SLOVENSKI STANDARD
oSIST prEN ISO 10431:2007

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Industrija nafte in zemeljskega plina - Ļrpalne enote - Specifikacija (ISO/DIS 10431:2006)

Petroleum and natural gas industries - Pumping units - Specification (ISO/DIS 10431:2006)

Erdöl- und Erdgasindustrien - Tiefpumpenantriebe - Anforderungen (ISO/DIS 10431:2006)

Industries du pétrole et du gaz naturel - Unités de pompage - Spécifications (ISO/DIS 10431:2006)

Ta slovenski standard je istoveten z: **prEN ISO 10431**

ICS:

23.080	Ļrpalke	Pumps
75.180.10	Oprema za raziskovanje in odkopavanje	Exploratory and extraction equipment

oSIST prEN ISO 10431:2007 **en**

EUROPEAN STANDARD

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English Version

Petroleum and natural gas industries - Pumping units - Specification (ISO/DIS 10431:2006)

Industries du pétrole et du gaz naturel - Unités de pompage - Spécifications (ISO/DIS 10431:2006)

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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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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

Foreword

This document (prEN ISO 10431:2006) 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, petrochemical and natural gas industries", the secretariat of which is held by AFNOR.

This document is currently submitted to the parallel Enquiry.

Endorsement notice

The text of ISO/DIS 10431:2006 has been approved by CEN as prEN ISO 10431:2006 without any modifications.

DRAFT INTERNATIONAL STANDARD ISO/DIS 10431

ISO/TC **67**/SC **4** Secretariat: **ANSI**

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Petroleum and natural gas industries — Pumping units — Specification

Industries du pétrole et du gaz naturel — Unités de pompage — Spécifications

[Revision of first edition (ISO 10431:1993)]

ICS 75.180.10

ISO/CEN PARALLEL ENQUIRY

The CEN Secretary-General has advised the ISO Secretary-General that this ISO/DIS covers a subject of interest to European standardization. **In accordance with the ISO-lead mode of collaboration as defined in the Vienna Agreement, consultation on this ISO/DIS has the same effect for CEN members as would a CEN enquiry on a draft European Standard.** Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month FDIS vote in ISO and formal vote in CEN.

In accordance with the provisions of Council Resolution 15/1993 this document is circulated in the English language only.

Conformément aux dispositions de la Résolution du Conseil 15/1993, ce document est distribué en version anglaise seulement.

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 10431 was prepared by Technical Committee ISO/TC 67, *Petroleum, Petrochemical and natural gas industries*, Subcommittee SC 4, *Drilling and production equipment*.

This second edition cancels and replaces the first edition (1993) which has been editorially revised.

Introduction

This International Standard has been developed by users/purchasers and suppliers/manufacturers of beam pumping units intended for use in the petroleum and natural gas industry worldwide. This International Standard is intended to give requirements and information to both parties in the design, selection, and manufacture of beam pumping units. Furthermore, this International Standard addresses the minimum requirements with which the supplier/manufacturer is to comply so as to claim conformity with this International Standard.

Users of this International Standard should be aware that requirements above those outlined in this International Standard may be needed for individual applications. This International Standard is not intended to inhibit a supplier/manufacturer from offering, or the user/purchaser from accepting, alternative equipment or engineering solutions. This may be particularly applicable where there is innovative or developing technology. Where an alternative is offered, the supplier/manufacturer should identify any variations from this International Standard and provide details.

Forms are provided in Annex B for rating of crank counterbalances and for recording pumping unit stroke and torque factors. Recommendations and examples for the calculation and application of torque factor on pumping units are contained in Annexes C to F and examples for calculating torque ratings for pumping unit reducers are contained in Annex G. Recommendations and considerations for conducting a system analysis are contained in Annex H. Finally, Annex I contains an illustration of a typical beam pumping unit and the nomenclature associated with it.

In this International Standard , ISO 10431, quantities expressed in the International System (SI) of units are also, where practical, expressed in United States Customary (USC) units, either in parentheses in the text or on separate data sheets or in separate annexes, for information. One exception is noted in Figure 13 where USC units are used alone.

Petroleum and natural gas industries — Pumping units — Specification

1 Scope

This International Standard provides the requirements and guidelines for the design and rating of beam pumping units for use in the petroleum and natural gas industry. Included are all components between the carrier bar and the speed reducer input shaft. This includes the following:

a) Pumping unit structures;

b) Pumping unit gear reducers;

c) Pumping unit chain reducers.

