



SLOVENSKI STANDARD
SIST EN ISO 13706:2000

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Petroleum and natural gas industries - Air-cooled heat exchangers (ISO 13706:1998)

Petroleum and natural gas industries - Air-cooled heat exchangers (ISO 13706:1998)

Erdöl- und Erdgasindustrien - Luftgekühlte Wärmetauscher (ISO 13706:2000)

Industries du pétrole et du gaz naturel - Echangeurs de chaleur refroidis a l'air (ISO 13706:2000)

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Ta slovenski standard je istoveten z: EN ISO 13706:2000

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ICS:

71.120.30	Prenosniki toplote	Heat exchangers
75.180.20	Predelovalna oprema	Processing equipment

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 13706

April 2000

ICS 75.180.20

English version

Petroleum and natural gas industries - Air-cooled heat
exchangers (ISO 13706:1998)

Industries du pétrole et du gaz naturel - Echangeurs de
chaleur refroidis à l'air (ISO 13706:1998)

Erdöl- und Erdgasindustrien - Luftgekühlte Wärmetauscher
(ISO 13706:1998)

This European Standard was approved by CEN on 15 April 2000.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Foreword

The text of the International Standard ISO 13706:2000 has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum and natural gas industries" in collaboration with Technical Committee CEN/TC 12 "Materials, equipment and offshore structures for petroleum 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 October 2000, and conflicting national standards shall be withdrawn at the latest by October 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

NOTE FROM CEN/CS: The foreword is susceptible to be amended on reception of the German language version. The confirmed or amended foreword, and when appropriate, the normative annex ZA for the references to international publications with their relevant European publications will be circulated with the German version.

Endorsement notice

The text of the International Standard ISO 13706:2000 was approved by CEN as a European Standard without any modification.

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INTERNATIONAL
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ISO
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First edition
2000-04-15

**Petroleum and natural gas industries —
Air-cooled heat exchangers**

*Industries du pétrole et du gaz naturel — Échangeurs de chaleur refroidis
à l'air*

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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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 13706 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum and natural gas industries*, Subcommittee SC 6, *Processing equipment and systems*.

Annexes A, B and C of this International Standard are for information only.

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ISO 13706:2000(E)**Introduction**

This International Standard is based on API standard 661, fourth edition, November 1997.

Users of this International Standard should be aware that further or differing requirements may 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 may be particularly applicable where there is innovative or developing technology. Where an alternative is offered, the vendor should identify any variations from this International Standard and provide details.

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Petroleum and natural gas industries — Air-cooled heat exchangers

1 Scope

This International Standard gives requirements and recommendations for the design, materials, fabrication, inspection, testing and preparation for shipment of air-cooled heat exchangers for use in the petroleum and natural gas industries.

This International Standard is applicable to air-cooled heat exchangers with horizontal bundles, but the basic concepts may also be applied to other configurations.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 76, *Rolling bearings — Static load ratings*.
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ISO 281, *Rolling bearings — Dynamic load ratings and rating life*.

ISO 286 (all parts), *ISO system of limits and fits*.

ISO 1081, *Belt drive — V-belts and V-ribbed belts, and corresponding grooved pulleys — Vocabulary*.

ISO 1459, *Metallic coatings — Protection against corrosion by hot-dip galvanizing — Guiding principles*.

ISO 1461, *Hot-dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods*.

ISO 2491, *Thin parallel keys and their corresponding keyways (dimensions in millimetres)*.

ISO 3744, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane*.

ISO 4183, *Belt drives — Classical and narrow V-belts — Grooved pulleys (system based on datum width)*.

ISO 4184, *Belt drives — Classical and narrow V-belts — Lengths in datum system*.

ISO 5287, *Narrow V-belt drives for the automotive industry — Fatigue test*.

ISO 5290, *Belt drives — Grooved pulleys for joined narrow V-belts — Groove sections 9J, 15J, 20J and 25J (effective system)*.

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ISO 8501-1, *Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness — Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.*

ISO 9563, *Belt drives — Electrical conductivity of antistatic endless synchronous belts — Characteristics and test method.*

ISO 10436, *Petroleum and natural gas industries — General-purpose steam turbines for refinery service.*

AGMA 6001¹⁾, *Design and selection of components for enclosed gear drives.*

AGMA 6010-E, *Practice for enclosed speed reducers or increasers using spur, helical, herringbone and spiral bevel gears.*

ICBO²⁾, *Uniform Building Code.*

3 Terms and definitions

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

3.1**bank**

one or more items arranged in a continuous structure

3.2**bare tube surface**

total area of the outside surfaces of the tubes, based on the length measured between the outside faces of the header tubesheets

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3.3**bay**

one or more tube bundles, serviced by two or more fans, including the structure, plenum and other attendant equipment

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NOTE Figure 1 shows typical bay arrangements.

