SLOVENSKI STANDARD
SIST EN ISO 13678:2009

01-julij-2009

Industrija za predelavo nafte in zemeljskega plina - Ovrednotenje in preskuġanje navojnih spojev za uporabo pri zaġļ itnih, proizvodnih (dviġnih) in vrtalnih elementih (ISO 13678:2009)

Petroleum and natural gas industries - Evaluation and testing of thread compounds for use with casing, tubing, line pipe and drill stem elements (ISO 13678:2009)

Erdöl- und Erdgasindustrie - Beurteilung und Prüfung von Gewindefetten zur Verwendung an Futter-, Steig- und Leitungsrohren und an Bohrgestängeteilen (ISO 13678:2009)

Industries du pétrole et du gaz naturel - Évaluation et essais des graisses pour filetage utilisées pour les tubes de cuvelage, les tubes de production, les tubes de conduites et les éléments de garnitures de forage (ISO 13678:2009)

Ta slovenski standard je istoveten z: EN ISO 13678:2009

ICS:

75.180.10	Oprema za raziskovanje in odkopavanje	Exploratory and extraction equipment

SIST EN ISO 13678:2009 en,fr

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 13678

May 2009

ICS 75.180.10

English Version

Petroleum and natural gas industries - Evaluation and testing of thread compounds for use with casing, tubing, line pipe and drill stem elements (ISO 13678:2009)

Industries du pétrole et du gaz naturel - Évaluation et essais des graisses pour filetage utilisées pour les tubes de cuvelage, les tubes de production, les tubes de conduites et les éléments de garnitures de forage (ISO 13678:2009)

Erdöl- und Erdgasindustrie - Beurteilung und Prüfung von Gewindefetten zur Verwendung an Futter-, Steig- und Leitungsrohren und an Bohrgestängeteilen (ISO 13678:2009)

This European Standard was approved by CEN on 30 April 2009.

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

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, 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
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....3

Foreword

This document (EN ISO 13678:2009) 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 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 November 2009, and conflicting national standards shall be withdrawn at the latest by November 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, 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 the United Kingdom.

Endorsement notice

The text of ISO 13678:2009 has been approved by CEN as a EN ISO 13678:2009 without any modification.

INTERNATIONAL STANDARD

ISO 13678

Second edition
2009-05-15

Petroleum and natural gas industries — Evaluation and testing of thread compounds for use with casing, tubing, line pipe and drill stem elements

Industries du pétrole et du gaz naturel — Évaluation et essais des graisses pour filetage utilisées pour les tubes de cuvelage, les tubes de production, les tubes de conduites et les éléments de garnitures de forage

Reference number
ISO 13678:2009(E)

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

COPYRIGHT PROTECTED DOCUMENT

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.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword iv

Introduction v

1 Scope 1

2 Conformance 1
2.1 Dual citing of normative references 1
2.2 Units of measurement 1

3 Normative references 2

4 Terms and definitions 3

5 Thread compound characteristics 4
5.1 Product characteristics 4
5.2 Physical and chemical characteristics 5

6 Thread compound performance properties 9
6.1 Small-scale test 9
6.2 Frictional properties 9
6.3 Extreme surface-contact pressure (gall resistance) properties for casing, tubing and line pipe 10
6.4 Fluid sealing properties for casing, tubing and line pipe 11

7 Quality assurance and control 11

8 Marking requirements 12
8.1 Marking 12
8.2 Labelling 12

Annex A (informative) **API modified thread compound** 13

Annex B (normative) **Casing, tubing and line pipe reference standard formulation** 17

Annex C (normative) **Penetration test** 19

Annex D (normative) **Evaporation test** 20

Annex E (normative) **Oil separation test** 21

Annex F (normative) **Application/adherence test** 22

Annex G (normative) **Gas evolution test** 23

Annex H (normative) **Water leaching test** 27

Annex I (informative) **Frictional properties test** 30

Annex J (informative) **Extreme surface-contact pressure (galling) test for casing, tubing and line pipe** 40

Annex K (informative) **Fluid sealing test for casing, tubing and line pipe** 41

Annex L (informative) **Corrosion inhibition tests** 44

Annex M (informative) **Compound high-temperature stability test** 45

Bibliography 46

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 13678 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*.

