



SLOVENSKI STANDARD
SIST EN ISO 12212:2012

01-oktober-2012

Petrokemična industrija ter industrija za predelavo nafte in zemeljskega plina - Tipi prenosnikov toplote v obliki lasnice (ISO 12212:2012)

Petroleum, petrochemical and natural gas industries - Hairpin-type heat exchangers (ISO 12212:2012)

Erdöl-, petrochemische und Erdgasindustrie - Haarnadel -Wärmetauscher (ISO 12212:2012)

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Industries du pétrole et du gaz naturel - Échangeurs thermiques en épingle à cheveux (ISO 12212:2012)

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71.120.30	Prenosniki toplote	Heat exchangers
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EUROPEAN STANDARD

EN ISO 12212

NORME EUROPÉENNE

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Contents

Page

Foreword.....3

**iTeh STANDARD PREVIEW
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[SIST EN ISO 12212:2012](https://standards.iteh.ai/catalog/standards/sist/0086b2e0-24a1-4896-9c7f-e04635e02c9/sist-en-iso-12212-2012)

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Foreword

This document (EN ISO 12212:2012) has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries" in collaboration with Technical Committee CEN/TC 12 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries" the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2013, and conflicting national standards shall be withdrawn at the latest by February 2013.

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

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INTERNATIONAL STANDARD

ISO
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First edition
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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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Contents

Page

Foreword	v
Introduction.....	vi
1 Scope	1
2 Normative reference.....	1
3 Terms and definitions	1
4 General	3
5 Proposal information required.....	4
6 Drawings and other required data	4
6.1 Outline drawings and other supporting data.....	4
6.2 Information required after outline drawings are reviewed.....	5
6.3 Reports and records	6
7 Design.....	7
7.1 Design temperature.....	7
7.2 Design pressure.....	7
7.3 Cyclic design	7
7.4 Shell	8
7.5 Front closure.....	8
7.6 Rear closure.....	10
7.7 Tube bundle	11
7.8 Nozzles and other connections	14
7.9 Shell supports.....	18
7.10 Gaskets.....	19
7.11 Flanged external girth joints	19
7.12 Cladding for corrosion allowance	19
8 Materials	20
8.1 General	20
8.2 Requirements for carbon steel in sour or wet hydrogen sulfide service	20
8.3 Gaskets.....	20
8.4 Tubes	20
9 Fabrication	21
9.1 Shells	21
9.2 Tubes	21
9.3 Welding.....	21
9.4 Heat treatment	22
9.5 Dimensional tolerances	22
9.6 Gasket contact surfaces other than nozzle flange facings.....	23
9.7 Tube-to-tubesheet joints.....	23
9.8 Assembly.....	24
10 Inspection and testing	24
10.1 Quality assurance.....	24
10.2 Quality control	24
10.3 Pressure testing	26
10.4 Nameplates and stampings	26
11 Preparation for shipment.....	27
11.1 Protection.....	27
11.2 Identification	27

ISO 12212:2012(E)

12	Supplemental requirements	28
12.1	General.....	28
12.2	Design.....	28
12.3	Examination.....	28
Annex A	(informative) Recommended practices	30
Annex B	(informative) Hairpin heat exchanger checklist.....	32
Annex C	(informative) Hairpin heat exchanger data sheets	34
Bibliography	45

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 12212:2012](https://standards.iteh.ai/catalog/standards/sist/0086b2e0-24a1-4896-9c7f-e04635e02cf9/sist-en-iso-12212-2012)

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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*.

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ISO 12212:2012(E)**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.

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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.

