustic simulation**

process whereby the one-dimensional acoustic characteristics of fluids and the reciprocating compressor dynamic flow influence on these characteristics are modelled

NOTE The model is mathematically based upon the governing differential equations (motion, continuity, etc.). The simulation should allow for determination of pressure/flow modulations at any point in the piping model resulting from any generalized compressor excitation (see 3.4 and 3.7).

### **3.2**

#### **active analysis**

portion of the acoustic simulation in which the pressure pulsation amplitudes due to imposed compressor operation for the anticipated loading, speed range and state conditions are simulated (see 3.1)

### **3.3**

#### **alarm point**

preset value of a parameter at which an alarm is actuated to warn of a condition that requires corrective action

### **3.4**

#### **analogue simulation**

method using electrical components (inductances, capacitors, resistances and current supply devices) to achieve the acoustic simulation (see 3.1).

### **3.5**

#### **capacity**

quantity of gas taken into the compressor at the specified inlet conditions, compressed and delivered at the specified discharge pressure

NOTE The capacity of a compressor does not include any gas that leaks out of the compressor during the compression process nor any air that leaks into a compressor used as a vacuum pump.

### **3.6**

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