This second edition cancels and replaces the first edition (ISO 13678:2000), which has been technically revised.

It is the intent of ISO/TC 67 that the first and second editions of ISO 13678 both be applicable, at the option of the purchaser, for a period of six months from the first day of the calendar quarter immediately following the date of publication of this second edition, after which period the first edition will no longer be applicable.

Introduction

This International Standard is based on API RP 5A3 [5], second edition, July 2003, with errata and inclusion of all clauses of API RP 7A1[1)] [6], first edition, November 1992, incorporated into Annex I.

This International Standard specifies requirements and gives recommendations for the manufacture, testing and selection of thread compounds for use on casing, tubing, line pipe and drill stem elements based on the current industry consensus of good engineering practice.

It is intended that the words casing and tubing apply to the service application, rather than to the diameter of the pipe.

The performance requirements of thread compounds for use with casing, tubing, line pipe, premium connections and rotary shouldered connections include:

— consistent frictional properties that allow both proper and uniform connection engagement;

— adequate lubrication properties to resist galling or damage of connection contact surfaces during make-up and breakout;

— adequate sealing properties for thread-type seal connections and/or not inhibiting the sealing properties of non-thread sealing connections (e.g. metal-to-metal seals, polytetrafluoroethylene (PTFE) seals, etc.) depending upon service requirements;

— physical and chemical stability both in service and in expected compound storage conditions;

— properties that allow effective application to the connection contact surfaces in expected service conditions and environment.

In addition, compounds for rotary shouldered connections provide:

— lubrication of the connection members during make-up to achieve the proper axial bearing stress;

— an effective seal between connection shoulders to prevent wash-out by drilling fluids;

— more uniform distribution of circumferential bearing stress if shoulders are not parallel;

— resistance to additional make-up down hole.

When evaluating the suitability of a thread compound, the user can define the service conditions and then consider field trials and field service experience in addition to laboratory test results. Appropriate supplementary tests can be utilized for specific applications which are not evaluated by the tests herein. The user and manufacturer are encouraged to discuss service applications and limitations of the compound being considered.

Representatives of users and/or other third party personnel are encouraged to monitor tests wherever possible. Interpolation and extrapolation of test results to other products, even of similar chemical composition, is not recommended.

1) Obsolete. Incorporated into this International Standard.

Testing in compliance with this International Standard does not in and of itself ensure adequate thread compound/connection system performance in field service. The user has the responsibility of evaluating the results obtained from the recommended procedures and test protocols and determining whether the thread compound/connection system in question meets the anticipated requirements of that particular field service application.

Petroleum and natural gas industries — Evaluation and testing of thread compounds for use with casing, tubing, line pipe and drill stem elements

1 Scope

This International Standard provides requirements, recommendations and methods for the testing of thread compounds intended for use on ISO/API thread forms, as well as proprietary casing, tubing, line pipe and drill stem elements with rotary shouldered connections. The tests outlined are used to evaluate the critical performance properties and physical and chemical characteristics of thread compounds under laboratory conditions.

These test methods are primarily intended for thread compounds formulated with a lubricating base grease and are not applicable to some materials used for lubricating and/or sealing thread connections. It is recognized that many areas can have environmental requirements for products of this type. This International Standard does not include requirements for environmental compliance. It is the responsibility of the end user to investigate these requirements and to select, use and dispose of the thread compounds and related waste materials accordingly.

