SLOVENSKI STANDARD
oSIST prEN ISO 10439-3:2010

01-december-2010

Petrokemična industrija ter industrija za predelavo nafte in zemeljskega plina - Aksialni in radialni kompresorji in ekspanzijski kompresorji - 3. del: Radialni kompresorji z integriranim gonilom (ISO/DIS 10439-3:2010)

Petroleum, petrochemical and natural gas industries - Axial and centrifugal compressors and expander-compressors - Part 3: Integrally geared centrifugal compressors (ISO/DIS 10439-3:2010)

Erdöl-, petrochemische und Erdgasindustrie - Axial- und Radialkompressoren und Expanderkompressoren für Sonderanwendungen zur Handhabung von Gas oder Prozessluft - Teil 3: Radialkompressoren mit integrierter Getriebeeinheit (ISO/DIS 10439-3:2010)

Industries du pétrole, de la pétrochimie et du gaz naturel - Compresseurs axiaux et centrifuges et compresseurs-détenteurs - Partie 3: Compresseurs centrifuges et axiaux à multiplicateur intégré (ISO/DIS 10439-3:2010)

Ta slovenski standard je istoveten z: **prEN ISO 10439-3**

ICS:

23.140	Kompresorji in pnevmatični stroji	Compressors and pneumatic machines
75.180.20	Predelovalna oprema	Processing equipment

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN ISO 10439-3

October 2010

ICS 75.180.20; 71.120.99

Will supersede EN ISO 10439:2002

English Version

Petroleum, petrochemical and natural gas industries - Axial and centrifugal compressors and expander-compressors - Part 3: Integrally geared centrifugal compressors (ISO/DIS 10439-3:2010)

Industries du pétrole, de la pétrochimie et du gaz naturel - Compresseurs axiaux et centrifuges et compresseurs-détenteurs - Partie 3: Compresseurs centrifuges et axiaux à multiplicateur intégré (ISO/DIS 10439-3:2010)

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This draft European Standard is submitted to CEN members for parallel enquiry. It has been drawn up by the Technical Committee CEN/TC 12.

If this draft becomes a European Standard, 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.

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

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Foreword

This document (prEN ISO 10439-3:2010) has been prepared by Technical Committee ISO/TC 118 "Compressors and pneumatic tools, machines and equipment" 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 document is currently submitted to the parallel Enquiry.

This document will supersede EN ISO 10439:2002.

Endorsement notice

The text of ISO/DIS 10439-3:2010 has been approved by CEN as a prEN ISO 10439-3:2010 without any modification.

DRAFT INTERNATIONAL STANDARD ISO/DIS 10439-3

ISO/TC **118**/SC **1** Secretariat: **NEN**

Voting begins on: **2010-10-07**

Voting terminates on: **2011-03-07**

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Petroleum, petrochemical and natural gas industries — Axial and centrifugal compressors and expander-compressors —

Part 3:
Integrally geared centrifugal compressors

Industries du pétrole, de la pétrochimie et du gaz naturel — Compresseurs axiaux et centrifuges et compresseurs-détenteurs —

Partie 3: Compresseurs centrifuges et axiaux à multiplicateur intégré

(Revision in part of ISO 10439:2002)

ICS 71.120.99; 75.180.20

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO-lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five-month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

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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 10439-3 was prepared by Technical Committee ISO/TC 118, *Compressors and pneumatic tools, machines and equipment*, Subcommittee SC 1, *Process compressors*, 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*.

This second edition cancels and replaces the first edition (ISO 10439:2002), which has been technically revised and split into four (4) parts.
ISO 10439 consists of the following parts, under the general title *Axial and centrifugal compressors and expander-compressors for special purpose applications handling gas of process air for petroleum, petrochemical and natural gas industries:*

Part 1: General requirements

Part 2: Non-integrally geared centrifugal and axial compressors

Part 3: Integrally geared centrifugal compressors

Part 4: Expander-compressors

Introduction

This International Standard is based on the 7th edition of the American Petroleum Institute standard API 617.

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 appropriate 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.

A Bullet (•) at the beginning of a clause or subclause indicates that either a decision is required or further information is to be provided by the purchaser. This information should be indicated on data sheets or stated in the enquiry or purchase order (see examples in ISO 10439-2 Annex A, ISO 10439-3 Annex A and ISO 10439-4 Annex A).

In this International Standard, where practical, US Customary units are included in parentheses for information.

Petroleum, petrochemical and natural gas industries — Axial and centrifugal compressors and expander-compressors —

Part 3:
Integrally geared centrifugal compressors

1 Scope

This International Standard specifies minimum requirements and gives recommendations for axial compressors, single-shaft and integrally geared process centrifugal compressors and expander-compressors for special purpose applications that handle gas or process air in the petroleum, petrochemical and natural gas industries. This part of ISO 10439 specifies integrally geared centrifugal compressors in conjunction with ISO 10439-1.

NOTE 1 See API 672 for packaged plant instrument air compressors.

NOTE 2 Expander stages are sometimes provided on these machines.

