

INTERNATIONAL STANDARD

ISO
11961

Second edition
2008-11-01

Petroleum and natural gas industries — Steel drill pipe

Industries du pétrole et du gaz naturel — Tiges de forage en acier



Reference number
ISO 11961:2008(E)

© ISO 2008

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.

This document is a preview generated by EVS



COPYRIGHT PROTECTED DOCUMENT

© ISO 2008

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

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.....	v
Introduction	vi
1 Scope	1
2 Conformance	1
2.1 Dual citing of normative references.....	1
2.2 Units of measurement	2
3 Normative references	2
4 Terms, definitions, symbols and abbreviated terms.....	4
4.1 Terms and definitions.....	4
4.2 Symbols and abbreviated terms	8
5 Information to be supplied when placing orders for drill-pipe	10
6 Requirements for drill-pipe.....	11
6.1 General.....	11
6.2 Dimensions, masses and connections.....	11
6.3 Material requirements.....	12
6.4 Process of manufacture for drill-pipe.....	14
6.5 Traceability	15
6.6 Inspection and testing — General.....	15
6.7 Testing of welds.....	16
6.8 Tensile test	16
6.9 Hardness test	17
6.10 Charpy V-notch impact test.....	18
6.11 Transverse side-bend test	19
6.12 Imperfections and defects in drill-pipe.....	19
6.13 Visual inspection of the drill-pipe weld zone.....	20
6.14 Non-destructive examination of the weld zone	20
6.15 Marking of drill-pipe.....	22
6.16 Minimum facility requirements for drill-pipe manufacturers.....	23
6.17 Documentation requirements of drill-pipe	24
7 Requirements for drill-pipe body	24
7.1 Information to be supplied when placing orders for drill-pipe bodies.....	24
7.2 Dimensional and mass requirements	25
7.3 Material requirements.....	27
7.4 Process of manufacture	28
7.5 Traceability	28
7.6 Inspection and testing — General.....	29
7.7 Testing of chemical composition.....	29
7.8 Tensile tests	30
7.9 Charpy V-notch impact tests	31
7.10 Drill-pipe-body wall thickness	32
7.11 Drill-pipe-body length.....	32
7.12 Internal upset	32
7.13 Internal profile	32
7.14 Straightness	33
7.15 Upset alignment.....	33
7.16 Mass determination	33
7.17 Imperfections and defects of drill-pipe body	33
7.18 Visual inspection of drill-pipe body	34

7.19	Non-destructive examination	34
7.20	Marking	38
7.21	Minimum facility requirements for drill-pipe-body manufacturer	39
7.22	Documentation requirements	39
8	Requirements for tool joints	40
8.1	Information to be supplied when placing orders for tool joints	40
8.2	Dimensional requirements	41
8.3	Material requirements	41
8.4	Process of manufacture	42
8.5	Traceability	43
8.6	Inspection and testing — General	43
8.7	Testing of chemical composition	43
8.8	Tensile tests	44
8.9	Hardness tests	45
8.10	Charpy V-notch impact tests	45
8.11	Imperfections and defects	47
8.12	Non-destructive examination	47
8.13	Marking	48
8.14	Minimum facility requirements for tool-joint manufacturers	48
8.15	Documentation requirements for tool joints	49
Annex A	(normative) Tables in SI units	51
Annex B	(normative) Figures in SI (USC) units	69
Annex C	(normative) Tables in USC units	83
Annex D	(normative) Purchaser inspection	101
Annex E	(informative) Supplementary requirements	102
Annex F	(informative) Procedures used to convert from USC units to SI units for drill-pipe	105
Annex G	(normative) Product specification levels	109
Annex H	(informative) API monogram	111
Bibliography	112

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 11961 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 11961:1996), which has been extensively technically revised.

It is the intention of ISO/TC 67 that either this edition or the previous edition of ISO 11961 be applicable, at the option of the purchaser (as defined in 4.1.31), for a period of six months from the first day of the calendar quarter immediately following the date of publication of this edition, after which period the previous edition will no longer be applicable.

Introduction

This International Standard is based on API Spec 5D and API Spec 7.

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 applicable 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.

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

- a) SHALL is used to indicate that a provision is MANDATORY;
- b) SHOULD is used to indicate that a provision is not mandatory, but RECOMMENDED as good practice;
- c) MAY is used to indicate that a provision is OPTIONAL.

Petroleum and natural gas industries — Steel drill pipe

1 Scope

This International Standard specifies the technical delivery conditions for steel drill-pipes with upset pipe-body ends and weld-on tool joints for use in drilling and production operations in petroleum and natural gas industries for three product specification levels (PSL-1, PSL-2 and PSL-3). The requirements for PSL-1 form the basis of this International Standard. The requirements that define different levels of standard technical requirements for PSL-2 and PSL-3 are in Annex G.