2 Conformance

2.1 Dual citing of normative references

In the interests of world-wide application of this International Standard, Technical Committee ISO/TC 67 has decided, after detailed technical analysis, that certain of the normative documents listed in Clause 3 and prepared by ISO/TC 67 or another ISO Technical Committee are interchangeable in the context of the relevant requirement with the relevant document prepared by the American Petroleum Institute (API), the American Society for Testing and Materials (ASTM) and the American National Standards Institute (ANSI). These latter documents are cited in the running text following the ISO reference and preceded by “or”, for example “ISO XXXX or API YYYY”. Application of an alternative normative document cited in this manner will lead to technical results different from the use of the preceding ISO reference. However, both results are acceptable and these documents are thus considered interchangeable in practice.

2.2 Units of measurement

In this International Standard, data are expressed in both the International System (SI) of units and the United States Customary (USC) system of units. For a specific order item, it is intended that only one system of units be used, without combining data expressed in the other system.

Products manufactured to specifications expressed in either of these unit systems shall be considered equivalent and totally interchangeable. Consequently, compliance with the requirements of this International Standard as expressed in one system provides compliance with requirements expressed in the other system.

For data expressed in the SI system, a comma is used as the decimal separator and a space as the thousands separator. For data expressed in the USC system, a dot (on the line) is used as the decimal separator and a space as the thousands separator. In the text, data in SI units are followed by data in USC units in parentheses.

3 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 2137, *Petroleum products and lubricants — Determination of cone penetration of lubricating greases and petrolatum*

ISO 2176, *Petroleum products — Lubricating grease — Determination of dropping point*

ISO/TR 10400, *Petroleum and natural gas industries — Equations and calculations for the properties of casing, tubing, drill pipe and line pipe used as casing or tubing*

ISO 10405, *Petroleum and natural gas industries — Care and use of casing and tubing*

ISO 13679, *Petroleum and natural gas industries — Procedures for testing casing and tubing connections*

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

API RP 5C1, *Recommended practice for care and use of casing and tubing*

API RP 5C5, *Recommended practice on procedures for testing casing and tubing connections*

API RP 7G, *Recommended practice for drill stem design and operating limits*

ASTM D217, *Standard Test Methods for Cone Penetration of Lubricating Grease*

ASTM D2265, *Standard Test Method for Dropping Point of Lubricating Grease over Wide Temperature Range*

ASTM D4048, *Standard Test Method for Detection of Copper Corrosion from Lubricating Grease*

4 Terms and definitions

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

4.1
API connection
pipe assembly consisting of two external threaded connectors (pins) and a coupling with two internal threaded connectors (box) or one pin and an integral box manufactured in accordance with ISO/API specifications

4.2
API modified thread compound
compound designated as “modified thread compound” in API BUL 5A2

NOTE API BUL 5A2 [4] is obsolete and has been replaced by API RP 5A3 [5].

4.3
box
connector with internal threads

4.4
CT and LP
casing, tubing and line pipe
production and delivery tubulars

4.5
drill stem elements
components of the drilling assembly from the swivel or top drive to the bit, composed of the kelly, drill string, subs, drill collars and other down hole tools such as stabilizers and reamers, also commonly referred to as rotary shouldered connections

4.6
pin
connector with external threads

4.7
premium connection
connection with or without metal-to-metal seal(s) that can provide greater clearance and/or higher performance properties when compared to the API connections

4.8
proprietary connection
connection, without published specifications, made and marketed by companies with exclusive rights to manufacture and/or sell

4.9
reference standard formulation
⟨casing, tubing and line pipe (CT and LP)⟩ thread compound formulated in accordance with the requirements of Annex B, to include the limitations and tolerances in Tables B.1, B.2 and B.3

4.10
reference standard formulation
⟨rotary shouldered connection⟩ thread compound formulated in accordance with the requirements of I.4.2.3

NOTE The reference standard formulations are not intended for general field service.

4.11
rotary shouldered connection
RSC
connection used on drill stem elements, which has threads and sealing shoulders