



**SLOVENSKI STANDARD**  
**SIST EN ISO 10442:2004**  
**01-maj-2004**

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**Petroleum, chemical and gas service industries - Packaged, integrally geared centrifugal air compressors (ISO 10442:2002)**

Petroleum, chemical and gas service industries - Packaged, integrally geared centrifugal air compressors (ISO 10442:2002)

Erdöl-, Chemie- und Erdgasindustrie - Turbo-Luftkompressoranlagen mit integriertem Getriebe (ISO 10442:2002)

Industries du pétrole, de la chimie et du gaz naturel - Compresseurs d'air centrifuges assemblés a multiplicateur intégré (ISO 10442:2002)

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**Ta slovenski standard je istoveten z: EN ISO 10442:2002**

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**ICS:**

23.140	S[ { ] ! ^ • [ ! b / 4 } ^ ç { æ ä } ã • d [ l a	Compressors and pneumatic machines
75.180.20	Predelovalna oprema	Processing equipment

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**en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO 10442**

December 2002

ICS 23.140; 75.180.20

English version

**Petroleum, chemical and gas service industries - Packaged,  
integrally geared centrifugal air compressors (ISO 10442:2002)**

Industries du pétrole, de la chimie et du gaz naturel -  
Compresseurs d'air centrifuges assemblés à multiplicateur  
intégré (ISO 10442:2002)

This European Standard was approved by CEN on 6 November 2002.

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 Management Centre 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 Management Centre has the same status as the official versions.

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

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

**EN ISO 10442:2002 (E)****Foreword**

This document (EN ISO 10442:2002) has been prepared by Technical Committee ISO/TC 118 "Compressors, pneumatic tools and pneumatic machines" 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 June 2003, and conflicting national standards shall be withdrawn at the latest by June 2003.

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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

**NOTE FROM CMC** 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.

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The text of ISO 10442:2002 has been approved by CEN as EN ISO 10442:2002 without any modifications.

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# INTERNATIONAL STANDARD

**ISO**  
**10442**

First edition  
2002-12-01

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## **Petroleum, chemical and gas service industries — Packaged, integrally geared centrifugal air compressors**

*Industries du pétrole, de la chimie et du gaz naturel — Compresseurs d'air  
centrifuges assemblés à multiplicateur intégré*

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## ISO 10442:2002(E)

## 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.

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

ISO 10442 was prepared by Technical Committee ISO/TC 118, *Compressors, pneumatic tools and pneumatic machines*, in collaboration with Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 6, *Processing equipment and systems*.

Annex D forms a normative part of this International Standard. Annexes A, B and C are for information only.

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## Introduction

This International Standard is based on the American Petroleum Institute's API Std 672, second edition, April 1988.

Some of the content of this International Standard is identical or similar to ISO 10439, which covers centrifugal compressors for the petroleum, chemical and gas service industries.

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, chemical and gas service industries — Packaged, integrally geared centrifugal air compressors

## 1 Scope

This International Standard specifies requirements and gives recommendations for the design, materials, fabrication, inspection, testing and preparation for shipment of constant-speed, packaged, integrally geared centrifugal air compressors, including their accessories, for use in the petroleum, chemical and gas service industries. It is also applicable to gas services other than air that are non-hazardous and non-toxic. It is not applicable to machines that develop a pressure rise of less than 35 kPa above atmospheric pressure, which are classed as fans or blowers.

NOTE In this International Standard, where practical, US customary units have been included in brackets for information.

