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Guidance on Industry Standard for API 674 Positive Displacement Pumps - Reciprocating

GIS 34-211

BP GROUP
ENGINEERING TECHNICAL PRACTICES

Foreword

This is the first issue of Engineering Technical Practice (ETP) BP GIS 34-211. This Guidance on Industry Standard (GIS) is based on parts of heritage documents from the merged BP companies as follows:

Amoco

- | | |
|-----------------|---|
| A RE-PUMP-674-P | Rotating Equipment—Pumps—API 674 Reciprocating—Procurement Specification. |
| A RE-PUMP-00-G | Rotating Equipment—Pumps—Guide. |

ARCO

- | | |
|-----------|---|
| Std 23-89 | Positive Displacement Pumps, Reciprocating. |
|-----------|---|

Gulf of Mexico Deepwater (GOMDW)

- | | |
|--------------------|---|
| 1400-20-ME-SP-2036 | Positive Displacement Pumps - Reciprocating, Addendum to: API Standard 674. |
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Introduction

- a. Guidance for positive displacement reciprocating pumps is based on American Petroleum Institute (API) Standard 674, Positive Displacement Pumps - Reciprocating, Second Edition, June 1995.
- b. Guidance statements of this GIS are modifications to API 674.
- c. Modifications to API 674 are identified as Add, Modify to Read, or Delete.
- d. Paragraph numbers in this GIS correspond to API 674.
- e. Paragraphs of API 674 that are not revised remain applicable.

1 General

1.1 Scope

Add

This shall be interpreted as minimum requirements. No statement shall be construed as limiting work to such minimum requirements.

Reciprocating power pumps can be used in low flow, high differential pressure services and are usually motor driven or engine driven. Disadvantages include system pulsation and increased maintenance, especially for packing, plungers, and valves.

Reciprocating direct acting pumps are sometimes attractive if steam or other gas is available to drive pump. These pumps have the same disadvantages as reciprocating power pumps and require higher maintenance due to condensate and other drive end problems. Normally, direct acting reciprocating pumps cannot be justified. However, they are frequently used for emergency pumpout on processing units. In this capacity, in total loss of power, they are used to evacuate units of all process fluids.

1.2 Alternative designs

Modify to Read

Primary Vendor quotation shall comply with this GIS. Vendor may supplement basic quotation with alternate quotations, provided the following conditions are met:

- a. Significant process, price, or delivery date advantage is indicated.
- b. Superior life cycle cost.
- c. Alternate quotation states all deviations from this specification.
- d. Complete engineering detail of alternate material and design is provided for BP review.

1.3 Conflicting requirements

Modify to Read

- a. In case of conflicts, order of precedence shall be:
 1. Local codes and standards.
 2. Purchase order/requisition/contract.



3. Project data sheet/drawings.
 4. This GIS.
 5. Referenced BP documents.
- b. Resolution of conflicts between the proposal and the purchase order shall be subject to BP's approval. Work affected by such conflict shall not proceed until approved by BP.

1.5 Referenced publications

ASME Add

B4.1 Preferred Limit and Fits for Cylindrical Parts.

ASTM Add

A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

ISO Add

ISO 4572 Hydraulic fluid power – Filters – Multipass method for evaluating filtration performance.

Add

BP

GIS 06-XXX	Guidance on Industry Standard for Coating Systems (GS 106-5).
GIS 12-201	Guidance on Industry Standard for Low Voltage Induction Motors (IEC).
GIS 12-202	Guidance on Industry Standard for NEMA Low Voltage Induction Motors.
GIS 12-203	Guidance on Industry Standard for High Voltage Induction Motors (IEC).
GIS 12-204	Guidance on Industry Standard for High Voltage Induction Motors (API 541).
GIS 14-XXX	Guidance on Industry Standard for Noise Control (A EN-NC-00-P).
GIS 34-301	Guidance on Industry Standard for API 611 General Purpose Steam Turbines.
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 34-502	Guidance on Industry Standard for API 677 General Purpose Gear Units.
GIS 34-503	Guidance on Industry Standard for API 671 Special Purpose Couplings.
GIS 34-504	Guidance on Industry Standard for ISO 14691 General Purpose Couplings.
GIS 36-XXX	Guidance on Industry Standard for Positive Material Identification (A MM-TEST-PMI-S).
GP 30-65	Guidance on Practice for Control Panels.
GP 30-70	Guidance on Practice for Instruments and Controls in Vendor Packaged Equipment.



2 Basic design

2.1 General

2.1.4 Modify to Read

Individual noise level of each pump package (pump, motor, and drive) shall not exceed 85 dBA at 1 m (3 ft) and shall comply with **GIS 14-XXX**.

2.1.5 Modify to Read

Unless specified otherwise, cooling water systems shall comply with 2.1.5.1, 2.1.5.2, and 3.5.5.

2.1.7 Add

Instruments and valves, including auxiliary systems, shall be securely mounted and supported to prevent damage during shipment, storage, operation, and maintenance.

2.3 Ratings

2.3.1 Add

- a. At rated capacity, pump speed shall not exceed 85% of maximum allowable speed in Table 1.
- b. Direct acting pumps shall be limited to maximum of 30 strokes/minute in accordance with Table 2.

2.3.2 Modify to Read

If NPSHR is within 1,5 m (5 ft) of net positive suction head available (NPSHA) (including preliminary estimated system acceleration head), speeds shall be less than those in Table 1 and Table 2.

Reducing the speed increases the NPSHA or NPIP Available.

The formula for NPSHA or NPIP Available for positive displacement pumps is different from that for rotodynamic pumps. NPSHA or NPIP Available for positive displacement pumps considers acceleration head loss due to the pulsing nature of the flow.

2.3.4 Modify to Read

Liquid end shall be sized using volumetric efficiency less than or equal to:

- a. 90% if piston type.
- b. 95% if plunger type.

2.3.9 Add

At rated discharge pressure, rod loading shall not exceed 85% of maximum allowable continuous rod loading. These values shall be provided for BP's review.

2.4 Cylinders and pressure-retaining parts (including pulsation suppression devices)

2.4.4 Add

Each tapped hole shall be chamfered minimum of 1,5 mm (1/16 in)

Loaded studs or bolts in tapped holes can produce a sealing failure mode if the top thread in the hole adjacent to the sealing surface yields and displaces material around the hole circumference causing a local "high spot" on the sealing surface. Chamfering minimizes this possibility.