3.4**finned surface**

<of a tube> total area of the outside surface exposed to air

3.5**forced-draught exchanger**

exchanger designed with the tube bundles located on the discharge side of the fan

3.6**induced-draught exchanger**

exchanger designed with the tube bundles located on the suction side of the fan

3.7**item**

one or more tube bundles for an individual service

1) American Gear Manufacturers' Association, 1500 King Street, Suite 201, Alexandria, VA 22314, USA.

2) International Conference of Building Officials, 5360 South Workman Mill Road, Whittier, CA 90601, USA.

3.8**item number**

purchaser's identification number for an item

3.9**pressure design code**

recognized pressure vessel standard specified or agreed by the purchaser

EXAMPLE ASME VIII.

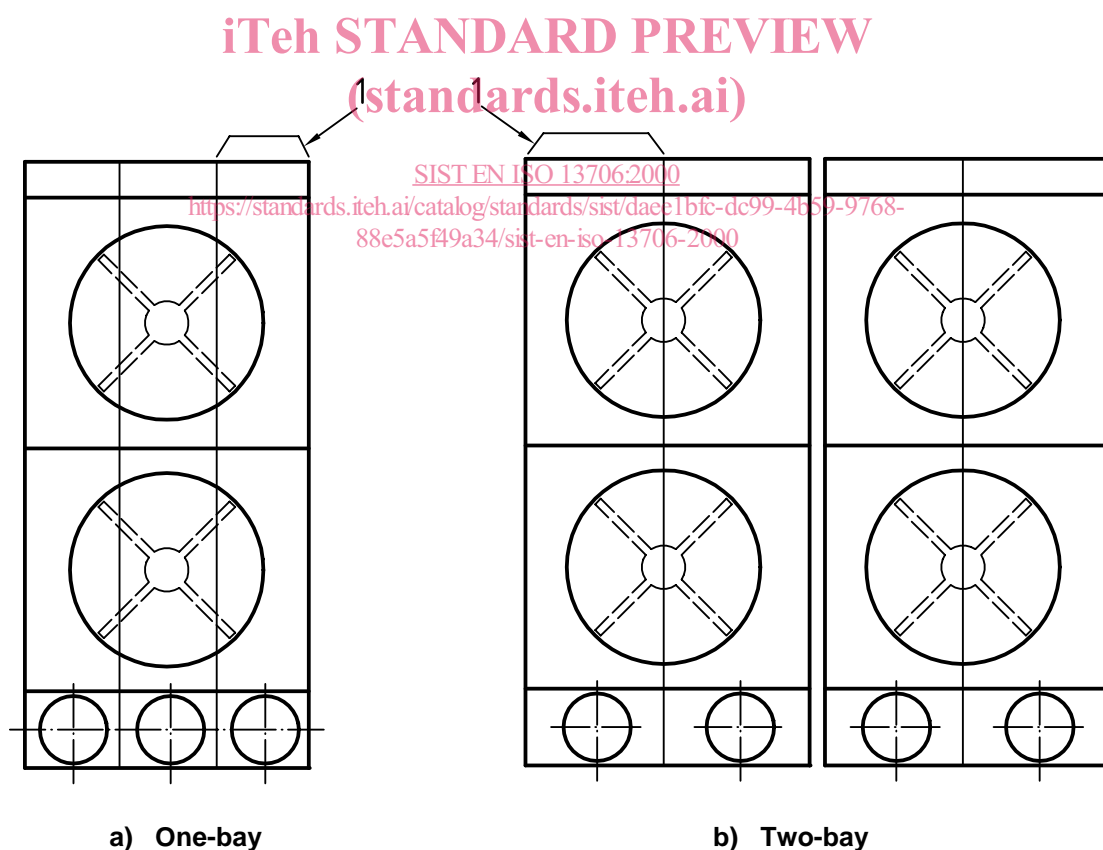
3.10**structural code**

recognized structural standard specified or agreed by the purchaser

EXAMPLES AISC M011 and AISC S302.

3.11**tube bundle**

assembly of headers, tubes and frames

**Key**

1 Tube bundle

Figure 1 — Typical bay arrangements

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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 given in this International Standard.

NOTE A round bullet (●) at the beginning of a subclause indicates a requirement for the purchaser to make a decision or provide information (see checklist in annex B). A triangular bullet (▲) at the beginning of a subclause indicates that this detail is included on the air-cooled heat exchanger data sheet (see annex B).