2 Normative References

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

ISO 5389:2005, *Turbocompressors – Performance test code*

ISO 8068:2006 *Lubricants, industrial oils and related products (class L) – Family T (Turbines) – Specifications for lubricating oils for turbines*

ISO 10439-1:2010 *Petroleum, Petrochemical and natural gas industries – Axial and Centrifugal Compressors and Expander-compressors – Part 1: General requirements*

API STD 670, *Machinery Protection Systems – Fourth Edition*

AGMA 2015-1-A01 2001, *Accuracy Classification System – Tangential Measurements for Cylindrical Gears*

AGMA 2101, *Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth*

ASME PTC 10-1997, *Performance Test Code on Compressors and Exhausters*

3 Terms, Abbreviated terms and Definitions

For the purposes of this document, the terms, abbreviated terms and definitions given in ISO 10439-1 apply. A cross-section showing nomenclature of an integrally geared centrifugal compressor may be found in Annex C.

4 General

4.1 Dimensions and units

The dimensional and unit requirements of 10439-1 shall apply.

4.2 Statutory requirements

The statutory requirements of 10439-1 shall apply.

4.3 Unit responsibility

The unit responsibilities of ISO 10439-1 shall apply.

4.4 Basic Design

4.4.1 Performance

4.4.1.1 The sectional head-capacity characteristic curve of each compressor section shall rise continuously from the rated point to predicted surge. The compressor, without the use of a bypass, shall be suitable for continuous operation at any capacity at least 10 % greater than the predicted surge capacity shown in the proposal.

4.4.1.2 Unless otherwise specified, the design lubricant shall be hydrocarbon oil of viscosity Grade 32 with an FZG load stage of 5, in accordance with ISO 8068. Viscosity Grade 46 with an FZG load stage of 5 may be used as a design lubricant, with purchaser's approval. Oils with extreme pressure (EP) additives shall not be used.

NOTE Typical oil used in refineries and chemical plants has an FZG of 5 or higher. Requiring a higher FZG by design can require the need for special oil for this equipment.

4.5 Materials

Materials shall be in accordance with 4.5 of ISO 10439-1.

NOTE Refer to Annex D for typical materials.

4.6 Casings

Casings shall be in accordance with 4.6 of ISO 10439-1 and 4.6.1 through 4.6.6, as follows.

4.6.1 Pressure-containing Casings

● **4.6.1.1** The maximum allowable working pressure of each pressure casing shall be at least equal to the specified relief valve set pressure for that casing. The purchaser will specify the relief valve set pressure(s) for final discharge pressure and intermediate casing pressures, if applicable.

NOTE If only one relief valve pressure is specified, its set pressure may not apply to the intermediate pressure.

4.6.1.1.1 When a relief valve set pressure is not specified, each pressure casing shall be rated for the settling-out pressure, or at least 125 percent of the maximum specified discharge pressure (gauge) of that pressure casing as determined by the vendor. System protection shall be furnished by the purchaser.

4.6.1.2 Socket-head or spanner-type bolting shall not be used externally unless specifically approved by the purchaser. For limited space locations, integrally flanged fasteners may be required.

4.6.2 Casing Repair

Casings repairs shall be in accordance with 4.6.2 of ISO 10439-1.

4.6.3 Material inspection of Pressure Containing Parts

Casing material inspection of pressure containing parts shall be in accordance with 4.6.3 of ISO 10439-1.

4.6.4 Pressure Casing Connections

Pressure Casing Connections shall be in accordance with 4.6.4 of ISO 10439-1 and the following paragraphs.

4.6.4.1 Main Process Connections

Main process connections shall be in accordance with 4.6.4.2 of ISO 10439-1.

4.6.4.2 Auxiliary Connections

4.6.4.2.1 If flanged or machined and studded openings are impractical, threaded connections may be used where they do not come in contact with flammable or toxic gas, with purchasers approval as follows:

a) On non-weldable materials, such as cast iron.

b) Where essential for maintenance (disassembly and assembly).

These threaded openings shall be as specified in 4.6.4.3.8 of ISO 10439-1.

4.6.4.2.2 Auxiliary connections shall be at least DN 20 (3/4-in. NPT). See 4.11.1.7 through 4.11.1.9 and Table 1 for auxiliary gearbox connections.

NOTE See 4.6.4.1.3 of ISO 10439-1 for allowable connection sizes.

4.6.4.2.3 Threaded connections for pipe sizes DN 20 (3/4-in. NPT) through DN 40 (1-1/2-in. NPT) size are permissible with the approval of the purchaser.

NOTE See 4.6.4.1.3 of ISO 10439-1 for allowable connection sizes.

4.6.5 Casing Support Structure

The mounting of the pressure casing (volute) to the gearbox shall be per 4.4.1.7 in ISO 10439-1. Bolting used to mount pressure casings shall be per 4.6.1.7 in ISO 10439-1.

4.6.6 External Forces and Moments

4.6.6.1 The vendor shall furnish the allowable forces and moments for each main process nozzle which has a customer connection in tabular form with the proposal. If nozzle loadings are not furnished, they shall be no less than NEMA SM23.