INTERNATIONAL STANDARD

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Petroleum and natural gas industries — Field inspection of new casing, tubing and plain-end drill pipe

Industries du pétrole et du gaz naturel — Contrôle sur parc ou sur chantier des tubes de cuvelage, des tubes de production et des tiges de forage à extrémités lisses

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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 15463 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 provided for field inspection and testing of OCTG; it is not intended to restrict the agency or owner from using personal judgement and supplementing the specified inspections with other techniques, extending existing techniques, or re-inspecting certain lengths of OCTG.

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 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.

Petroleum and natural gas industries — Field inspection of new casing, tubing and plain-end drill pipe

1 Scope

This International Standard specifies requirements and gives recommendations for field inspection and testing of oil country tubular goods (OCTG). This International Standard covers the practices and technology commonly used in field inspection; however, certain practices may also be suitable for mill inspections.

This International Standard covers the qualification of inspection personnel, a description of inspection methods and apparatus calibration and standardization procedures for various inspection methods. The evaluation of imperfections and marking of inspected OCTG are included.

This International Standard is applicable to field inspection of OCTG and is not applicable for use as a basis for acceptance or rejection (for which the relevant purchasing specification is applicable, see 5.4.2).

2 Conformance

2.1 Normative references

In the interests of worldwide application of this International Standard, 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 other 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) or 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 may 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.

NOTE ISO 11960 has been back-adopted by API as API Spec 5CT. Therefore, for the purposes of the provisions in this International Standard which cite ISO 11960, API Spec 5CT is equivalent to ISO 11960.

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 specific field inspection and testing, it is intended that only one unit system be used, without combining data expressed in the other system.

Inspection and testing performed using either of these unit systems shall be considered equivalent and totally interchangeable. Consequently, compliance with the requirements of the relevant Product Standard expressed in one of the unit systems provides compliance with the requirements expressed in the other system.

For data expressed in the SI, 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.

2.3 Tables and figures

Separate tables for data expressed in SI units and USC units are given in Annex A and Annex C, respectively. For a specific order item, only one unit system shall be used.

In this International Standard, cross-references are made only to the tables in Annex A; if the USC units apply on an order, then any cross-references to tables in Annex A shall be taken to mean the equivalent table in Annex C.

Figures (data expressed in both SI and USC units) are contained in Annex B.

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 10405:2000, *Petroleum and natural gas industries — Care and use of casing and tubing*

ISO 11960:2001 (including Technical Corrigendum 1:2002), *Petroleum and natural gas industries — Steel pipes for use as casing or tubing for wells*

ISO 11961:1996, *Petroleum and natural gas industries — Steel pipes for use as drill pipe — Specification*

ISO 13678, *Petroleum and natural gas industries — Evaluation and testing of thread compounds for use with casing, tubing and line pipe*

API RP 5A3[1)], *Thread compounds for casing, tubing and line pipe*

API Spec 5B, *Threading, gauging and thread inspection of casing, tubing and line pipe threads*

API RP 5B1, *Threading, gauging and inspection of casing, tubing, and line pipe threads*

API RP 5C1:1999, *Care and use of casing and tubing*

API Spec 5D:2001, *Specification for drill pipe*

API Std 5T1, *Imperfection terminology*

4 Terms, definitions, symbols and abbreviated terms

4.1 Terms and definitions

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

4.1.1
A-scan
data presentation utilizing a horizontal base line that indicates distance, or time, and a vertical deflection from the base line that indicates amplitude

4.1.2
AC-field
magnetic field induced by alternating current

1) American Petroleum Institute; 1220 L Street NW, Washington DC, 20005, USA

4.1.3
agency
entity contracted to inspect new OCTG using the methods and criteria specified

4.1.4
ampere-turn
unit of magnetomotive force which is the product of the number of turns in a coil and the quantity of amperes of current flowing through it, representing the magnetizing strength of the coil

EXAMPLE 800 A in a 6-turn coil gives 4 800 ampere-turns.

4.1.5
arc, verb
create intense heat and light by passing an electric current across a gap

4.1.6
back-wall reflection
ultrasonic signal received from the back surface of the pipe wall

4.1.7
black-crested thread
non-full-crested thread whose original (black) mill surface has not been completely removed

4.1.8
black light
long-wave ultraviolet light (UV-A) with a wavelength between 320 nm and 400 nm

4.1.9
borescope
optical instrument with an illuminating lamp, used for inspecting the inside surface of OCTG

4.1.10
box
internally-threaded end of integral-joint OCTG, or the coupling end of threaded-and-coupled OCTG

4.1.11
calibration
comparison of an instrument with, or the adjustment of an instrument to, a known reference(s) standard that is often traceable to a national institute such as the National Institute of Standards and Technology

4.1.12
casing
steel pipe used in oil wells to seal off fluids from the bore hole and to prevent the walls of the hole from sloughing off or caving in

4.1.13
central conductor
conductor that is passed through the bore of OCTG in order to create a circular or circumferential magnetic field in the OCTG

NOTE This does not imply that the current rod is necessarily centred in the bore of the OCTG.

