SLOVENSKI STANDARD

SIST EN ISO 13679:2007

01-januar-2007

Industrija za proizvodnjo nafte in zemeljskega plina - Postopki za preskuġanje spojev za zaġļ itne in proizvodne (dvigne) cevi (ISO 13679:2002)

Petroleum and natural gas industries - Procedures for testing casing and tubing connections (ISO 13679:2006)

Erdöl- und Erdgasgewinnung - Prüfverfahren an Verbindungen für Futter- und Steigrohre (ISO 13679:2006)

Industries du pétrole et du gaz naturel - Procédures de test des connexions pour tubes de cuvelage et de production (ISO 13679:2006)

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ICS:

75.180.10	Oprema za raziskovanje in odkopavanje	Exploratory and extraction equipment
75.200	Oprema za skladiġļ enje nafte, naftnih proizvodov in zemeljskega plina	Petroleum products and natural gas handling equipment

SIST EN ISO 13679:2007 **en**

EUROPEAN STANDARD

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EUROPÄISCHE NORM

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October 2006

ICS 75.200; 75.180.10

English Version

Petroleum and natural gas industries - Procedures for testing casing and tubing connections (ISO 13679:2002)

Industries du pétrole et du gaz naturel - Procédures de test des connexions pour tubes de cuvelage et de production (ISO 13679:2002)

Erdöl- und Erdgasgewinnung - Prüfverfahren an Verbindungen für Futter- und Steigrohre

This European Standard was approved by CEN on 6 October 2006.

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.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

The text of ISO 13679:2002 has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum and natural gas industries" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 13679:2006 by 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 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 April 2007, and conflicting national standards shall be withdrawn at the latest by April 2007.

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

Endorsement notice

The text of ISO 13679:2002 has been approved by CEN as EN ISO 13679:2006 without any modifications.

INTERNATIONAL STANDARD

ISO 13679

First edition
2002-12-15

Petroleum and natural gas industries — Procedures for testing casing and tubing connections

Industries du pétrole et du gaz naturel — Procédures de test des connexions pour tubes de cuvelage et de production

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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 13679 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 5, *Casing, tubing and drill pipe*.

Introduction

This International Standard is part of a process to provide reliable tubing and casing connections for the oil and natural gas industry which are fit for purpose. It has been developed based on improvements to API Recommended Practice 5C5 and proprietary test procedures, with input from leading users, manufacturers and testing consultants from around the world. This International Standard represents the knowledge of many years of testing and qualification experiences.

The validation of connection test load envelope and failure limit loads is relevant to design of tubing and casing for the oil and natural gas industries. Tubing and casing are subject to loads which include internal pressure, external pressure, axial tension, axial compression, bending, torsion, transverse forces and temperature changes. The magnitude and combination of these loads result in various pipe body and connection failure modes. Although pipe body test and limit loads are well understood in general, the same cannot be stated for the connection. These failure modes and loads are generally different and often less than that of the pipe. Consequently experimental validation is required. Well design matches the test and limit loads of both the connection and pipe to the well conditions to provide load capacities with suitable reliability.

The validation of test and limit loads requires testing at the extremes of performance parameters to these defined loads. Testing at the extremes of the performance parameters assures that the production population, which falls within these limits, will meet or exceed the performance of the test population. Thread connection performance parameters include dimensional tolerances, mechanical properties, surface treatment, make-up torque and the type and amount of thread compound. For typical proprietary connections, worst-case tolerances are known and defined in this International Standard. For other connections design analysis is required to define worst-case tolerance combinations.

Users of this International Standard should be aware that further or differing requirements might be needed for individual applications. This International Standard is not intended to inhibit a vendor from offering, or a purchaser from accepting, alternate equipment or engineering solutions for the individual application. This may be particularly applicable when there is innovative or developing technology. Where an alternative is offered, the vendor should identify any variations from this International Standard and provide details.

This International Standard consists of the following major parts. Based on manufacturer's-supplied data specified in Annex A and/or calculations in Annex B, tests are conducted in accordance with Clauses 4 to 8 and reported on the data forms given in Annex C. Annex D lists all the information that is to be provided in the full report whereas Annex E lists the information that is to be provided in a summary test report. This summary test report lists the minimum information necessary to fully specify the connection tested and its preparation is intended for broader distribution. Annex F gives an example of a load frame calibration. Annex G gives considerations for possible connection product line qualification. Annex H provides guidelines for supplemental tests, which may be required for special applications. Annex I gives the design rationale for this International Standard. Annex J gives requirements for connections that contain both a metal-to-metal seal and a resilient seal which are tested separately.

Supplementary tests may be appropriate for specific applications that are not evaluated by the tests herein. The user and manufacturer should discuss well applications and limitations of the connection being considered.

Representatives of users and/or other third party personnel are encouraged to monitor the tests. ISO 13679 covers the testing of connections for the most commonly encountered well conditions. Not all possible service scenarios are included. For example, the presence of a corrosive fluid, which may influence the service performance of a connection, is not considered.

This International Standard includes provisions of various nature. These are identified by the use of certain verbal forms:

— SHALL is used to indicate that a provision is a REQUIREMENT, i.e. MANDATORY;

— SHOULD is used to indicate that a provision is a RECOMMENDATION to be used as good practice, but is not mandatory;

— MAY is used to indicate that a provision is OPTIONAL, i.e. indicates a course of action permissible within the limits of the document;

— CAN is used to indicate statements of POSSIBILITY and CAPABILITY.

