
**Petroleum, petrochemical and natural gas
industries — Hairpin-type heat
exchangers**

*Industries du pétrole et du gaz naturel — Échangeurs thermiques en
épingle à cheveux*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 12212 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural industries*, Subcommittee SC 6, *Processing equipment and systems*.

Introduction

It is necessary that users of this International Standard be aware that further or differing requirements can be needed for individual applications. This International 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 can be particularly applicable where there is an innovative or developing technology. Where an alternative is offered, it is the responsibility of the vendor to identify any variations from this International Standard and provide details.

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

A bullet (●) at the beginning of a clause or subclause indicates a requirement for the purchaser to make a decision or provide information (for information, a checklist is provided in Annex B).

In this International Standard, where practical, US Customary (USC) or other units are included in parentheses for information.

Petroleum, petrochemical and natural gas industries — Hairpin-type heat exchangers

1 Scope

This International Standard specifies requirements and gives recommendations for the mechanical design, materials selection, fabrication, inspection, testing and preparation for shipment of hairpin heat exchangers for use in the petroleum, petrochemical and natural gas industries.

Hairpin heat exchangers include double-pipe and multi-tube type heat exchangers.

2 Normative reference

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 15156 (all parts), *Petroleum and natural gas industries — Materials for use in H₂S-containing environments in oil and gas production*

ISO 23251, *Petroleum, petrochemical and natural gas industries — Pressure-relieving and depressuring systems*

ASME B16.5¹⁾, *Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard*

NACE MR0103²⁾, *Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments*

NACE SP0472, *Methods and Controls to Prevent In-Service Environmental Cracking of Carbon Steel Weldments in Corrosive Petroleum Refining Environments*

TEMA³⁾, *Standards of the Tubular Exchanger Manufacturers Association*

3 Terms and definitions

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

3.1

cyclic service

process operation with periodic variation in temperature, pressure and/or flowrate

1) ASME International, 3 Park Avenue, New York, NY 10016-5990, USA.

2) NACE International, P.O. Box 218340, Houston, TX 77218-8340, USA.

3) Tubular Exchanger Manufacturers Association, 25 North Broadway, Tarrytown, NY 10591, USA.