ISO 12212:2012(E)

- 3.2**
double-pipe
single pipe within a shell
- 3.3**
effective heat transfer area
outside surface area of the tubes that contributes to heat transfer including finned surface area (if any)
- 3.4**
full-penetration weld
welded joint that results in weld metal through the entire thickness of the components being joined
- 3.5**
front closure
closure that connects the tube side to purchaser's tube side piping and fixes the tube bundle or element to the shell
- 3.6**
hairpin heat exchanger
double-pipe (pipe-in-pipe) or multi-tube heat exchanger of two-leg bundle where each leg has its own separate shell
- NOTE Figure 1 shows typical components of a hairpin heat exchanger.
- 3.7**
heat exchanger unit
one or more heat exchangers arranged in series or parallel for a specified service that work together to perform the intended duty
- 3.8**
hydrogen service
service that contains hydrogen at a partial pressure exceeding 700 kPa (100 psi) absolute
- 3.9**
item number
purchaser's identification number for a hairpin heat exchanger
- 3.10**
minimum design metal temperature
lowest metal temperature at which pressure-containing elements can be subjected to design pressure
- EXAMPLES Ambient temperature or process fluid temperature.
- 3.11**
multi-tube
multiple tubes within a shell
- 3.12**
pressure design code
recognized pressure vessel standard specified or agreed by the purchaser
- EXAMPLES ASME BPVC, Section VIII; EN 13445 (all parts).
- 3.13**
rear closure
closure used at the return end of the heat exchanger which covers the u-bends
- 3.14**
sealing ring
special gasket that provides a seal on the OD of tubesheet and the shell/tube side flange

3.15**hairpin section**

one U-tube element with two shell legs

3.16**seal-welded**

tube-to-tubesheet joint weld of unspecified strength applied between the tubes and tubesheets for the sole purpose of reducing the potential for leakage

3.17**strength-welded**

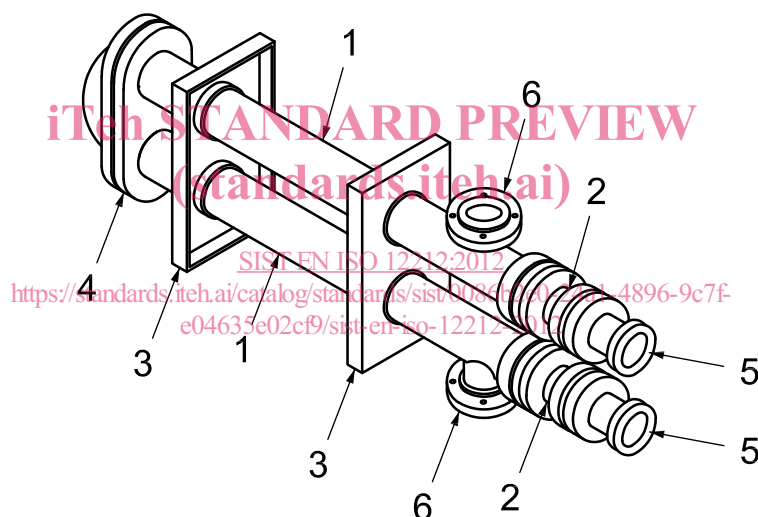
tube-to-tubesheet joint welded so that the design strength is equal to, or greater than, the axial tube strength specified by the pressure design code

3.18**structural welding code**

recognized structural welding code specified or agreed by the purchaser

3.19**tube bundle**

assembly of U-tubes, tube sheet and baffles where the tubes can be plain or finned

**Key**

1 shell	4 rear closure
2 front closure	5 tube side connection
3 support	6 shell side connection

Figure 1 — Typical components of a hairpin heat exchanger

4 General

- 4.1** The pressure design code shall be specified or agreed by the purchaser. Pressure components shall comply with the pressure design code and the supplemental requirements in this International Standard.
- 4.2** Where the use of TEMA is specified within this International Standard, the heat-exchanger construction shall conform to TEMA, Class R, unless another TEMA class is specified.
- 4.3** Hairpin exchangers typically do not require expansion joints. However, it can be necessary to evaluate some units to assess the requirement for an expansion joint. For such cases, the purchaser and vendor shall agree to all relevant design, fabrication, inspection and testing requirements.