## 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 261, *ISO general-purpose metric screw threads — General plan*

ISO 262, *ISO general-purpose metric screw threads — Selected sizes for screws, bolts and nuts*

ISO 724, *ISO general-purpose metric screw threads — Basic dimensions*

ISO 965 (all parts), *ISO general purpose metric screw threads — Tolerances*

ISO 3511-1, *Process measurement control functions and instrumentation — Symbolic representation — Part 1: Basic requirements*

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 5389, *Turbocompressors — Performance test code*

ISO 7005-2, *Metallic flanges — Part 2: Cast iron flanges*

ISO 9614 (both parts), *Acoustics — Determination of sound power levels of noise sources using sound intensity*

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

ISO 10438, (all parts), *Petroleum and natural gas industries — Lubrication, shaft-sealing and control-oil systems and auxiliaries*

ISO 10441, *Petroleum and natural gas industries — Flexible couplings for mechanical power transmission — Special purpose applications*

**ISO 10442:2002(E)**

IEC 60079-10, *Electrical apparatus for explosive gas atmospheres — Part 10, Classification of hazardous areas*

ABMA<sup>1)</sup> Std 7, *Shaft and housing fits for metric radial ball and roller bearings (except tapered roller bearings) conforming to basic boundary plan*

ABMA Std 20, *Radial bearings of ball, cylindrical roller and spherical roller types — Metric design*

AGMA<sup>2)</sup> 2000, *Gear classification and inspection handbook*

AGMA 6011, *Specification for High Speed Helical Gear Units*

API Std 670, *Vibration, axial position, and bearing temperature monitoring systems*

API RP 520 PT I, *Sizing, selection, and installation of pressure-relieving devices in refineries, Part I, Sizing and selection*

API RP 520 PT II, *Sizing, selection, and installation of pressure-relieving devices in refineries, Part II, Installation*

ASME<sup>3)</sup> PTC 10, *Performance test code on compressors and exhausters*

ASTM<sup>4)</sup> A275, *Standard test method for magnetic particle examination of steel forgings*

DIN<sup>5)</sup> 3990, *Load calculations for gearings*

NEMA<sup>6)</sup> SM 23, *Steam turbines for mechanical drive service*

TEMA<sup>7)</sup> *Standards of the Tubular Exchanger Manufacturers Association, eight edition*

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**3 Terms and definitions**

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

**3.1****bull gear**

low-speed rotor of the integral gear

**3.2****inlet volume flow**

volume flow rate determined at the conditions of pressure, temperature, compressibility and gas composition, including moisture, at the compressor inlet flange

[ISO 10439:2002, definition 3.5]

- 
- 1) American Bearing Manufacturers Association, 2025 M Street, NW. Suite 800, Washington, DC 20036, USA.
  - 2) American Gear Manufacturers Association, 1500 King St, Suite 201, Alexandria VA 22314, USA.
  - 3) American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017-2392, USA.
  - 4) American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-11887, USA.
  - 5) Deutsches Institut für Normung E.V., Beuth Verlag GmbH, Burggrafenstrasse 6, D10787, Berlin, Germany.
  - 6) US National Electrical Manufacturers Association, 1300 North 17th Street, Suite 1847, Rosslyn, Virginia 22209, USA.
  - 7) US Tubular Exchanger Manufacturers Association, 25 N Broadway, Tarrytown, New York, NY 10007, USA.

**3.3****maximum allowable temperature**

maximum continuous temperature for which the manufacturer has designed the equipment (or any part to which the term is referred) when handling the specified fluid at the specified pressure

[ISO 10439:2002, definition 3.6]

**3.4****maximum allowable working pressure**

maximum continuous pressure for which the manufacturer has designed the equipment (or any part to which the term is referred) when operating at the maximum allowable temperature

[ISO 10439:2002, definition 3.7]

**3.5****normal operating point**

point at which usual operation is expected and optimum efficiency is desired

NOTE This will usually be the point at which the vendor certifies that performance is within the tolerances stated in this International Standard.

[ISO 10439:2002, definition 3.11]

**3.6****pinion**

high-speed rotor, or rotors, of the integral gear

**3.7****pipng design code**

recognized piping standard specified or agreed by the purchaser

EXAMPLE

ASME B31.3.

