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GIS 26-103

Air-Cooled Heat Exchangers (ISO 13706 or API 661)

Group Instruction for Supply

**BP GROUP
ENGINEERING TECHNICAL PRACTICES**

Foreword

This issue of Engineering Technical Practice (ETP) BP GIS 26-103 incorporates the following revisions:

- a. Alignment with the current version of ISO 13707 or API Std 661.
- b. Addition of commentary reference to GP 26-10 for fluid velocity limits in lieu of Annex D which is deleted.
- c. Correction of references.
- d. Addition of requirement for BP approval of use of suspended belt drive, motor shaft up configuration for fan drives.
- e. Clarification on use of coil guards and screens.
- f. Insertion of standard MSDS wording.

This Group Instruction for Supply (GIS) is based on parts of heritage documents from the merged BP companies as follows:

BP (Pre-1999)

BP GS 126-2 Air-Cooled Heat Exchangers to API 661.

Amoco

A FE-HE-661-P Fabricated Equipment - Heat Exchangers - API 661 - Procurement Specification.

ARCO

ES 21 Air Cooled Heat Exchangers.

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Introduction

- a. Requirements for air-cooled heat exchangers are based on International Organization for Standardization (ISO) 13706/API Std 661, Petroleum and natural gas industries - Air-cooled heat exchangers, 2005-10-15.
- b. Requirements of this GIS are modifications to ISO 13706.
- c. Modifications to ISO 13706 are identified as Add, Modify to Read, or Delete.
- d. Clause numbers in this GIS correspond to ISO 13706.
- e. Clauses of ISO 13706 that are not revised remain applicable.



2 Normative references

Add

BP

GIS 06-601	Painting of Metal Surfaces.
GIS 12-201	Low Voltage Induction Motors (IEC).
GIS 12-501	Low Voltage AC Drives (IEC).
GIS 12-502	Low Voltage AC Drives (NEMA).
GIS 18-014	Heat Exchanger Tube End Fixing.

British Standards Institute (BS)

BS 903-C1, BS 2782-2: Method 231A

Methods of testing vulcanized rubber - Part C1: Determination of surface resistivity. BS 2782, Methods of testing plastics - Part 2: Electrical properties - Method 231A: Determination of surface resistivity.

International Organization for Standardization (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 5801	Industrial fans - Performance testing using standardized airways (BS 848: Part 1).

Process Industry Practices (PIP)

PIP ELSMT01	AC Squirrel Cage Induction Motors (600 Volts and Below).
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4 General

Add

4.6 For any group of air-cooled heat exchangers, the units shall be designed to permit, wherever practical, interchangeability of components, including fans, drivers, belts, tubes, tube bundles, and control system components.

4.7 Exchangers shall be designed to obtain the most efficient and economical combination of fan (horse)power and equipment configuration. Economic evaluation shall be based on comparing increased investment cost against the saving of reduced power consumption. Utility costs and operating factors shall be obtained from BP.

4.8 Exchanger design shall account for operation at part load. If not stated otherwise, operation at 60% of design load shall be assumed.

This is particularly important for viscous fluids (5 cP and greater) and those with high pour points.

4.9 Inside tube wall temperature shall comply with Annex C, Table C.1, above the fluid pour (freeze) point. This condition shall be satisfied for the lowest part load design case with air entering at winter design ambient temperature.

The provision of counter or parallel flow piping arrangements or air recirculation may be necessary to achieve this.



5 Proposals

5.1 Add

Completed performance data sections of data sheet (Annex B) for each operating case, including specified summer and winter conditions.

5.7 Modify Second Sentence to Read

The proposal shall include a noise data sheet (see example in Annex B).

Add

5.10 Proposal shall include definition of stairways, ladders, and platforms, including number, size, and location.

5.11 Proposal shall guarantee thermal performance.

6 Documentation

6.1 Approval information

6.1.1 Modify Introductory Sentence to Read

For each item number, documents shall be produced for submittal to BP that include the following information:

6.1.1.i Add

Location of lifting points on each component intended to be handled in a single lift.

6.1.1 Add to List

- r) Thermal calculations and guarantee.
- s) Structural calculations (including provision for anchoring and expansion, with information to include resultant forces, shears, and moments on support structure or foundation).
- t) Detailed Drawings:
 - 1) For the unit, drawings shall show sufficient detail to identify how components fit together and shall include cross reference to component detail drawings.
 - 2) For the headers, drawings shall be fully dimensioned showing details.
 - 3) For the tube bundle, drawing shall show layout, tube support, and provision for thermal expansion.
- u) Quality Plan.
- v) Restrictions regarding testing or operation of the heat exchanger unit (or other units if part of a bank).
- w) Details of instrumentation, including fan-blade and louver actuators and positioners, and vibration switches, type, size, manufacturer, and model.
- x) Estimated performance curves for fans, including the effect of autovaryable pitch mechanisms, variable speed motors, or range of manual adjustment if fitted with louvers.
- y) Details of spare parts shall be identified.
- z) Heat treatment details for materials other than carbon steel.

6.1.3 Modify Third Sentence to Read

The calculations shall be submitted and shall be subject to approval.

