SLOVENSKI STANDARD
SIST EN ISO 13691:2004

01-maj-2004

Nadomešča:
SIST ISO 13691:2002

Industrija za predelavo nafte in zemeljskega plina - Hitrotekoča gonila za posebne namene (ISO 13691:2001)

Petroleum and natural gas industries - High-speed special-purpose gear units (ISO 13691:2001)

Erdöl- und Erdgasindustrie - Schnellaufgetriebe für spezielle Anwendungen (ISO 13691:2001)

Industries du pétrole et du gaz naturel - Engrenages a grande vitesse pour applications particulieres (ISO 13691:2001)

Ta slovenski standard je istoveten z: **EN ISO 13691:2002**

ICS:

21.200	Gonila	Gears
75.180.20	Predelovalna oprema	Processing equipment

SIST EN ISO 13691:2004 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 13691

November 2002

ICS 21.200; 75.180.20

English version

Petroleum and natural gas industries - High-speed special-purpose gear units (ISO 13691:2001)

Industries du pétrole et du gaz naturel - Engrenages à grande vitesse pour applications particulières (ISO 13691:2001)

This European Standard was approved by CEN on 1 August 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.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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

Ref. No. EN ISO 13691:2002 E

Foreword

The text of ISO 13691:2001 has been prepared by Technical Committee ISO/TC 60 "Gears" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 13691:2002 by 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 May 2003, and conflicting national standards shall be withdrawn at the latest by May 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.

Endorsement notice

The text of ISO 13691:2001 has been approved by CEN as EN ISO 13691:2002 without any modifications.

NOTE Normative references to International Standards are listed in Annex ZA (normative).

Annex ZA
(normative)

Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE Where an International Publication has been modified by common modifications, indicated by (mod.), the relevant EN/HD applies.

Publication	Year	Title	EN	Year
ISO 8501-1	1988	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	EN ISO 8501-1	2001
ISO 10441	1999	Petroleum and natural gas industries - Flexible couplings for mechanical power transmission - Special purpose applications	EN ISO 10441	1999

INTERNATIONAL STANDARD

ISO 13691

First edition
2001-12-15

Petroleum and natural gas industries — High-speed special-purpose gear units

Industries du pétrole et du gaz naturel — Engrenages à grande vitesse pour applications particulières

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

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Contents

Page

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 13691 was prepared by Technical Committee ISO/TC 60, *Gears*, Subcommittee SC 2, *Gear capacity calculation*.

ISO 13691 is based on API 613 and is intended to give ratings similar to those found when using API 613.

Annexes A to G of this International Standard are for information only.

Introduction

This International Standard is based on the accumulated knowledge and experience of manufacturers and users of gear units. It has been developed to satisfy the requirements of the petroleum, petrochemical and natural gas industries, but its use is not restricted to these industries.

The purpose of this International Standard is to establish minimum requirements for design and construction so that the equipment is suitable for the purpose for which it is required.

Energy conservation and protection of the environment are matters of concern and are important in all aspects of equipment design, application and operation. The manufacturers and users of equipment should aggressively pursue alternative, innovative approaches which improve energy utilization and/or minimize the environmental impact, without sacrificing safety or reliability. Such approaches should be thoroughly investigated and purchase options should increasingly be based on the estimation of whole-life costs and the environmental consequences rather than acquisition costs alone.

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

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 paragraph indicates that either a decision is required or further information is to be provided by the purchaser. This information should be indicated on the data sheets; otherwise it should be stated in the quotation request or in the order.

Petroleum and natural gas industries — High-speed special-purpose gear units

1 Scope

This International Standard specifies the minimum requirements for enclosed, precision, single and double helical, one- and two-stage speed increasers and reducers of parallel shaft design with pinion speeds of 3000 min^{-1} or greater, or pitch line velocities of 25 m/s or greater, for special purpose applications. Such applications will typically be required to operate continuously for extended periods, without installed spare equipment and are critical to the continued operation of the installation. By agreement this International Standard may be used for other services.

This International Standard also specifies a method of rating gears which meet the following criteria:

a) gear accuracy

- teeth accuracy: accuracy grade 4 or better as given in ISO 1328-1:1995, for both single pitch deviation, f_{pt}, and total cumulative pitch deviation, F_p,
- total helix deviation F_β between the helices of the pinion and wheel: accuracy grade 4 or better as given in ISO 1328-1:1995;

b) range of the transverse contact ratios: $1{,}2 < \varepsilon_\alpha < 2{,}0$;

c) overlap ratio $\varepsilon_\beta \geqslant 1{,}0$;

d) helix angle: $5 \leqslant \beta \leqslant 35°$;

e) working flanks of the pinion or gear: provided with profile modifications to obtain a good conjugate tooth load distribution along the path of contact;

f) working flanks of pinion or gear: modified as necessary to compensate for both torsional and bending deflections and, when necessary for gears with pitch line velocities in excess of 100 m/s, also for thermal distortions;

g) gear lubrication: straight mineral oil, viscosity grade VG-32 or VG-46 (see ISO 3448);

h) material of the gear teeth: quality MQ or better, in accordance with ISO 6336-5:1996.

