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Guidance on Industry Standard for ISO 13707 Reciprocating Compressors (API 618)

GIS 34-104

BP GROUP
ENGINEERING TECHNICAL PRACTICES

Foreword

This is the first issue of Engineering Technical Practice (ETP) BP GIS 34-104. This Guidance on Industry Standard (GIS) is based on parts of heritage documents from the merged BP companies as follows:

British Petroleum

GS 134-6 Reciprocating Compressors to API 618

Amoco

A RE-COMP-618-P Rotating Equipment—Compressors—API 618 Reciprocating—
Procurement Specification

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Introduction

- a. Guidance for reciprocating compressors is based on International Standards Organisation (ISO) 13707, Petroleum and natural gas industries – Reciprocating compressors, December 2000 API 618).
- b. Guidance statements of this GIS are modifications to ISO 13707.
- c. Modifications to ISO 13707 are identified as Add, Modify to Read, or Delete.
- d. Paragraph numbers in this specification correspond to ISO 13707.
- e. Paragraphs of ISO 13707 that are not revised remain applicable.

Section 1 – General

1.1 Scope

1.1.1 Modify Note to Read

Requirements for integral gas engines and packaged high-speed separable engine driven reciprocating compressors for oil and gas production services are covered in GIS 34-103.

1.3 Conflicting requirements

Modify to Read

In case of conflicts, order of precedence shall be:

- a. Local codes and standards.
- b. Purchase order/requisition/contract.
- c. Project data sheet/drawings.
- d. This GIS.
- e. Referenced BP documents.
- f. Referenced standards.

1.5 Referenced publications

1.5.1 Add

API

API RP 551

Process Measurement Instrumentation.

API RP 686

Recommended Practices for Machinery Installation and Installation Design.

Add

American Society of Mechanical Engineering (ASME)

ASME PTC 9

Displacement Compressors, Vacuum Pumps, and Blowers.

BP

GIS 12-203

Guidance on Industry Standard for IEC High Voltage Induction Motors.



GIS 12-204	Guidance on Industry Standard for NEMA High Voltage Induction Motors (API541).
GIS 12-205	Guidance on Industry Standard for IEC Synchronous Motors.
GIS 12-206	Guidance on Industry Standard for ANSI/NEMA Synchronous Motors.
GIS 14-XX	Guidance on Industry Standard for Noise Control.
GIS 26-101	Guidance on Industry Standard for ISO 16812 Shell and Tube Heat Exchangers.
GIS 26-102	Guidance on Industry Standard for Double Pipe Heat Exchangers.
GIS 34-302	Guidance on Industry Standard for API 612 Special Purpose Steam Turbines.
GIS 34-501	Guidance on Industry Standard for API 613 Special Purpose Gear Units.
GIS 34-701	Guidance on Industry Standard for Lubrication, Seal Oil, and Gas Seal Systems.
GIS 36-XX	Guidance on Industry Standard for Tube End Fixing (GS 118-8).
GP 12-01	Guidance on Practice for Power System Design.
GP 12-02	Guidance on Practice for Power System Installation and Construction.
GP 30-65	Guidance on Practice for Control Panels.

British Standards Institute (BSI)

BSI BS 2050	Specification for Electrical resistance of conducting and antistatic products made from flexible polymeric material.
BSI PD 5304	Safety of machinery.

International Standards Organization (ISO)

ISO 1813	Belt drives - V-ribbed belts, joined V-belts and V-belts including wide section belts and hexagonal belts – Electrical conductivity of antistatic belts: Characteristics and methods of test.
ISO 16889	Hydraulic fluid power filters – Multi-pass method for evaluating filtration performance of a filter element.

Section 2 – Basic design

2.1 General

2.1.2 Modify to Read

- a. Unless an alternative limit is specified on data sheet, noise levels at or beyond 1 m (3 ft) from machine (plus driver and ancillaries) surfaces shall not exceed 85 dB(A).

Noise limits below 85 dB(A) may be required in some countries.

- b. If Vendor cannot meet the foregoing limits without adding noise attenuating features, levels with and without these features shall be stated in proposal.

Add

Sound pressure levels shall comply with **GIS 14-XX**.

2.2 Allowable speeds

Typical speed for refinery application is 300 rpm. Applications within chemicals have run as fast as 600 rpm. Faster speeds mean shorter strokes to stay within the maximum piston speed.



For proposals greater than 300 rpm, survey the machinery network for availability information on similar installations.

Add

For non-lubricated service and non-metallic wear bands, with bearing loads greater than 0.032 MPa (4.5 psi), the maximum piston speed shall be 230 metres per minute (750 feet per minute).

2.3 Allowable discharge temperature

2.3.1 Add

For hydrocarbon lubricated compressors handling air or other oxygen bearing gases that will support combustion of lubricant, maximum actual discharge temperature shall not exceed the following limits:

Discharge Pressure		Maximum Actual Discharge Temperature	
bar (ga)	(psig)	°C	(°F)
0 to 20	(0) to (290)	140	(284)
20 to 50	(290) to (725)	130	(266)

For discharge pressures greater than 50 bar (ga) (725 psig), discharge temperature limits shall be agreed for each case.

2.3.2 Add

Recommended alarm and shutdown set points shall be supplied. The following high discharge temperature alarms and trips shall be provided for hydrocarbon lubricated compressors handling air or other oxygen bearing gases:

Discharge Pressure		Alarm		Trip	
bar (ga)	(psig)	°C	(°F)	°C	(°F)
0 to 20	(0) to (290)	150	(302)	155	(311)
20 to 50	(290) to (725)	140	(284)	145	(293)

For discharge pressures greater than 50 bar (ga) (725 psig), discharge temperature alarms and trips shall be agreed for each case.

2.4 Rod and gas loadings

2.4.1 Modify to Read

Combined rod loading shall not exceed 95% of manufacturer's maximum allowable continuous combined rod loading for compressor running gear at any specified operating point. These combined rod loads shall be calculated on basis of set point pressure of discharge relief valve of each stage and of lowest specified suction pressure corresponding to each load step.

The manufacturers have a finite number of frame designs. During the inquiry stage, consider asking for a price for the next size larger frame than the frame size required to be in accordance with 2.4.1. This larger frame size will then reduce the maximum percentage of allowable rod loads in service. Additional benefit could occur from larger distances between adjacent cylinders, making valve changes easier.

2.4.4 Modify Second Sentence to Read

Duration of this reversal shall not be less than $\pi/6$ radians (30 degrees) of crank angle, and magnitude of peak combined reversed load shall be at least 6% of actual combined load in opposite direction.