Petroleum and natural gas industries — Procedures for testing casing and tubing connections

1 Scope

This International Standard establishes minimum design verification testing procedures and acceptance criteria for casing and tubing connections for the oil and natural gas industries. These physical tests are part of a design verification process and provide objective evidence that the connection conforms to the manufacturer's claimed test load envelope and limit loads.

It categorizes test severity into four test classes.

It describes a system of identification codes for connections.

This International Standard does not provide the statistical basis for risk analysis.

This International Standard addresses only three of the five distinct types of primary loads to which casing and tubing strings are subjected in wells: fluid pressure (internal and/or external), axial force (tension or compression), bending (buckling and/or wellbore deviation), as well as make-up torsion. It does not address rotation torsion and non-axisymetric (area, line or point contact) loads.

This International Standard specifies tests to be performed to determine the galling tendency, sealing performance and structural integrity of casing and tubing connections. The words casing and tubing apply to the service application and not to the diameter of the pipe.

2 Normative references

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

ISO 3183-1, *Petroleum and natural gas industries — Steel pipe for pipelines — Technical delivery conditions — Part 1: Pipes of requirement class A*

ISO 3183-2, *Petroleum and natural gas industries — Steel pipe for pipelines — Technical delivery conditions — Part 2: Pipes of requirements class B*

ISO 3183-3, *Petroleum and natural gas industries — Steel pipe for pipelines — Technical delivery conditions — Part 3: Pipes of requirement class C*

ISO 10400:1993, *Petroleum and natural gas industries — Formulae and calculation for casing, tubing, drill pipe, and line pipe properties*

ISO 10422, *Petroleum and natural gas industries — Threading, gauging and thread inspection of casing, tubing and line pipe threads*

ISO 11960, *Petroleum and natural gas industries — Steel pipes for use as casing or tubing for wells*

ISO 13680, *Petroleum and natural gas industries — Corrosion-resistant alloy seamless tubes for use as casing, tubing and coupling stock — Technical delivery conditions*

API Bul 5C3, *Bulletin on formulas and calculations for casing, tubing, drill pipe and line pipe properties*

API Spec 5B, *Specification for threading, gauging, and thread inspection of casing, tubing, and line threads (U.S. Customary Units)*

API Spec 5L, *Specification for line pipe*

3 Terms, definitions, symbols and abbreviated terms

For the purposes of this document, the following terms, definitions, symbols and abbreviated terms apply.

3.1 Terms and definitions

3.1.1
ambient temperature
actual room temperature in the test lab with no residual heat remaining in test specimens from previous thermal tests

3.1.2
axial-pressure load diagram
plot of pressure versus axial load showing pipe and/or connection test load envelope or limit load extremes

3.1.3
connection
assembly consisting of either two pins and a coupling or one pin and an integral box

3.1.4
failure load
load at which the pipe body or connection will fail catastrophically as in an axial separation, a rupture, large permanent deformation (e.g. buckling or collapse) or massive loss of sealing integrity

3.1.5
galling
cold welding of contacting material surfaces followed by tearing of the metal during further sliding/rotation

NOTE 1 Galling results from the sliding of metallic surfaces that are under high bearing forces. Galling can generally be attributed to insufficient lubrication between the mating surfaces. The purpose of the lubricating medium is to minimize metal-to-metal contact and allow efficient sliding of the surfaces. Other ways to prevent galling are to reduce the bearing forces or reduce the sliding distance.

NOTE 2 There are several degrees of galling used for repair and reporting purposes as defined in 3.1.5.1 to 3.1.5.3.

3.1.5.1
light galling
galling that can be repaired by the use of abrasive paper

3.1.5.2
moderate galling
galling that can be repaired by the use of fine files and abrasive paper

3.1.5.3
severe galling
galling that cannot be repaired by the use of fine files and abrasive paper

3.1.6
leak
any positive displacement of fluid in the measuring system during hold periods

3.1.7
limit load
load combination extreme (axial load and/or pressure) which defines the failure conditions for the connection or maximum load resulting in large permanent deformation (such as buckling) prior to catastrophic failure

3.1.8
lot
lengths of pipe with the same specified dimensions and grade from the same heat of steel which are heat-treated as part of a continuous operation (or batch)

3.1.9
metal-to-metal seal
seal or sealing system that relies on intimate and usually high contact stress of mating metal surfaces to achieve a seal

NOTE The thread compound can affect, both beneficially and detrimentally, the performance of a metal seal.

3.1.10
mother joint
length of pipe or coupling stock from which short lengths are cut for machining connection test specimens

3.1.11
multiple seals
sealing system, which consists of more than one independent barrier, and of which each barrier forms a seal itself

3.1.12
pipe string
pipe body and the connection

3.1.13
pup joint
short pipe length usually with threaded ends

3.1.14
resilient seal
seal or sealing system, which relies on entrapment of a seal ring within a section of the connection (e.g. in the thread-form, on a seal area, etc.) to achieve a seal

3.1.15
seal
barrier to prevent the passage of fluids

3.1.16
seal ovality
maximum seal diameter minus the minimum seal diameter divided by the average seal diameter multiplied by 100

NOTE Seal ovality is expressed as a percentage.

3.1.17
single seal
one barrier or multiple barriers that cannot be physically differentiated in their function

3.1.18
specimen
connection between two pieces of pipe

NOTE The specimen can be composed of one coupling and two pins for coupled connections, or one pin and one box for integral connections.