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 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

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 965-1, *ISO general-purpose metric screw threads — Tolerances — Part 1: Principles and basic data*

ISO 965-2, *ISO general- purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose external and internal screw threads — Medium quality*

ISO 965-3, *ISO general-purpose metric screw threads — Tolerances — Part 3: Deviations for constructional screw threads*

ISO 1122-1, *Vocabulary of gear terms — Part 1: Definitions related to geometry*

ISO 1328-1:1995, *Cylindrical gears — ISO system of accuracy — Part 1: Definitions and allowable values of deviations relevant to corresponding flanks of gear teeth*

ISO 1940-1:1986, *Mechanical vibration — Balance quality requirements of rigid rotors — Part 1: Determination of permissible residual unbalance*

ISO 2953, *Mechanical vibration — Balancing machines — Description and evaluation*

ISO 3448:1992, *Industrial liquid lubricants — ISO viscosity classification*

ISO 6336-3, *Calculation of load capacity of spur and helical gears — Part 3: Calculation of tooth bending strength*

ISO 6336-5, *Calculation of load capacity of spur and helical gears — Part 5: Strength and quality of materials*

ISO 6743-6, *Lubricants, industrial oils and related products (class L) — Classification — Part 6: Family C (Gears)*

ISO 7005-1, *Metallic flanges — Part 1: Steel flanges*

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

ISO 8501-1:1988, *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 8579-1, *Acceptance code for gear units — Part 1: Test code for airborne sound*

ISO 8821, *Mechanical vibration — Balancing — Shaft and fitment key convention*

ISO 9084:2000, *Calculation of load capacity of spur and helical gears — Application to high speed gears and gears of similar requirement*

ISO/TR 10064-4, *Cylindrical gears — Code of inspection practice — Part 4: Recommendations relative to surface texture and tooth contact pattern checking*

ISO 10438-1, *Petroleum and natural gas industries — Lubrication, shaft-sealing and control-oil systems and auxiliaries — Part 1: General requirements*

ISO 10438-2, *Petroleum and natural gas industries — Lubrication, shaft-sealing and control-oil systems and auxiliaries — Part 2: Special-purpose oil systems*

ISO 10438-3, *Petroleum and natural gas industries — Lubrication, shaft-sealing and control-oil systems and auxiliaries — Part 3: General-purpose oil systems*

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

ISO/TR 13593, *Enclosed gear drives for industrial applications*

ISO/TR 13989-1, *Calculation of scuffing load capacity of cylindrical, bevel and hypoid gears — Part 1: Flash temperature method*

ISO/TR 13989-2, *Calculation of scuffing load capacity of cylindrical, bevel and hypoid gears — Part 2: Integral temperature method*

IEC 60079-0, *Electrical apparatus for explosive gas atmospheres — Part 0: General requirements*

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

ASME B16.11, *Forged fittings, Socket-Welding and Threaded*

ASME, *Boiler and pressure vessel code — Section V*

ASME, *Boiler and pressure vessel code — Section VIII, Division 1*

ASME Y 14.2 M, *Line conventions and lettering*

ASTM A956, *Standard test method for Leeb hardness testing of steel products*

ASTM E94, *Standard guide for radiographic examination*

ASTM E125, *Standard reference photographs for magnetic particle indications on ferrous castings*

ASTM E709, *Standard guide for magnetic particle examination*

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 1122-1 and the following apply.

NOTE The use of the word design in any term (such as design power, design pressure, design temperature, or design speed) should be avoided in the purchaser's specifications. This terminology should be used only by the equipment designer and the manufacturer.

3.1
axially [horizontally] split casing joint
casing joint parallel to the shaft centreline

3.2
critical speed
shaft rotational speed at which the rotor-bearing-support system is in a state of resonance with any exciting frequency associated with that speed

3.3
wheel
lower speed gear element in mesh

3.4
pinion
higher speed gear element in mesh

3.5
gear rated power
maximum power specified by the purchaser on the data sheet and stamped on the nameplate

cf. 5.2.1.