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**3.8****pressure casing**

composite of all the stationary pressure-containing parts of the unit

**3.9****pressure design code**

recognized pressure vessel standard specified or agreed by the purchaser

EXAMPLE

ASME Boiler and Pressure Vessel Code, Section VIII.

[ISO 10439:2002, definition 3.14]

**3.10****rated discharge pressure**

highest pressure required to meet the specified operating conditions

**3.11****rated operating point**

operating point at which the rated volume flow and the rated discharge pressure are attained

**3.12****rated operating speed**

speed required to meet the conditions specified by the purchaser for the intended service

NOTE This speed is equal to the maximum continuous speed for constant speed compressor units.

**ISO 10442:2002(E)****3.13****rated volume flow**

inlet volume flow required by the specified operating conditions

**3.14****standby service**

service condition in which a normally idle or idling piece of equipment is capable of immediate automatic or manual start-up and continuous operation

**3.15****trip speed**

speed at which the independent emergency overspeed device operates to shut down a prime mover

NOTE For constant speed motor drivers, this is the speed corresponding to the synchronous speed of the motor at the maximum frequency of the electrical supply.

[ISO 10439:2002, definition 3.19]

**4 Basic design****4.1 General****4.1.1 Purchaser decision or information**

A bullet (●) at the beginning of a clause indicates that the purchaser is required to make a decision or provide information. This information should be indicated on the data sheets (see annex A).

**4.1.2 Packaged equipment**

The vendor shall provide, as a minimum, the following equipment (referred to herein as a package), packaged to meet the specified operating conditions:

- a) centrifugal compressor with integral speed-increasing gear unit;
- b) intercoolers, moisture separators and V-notched gate drain valves;
- c) inlet throttle device (valve or variable-inlet guide vanes);
- d) driver (motor or turbine as specified);
- e) couplings and guards;
- f) "lube"-oil system;
- g) vibration monitoring system;
- h) controls and instrumentation;
- i) instrument and control panel;
- j) common baseplate.

If requested by the purchaser, the layout of the package shall be agreed by the purchaser.

### 4.1.3 Shipped loose equipment

The vendor shall provide the following accessory equipment, either packaged or included within the scope of supply and shipped loose, to meet the specified operating conditions:

- a) aftercooler with moisture separator and V-notched gate drain valve;
- b) discharge check valve;
- c) discharge blowoff or by-pass valve;
- d) air inlet filter-silencer;
- e) blowoff or by-pass silencer.

### 4.1.4 Other equipment

- Any other equipment required shall be specified by the purchaser and included in the vendor's proposal.

### 4.1.5 Standby service

If standby service is specified, the vendor shall provide all necessary controls and protective systems to allow automatic or manual start-up.

### 4.1.6 Turbine-driven equipment

All turbine-driven equipment shall be designed to run without damage to the trip speed of the driver.

### 4.1.7 Normal operating point

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- The purchaser shall specify the normal operating point on the data sheets.

### 4.1.8 Environmental conditions

- The purchaser shall specify whether the installation is indoors (heated or unheated) or outdoors (with or without a roof), as well as the weather and environmental conditions in which the package must operate (including maximum and minimum temperatures and unusual humidity or dust problems). The package and its accessories shall be suitable for operation under these specified conditions. For the purchaser's guidance, the vendor shall list in the proposal any special protection that the purchaser is required to supply.

### 4.1.9 Engineering coordination

The vendor shall assume responsibility for the engineering coordination of the package and all accessories included in the scope of the order.

### 4.1.10 Package arrangement

The arrangement of the package, including piping, coolers, pumps and controls, shall provide adequate clearance areas and safe access for operation and maintenance.

### 4.1.11 Oil reservoirs and housings

Oil reservoirs and compressor housings that enclose moving lubricated parts (such as bearings, shaft seals, highly polished parts, instruments and control elements) shall be designed to minimize contamination by moisture, dust and other foreign matter during periods of operation and idleness.