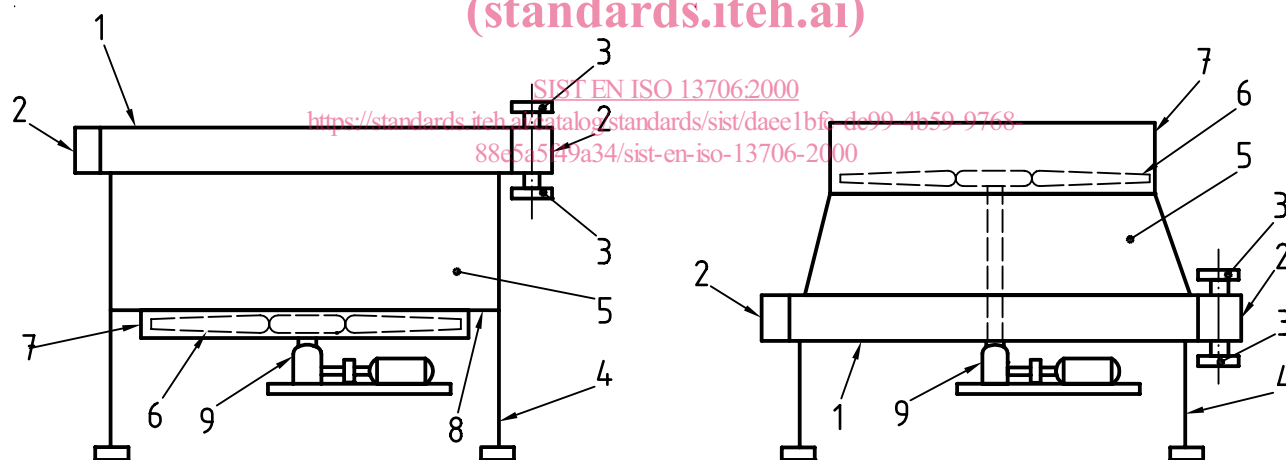
4.2 The air-cooled heat exchanger shall be either a forced-draught exchanger or an induced-draught exchanger and shall include the components shown in Figure 2 and any auxiliaries such as ladders, walkways and platforms.

4.3 Annex A, which may be consulted if required, includes for information some recommended mechanical and design details. Annex A also includes precautions for consideration when specifying certain design aspects, including temperature limitations, type of extended surface, tube support methods, type of air-cooled heat exchanger, materials of gasket construction and operational considerations such as walkway access.

- 4.4 The vendor shall comply with the applicable local regulations specified by the purchaser.

4.5 In this International Standard, where practical, U.S. Customary units are included in brackets for information.

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a) Forced draught

b) Induced draught

Key

1	Tube bundle	6	Fan
2	Header	7	Fan ring
3	Nozzle	8	Fan deck
4	Supporting column	9	Drive assembly
5	Plenum		

Figure 2 — Typical components of an air-cooled heat exchanger

5 Proposals

- 5.1 The vendor's proposal shall include a completed data sheet for each item (see annex B).
- 5.2 A proposal drawing shall be furnished which shows the major dimensions in plan and elevation, and the nozzle sizes and their orientation.
- 5.3 The proposal shall state whether vertically mounted electric motors shall be shaft up or shaft down.
- 5.4 The fabrication procedure and welding procedure shall be furnished for welded tube-to-tubesheet joints.
- 5.5 The proposal shall fully define the extent of shop assembly and include a general description of the components to be assembled in the field.
- 5.6 Any proposal for a design that is not fully described in this International Standard shall include additional drawings sufficient to describe the details of construction.
- 5.7 The proposal shall include a detailed description of any exceptions to the specified requirements.
- 5.8 The proposal shall include noise data. The proposal shall include a noise data sheet (see annex B) if specified by the purchaser.
 - 5.9 The proposal shall include fan performance characteristic curves if specified by the purchaser.
- 5.10 The proposal shall include details of the method used to secure the fin ends (7.1.11.7).
- 5.11 The vendor shall inform the purchaser if the vendor considers that the requirements specified by the purchaser are in conflict with, or are not suitable for, the intended purposes or operation of the unit.

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6.1 Approval information

- 6.1.1 For each item number, the vendor shall produce documents which include the following information. The purchaser shall specify which documents shall be submitted and which of them shall be subject to approval.
 - a) The purchaser's item number, the service, the project name and location, the purchaser's order number and the vendor's shop order number;
 - b) design pressure, maximum allowable working pressure, test pressure, maximum and minimum design temperature, and corrosion allowance;
 - c) any applicable codes and purchase specifications of the purchaser;
 - d) material specifications and grades for all pressure parts;
 - e) overall dimensions;
 - f) dimensions and locations of supports and sizes of holding-down bolts;
 - g) nozzle size, rating, facing, location, projection beyond header surface, allowable loadings (forces and moments) and direction of flow;
 - h) drive mount details;
 - i) masses of the tube bundle, the exchanger empty and full of water, and the mass of the heaviest component or combination of components intended by the vendor to be handled in a single lift;