Only loads imposed on the structure and/or gear reducer by the polished rod load are considered in this International Standard.

Also included are the requirements for the design and rating of enclosed speed reducers wherein the involute gear tooth designs include helical and herringbone gearing. The rating methods and influences identified in this International Standard are limited to single and multiple stage designs applied to oil field pumping units in which the pitch-line velocity of any stage does not exceed 25,4 m/s (5 000 ft/min) and the speed of any shaft does not exceed 3 600 r/min.

This standard does not cover chemical properties of materials, installation and maintenance of the equipment, beam type counterbalance units, prime movers and power transmission devices outside the gear reducer, or control systems.

2 Normative references

The following normative documents contain requirements which, through reference in this text, constitute requirements of this International Standard. The latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ANSI/AGMA 1012–G05, Gear Nomenclature, Definitions of Terms with Symbols

ASTM International, Standard specification for carbon structural steel, ASTM A36

AGMA 2001-D04, Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth

AGMA 908-B89, Geometry Factors for Determining the Pitting Resistance and Bending Strength of Spur, Helical and Herringbone Gear Teeth

American National Standards Institute, Precision Power Transmission Roller Chains, ANSI B29.1

API RP 11G, Design Calculations for Sucker Rod Pumping Systems (Conventional Units)

API RP 11L, Recommended Practice for Design Calculations for Sucker Rod Pumping Systems (Conventional Units)

3 Terms and definitions

Terms used conform to ANSI/AGMA 1012–G05, other terms are given below.

3.1
beam pumping unit
machine for translating rotary motion from a crankshaft to linear reciprocating motion for the purpose of transferring mechanical power to a down-hole pump

3.2
beam pumping unit structure
all components between the carrier bar and the speed reducer output shaft

3.3
brake
component of a pumping unit designed to restrain motion in all rotary joints

NOTE It is often composed of a disk or drum mounted on the reducer input shaft combined with a mechanism to impart a restraining friction torque.

3.4
carrier bar
part of the pumping unit that supports the load of the sucker rod string through the polished rod clamp

3.5
class I lever system
lever system in which the fulcrum is located between the load and the applied force or effort

NOTE An example of this is a beam pumping unit with the fixed saddle bearing located along the walking beam between the equalizer and the well.

3.6
class III lever system
lever system in which the applied force (effort) is located between the load and fulcrum

NOTE An example of this is a beam pumping unit with the equalizer located between the fixed samson post bearing and the well.

3.7
cranks
driving link in the four-bar linkage of a beam pumping unit that is located between the output shaft of the gear reducer and the pitman link

3.8
diametral
along a diameter

3.9
equalizer
connects the pitman links to the rear of the walking beam

3.10
hanger
component of a pumping unit designed to interface with the fluid well

NOTE Transmits well load from the polished rod to the pumping unit wireline.

3.11
horsehead
component of a beam pumping unit designed to transmit force and motion from the walking beam to the flexible wireline

NOTE Its shape is such that the imparted motion is directed vertically above the well head allowing the polished rod to move without undue side loads.

3.12
pitmans
Connecting link in the pumping unit mechanism between the cranks and the equalizer

3.13
rotation direction
crank rotation is defined as either clockwise or counter-clockwise as viewed from the side of the beam pumping unit with the well head to the right

3.14
samson post bearing
bearing mounted to a fixed location atop the samson post of the pumping unit that is attached to and provides the fulcrum location for the walking beam

3.15
speed reducer
mechanism located between the belt drive and the cranks to transmit rotary power while reducing speed and increasing torque

3.16
structural unbalance
force required at the polished rod to balance the beam in a horizontal position with the pitmans disconnected from the crank pin and no applied well load

NOTE The structural unbalance is considered positive when the force required at the polished rod is downward, and negative when upward.

3.17
torque factor
factor, for any given crank angle, that, when multiplied by the load at the polished rod, gives the torque at the crankshaft of the beam pumping unit speed reducer

NOTE The torque factor has units of length.

4 Abbreviations and symbols

The symbols and definitions used in this specification may differ from other specifications. Users should assure themselves that they are using these symbols and definitions in the manner indicated herein.

a area of cross section

A_s tensile area of fastener

C standard center distance between gear shafts

C_1 pitting velocity factor

C_3 pitting stress number/factor for external helical gears