This International Standard covers the following grades of drill-pipe:

- grade E drill-pipe;
- high-strength grades of drill-pipe, grades X, G and S.

A typical drill-pipe configuration is given, showing main elements and lengths (see Figure B.1). The main dimensions and masses of the grades of drill-pipe are given in both SI units (see Table A.1) and in USC units (see Table C.1).

This International Standard can also be used for drill-pipe with tool joints not specified by ISO or API standards.

By agreement between purchaser and manufacturer, this International Standard can also be applied to other drill-pipe body and/or tool-joint dimensions. This International Standard lists supplementary requirements that can optionally be agreed between purchaser and manufacturer, for testing, performance verification and non-destructive examination (see Annex E).

This International Standard does not consider performance properties.

NOTE 1 In this International Standard, drill-pipe is designated by label 1, label 2, grade of material (E, X, G and S), upset type and type of rotary shouldered connection. Designations are used for the purpose of identification in ordering.

NOTE 2 Reference can be made to ISO 10424-2 or API Spec 7-2 for the detailed requirements for the threading of drill-pipe tool joints.

NOTE 3 Reference can be made to API RP 7G for the performance properties of the drill-pipe.

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. Separate tables for data expressed in SI units and USC units are in Annex A and Annex C, respectively. Figures are in Annex B and express data in both SI and USC 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 brackets.

NOTE The procedures used to convert from USC units to SI units are given in informative Annex F.

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 amendment) applies.

ISO 6506-1, *Metallic materials — Brinell Hardness test — Part 1: Test method*

ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)*

ISO 6892, *Metallic materials — Tensile testing*

ISO 7500-1, *Metallic materials — Verification of static uni-axial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system*

ISO 9303, *Seamless and welded (except submerged arc-welded) steel tubes for pressure purposes — Full peripheral ultrasonic testing for the detection of longitudinal imperfections*

ISO 9304, *Seamless and welded (except submerged arc-welded) steel tubes for pressure purposes — Eddy current testing for the detection of imperfections*

ISO 9305, *Seamless steel tubes for pressure purposes — Full peripheral ultrasonic testing for the detection of transverse imperfections*

ISO 9402, *Seamless and welded (except submerged arc-welded) steel tubes for pressure purposes — Full peripheral magnetic transducer/flux leakage testing of ferromagnetic steel tubes for the detection of longitudinal imperfections*

ISO 9513, *Metallic materials — Calibration of extensometers used in uniaxial testing*

ISO 9598, *Seamless steel tubes for pressure purposes — Full peripheral magnetic transducer/flux leakage testing of ferromagnetic steel tubes for the detection of transverse imperfections*

ISO/TR 9769, *Steel and iron — Review of available methods of analysis*

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 10424-2, *Petroleum and natural gas industries — Rotary drilling equipment — Part 2: Threading and gauging of rotary shouldered thread connections*

ISO 11484, *Steel tubes for pressure purposes — Qualification and certification of non-destructive (NDT) personnel*

ISO 13665, *Seamless and welded steel tubes for pressure purposes — Magnetic particle inspection of the tube body for the detection of surface imperfections*

API Spec 7-2, *Specification for Threading and Gauging of Rotary Shouldered Thread Connections*

API RP 7G, *Recommended Practice for Drill Stem Design and Operating Limits*

ANSI/API 5C3, *Bulletin on Formulas and Calculations for Casing, Tubing, Drill-pipe, and Line Pipe Properties (including Supplement 1)*

ASME *Boiler and Pressure Vessel Code, Section IX*

ASNT SNT-TC-1A, *Recommended Practice, Personnel Qualification and Certification in Non-Destructive Testing*

ASTM A370, *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*

ASTM A751, *Standard Test Methods, Practices and Terminology for Chemical Analysis of Steel Products*

ASTM A941, *Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys*

ASTM E4, *Standard Practices for Force Verification of Testing Machines*

ASTM E10, *Standard Test Method for Brinell Hardness of Metallic Materials*

ASTM E18, *Standard Test Methods for Rockwell Hardness of Metallic Materials*

ASTM E23, *Standard Test Methods for Notched Bar Impact Testing of Metallic Materials*

ASTM E83, *Standard Practice for Verification and Classification of Extensometer Systems*

ASTM E92, *Standard Test Method for Vickers Hardness of Metallic Materials*

ASTM E213, *Standard Practice for Ultrasonic Examination of Metal Pipe and Tubing*

ASTM E309, *Standard Practice for Eddy-Current Examination of Steel Tubular Products Using Magnetic Saturation*

ASTM E570, *Standard Practice for Flux Leakage Examination of Ferromagnetic Steel Tubular Products*

ASTM E709, *Standard Guide for Magnetic Particle Testing*