4.1.14
chamfer
conical surface at the end of pipe having round or buttress threads

4.1.15
chatter
wavy surface of the thread flank, root, crest, or chamfer, caused by a vibrating cutter insert

4.1.16
chock
block or wedge used beneath a length of pipe so that it cannot roll

4.1.17
circular magnetic field
circumferential magnetic field
magnetic field in or surrounding a current-carrying conductor, or OCTG, such that the magnetic field is oriented circumferentially within the wall of the OCTG

4.1.18
circular magnetization
circumferential magnetization
production of a magnetic field in a pipe wall or coupling such that the magnetic field is oriented circumferentially

4.1.19
classification
action taken to categorize a length of new OCTG based on conformance with the contracted inspection requirements

4.1.20
contour, verb
taper gradually by filing or grinding to remove abrupt changes in the wall thickness

4.1.21
contour-grind, verb
radius-grind
grind to remove sharp edges and/or abrupt changes in the wall thickness around imperfections or areas of exploratory grinding

4.1.22
couplant
material (usually a liquid) used between an ultrasonic transducer and the test specimen to assist transmission of ultrasonic sound waves between them

4.1.23
crest
top of a thread

4.1.24
cut, noun
gouge or distortion in two or more thread crests in a line, either parallel to the pipe axis or at an angle across the threads

4.1.25
DC-field
residual or active magnetic field induced by direct current

4.1.26
defect
imperfection of sufficient magnitude or properties to warrant rejection of OCTG based on the specified acceptance criteria

4.1.27
demagnetization
process of removing part or all of the residual magnetism from OCTG

4.1.28
detector
detector shoe
scanning shoe carrying one or more transducers, used to protect transducers from mechanical damage

4.1.29
discontinuity
flaw
imperfection
irregularity in the product, such as a lap, seam, pit and lamination

4.1.30
disposition
action taken in accordance with the applicable specification with regard to a defect in a length of OCTG

4.1.31
drift mandrel
cylinder, machined to specified dimensions, that is passed through a pipe to locate obstructions and/or to assess compliance with the appropriate specifications

4.1.32
dual-element transducer
ultrasonic transducer containing two piezoelectric elements, one for transmitting and one for receiving

4.1.33
eddy current
circulating current caused to flow in the OCTG by varying magnetic fields

4.1.34
electromagnetic inspection
EMI
primarily the eddy-current and flux-leakage methods used to detect imperfections

NOTE Field electromagnetic "Inspection Systems" sometimes include equipment for performing additional inspections or services.

4.1.35
evaluation
process of determining the severity of an imperfection which leads to determining whether the OCTG is acceptable or rejectable against the appropriate specification

4.1.36
exploratory grind, noun
probe grind
grind performed to explore or determine the depth of an imperfection

4.1.37
external thread
thread on the outside surface of OCTG

4.1.38
false indication
NDT indication that is interpreted to be caused by a condition other than a discontinuity or imperfection

NOTE False indications are considered non-relevant.

4.1.39
false starting thread
circumferential tool mark on a round-thread chamfer that precedes the actual starting thread

4.1.40
ferromagnetic
term applied to materials that can be magnetized or strongly attracted by a magnetic field

4.1.41
field end
pipe end opposite the internally-threaded end

NOTE Mill identification is at the internally-threaded end.

4.1.42
flank
side
surface of a thread that connects the crest with the root

4.1.43
fluorescent magnetic particle inspection
magnetic particle inspection process employing a finely-divided, fluorescent, ferromagnetic inspection medium that fluoresces when exposed to black light

4.1.44
flux density
strength of a magnetic field

NOTE In the Gaussian system, flux density is expressed in gauss.

4.1.45
flux leakage
magnetic field forced out into the air by a distortion of the field within the OCTG, caused by the presence of a discontinuity

4.1.46
full-body inspection
inspection coverage of the entire surface area of the OCTG within the limitations of the inspection equipment used

4.1.47
furring
build-up or bristling of dry magnetic particles at the ends of a longitudinally-magnetized length of OCTG, i.e. at its poles

4.1.48
gain
sensitivity adjustment produced by an amplifier or circuit

4.1.49
gamma-ray
high-energy, short wavelength, electromagnetic radiation emitted by a nucleus, which is penetrating and is best attenuated by dense material like lead or tungsten

NOTE The energy of gamma-rays is usually between 0,010 MeV and 10 MeV.

4.1.50
gauss meter
electronic magnetometer used to measure flux density

4.1.51
grind, verb
remove material from a surface by abrading, e.g. with a grinding wheel or file

4.1.52
handling damage
damage to the OCTG body, coupling or threads that occurred during loading, unloading, movements in transit, etc.

EXAMPLES cuts, gouges, dents, flattened (mashed) thread crests or similar.

4.1.53
hardness
resistance of a material to indentation, measured by pressing a hardmetal ball or diamond indenter into a smooth surface under standard conditions

4.1.54
hardness value
average of the valid readings taken in the test area for hardness

4.1.55
hydrostatic test
test performed by filling a length of OCTG with water and pressurizing it in order to verify its ability to withstand a specified pressure without leaking or rupturing

NOTE A hydrostatic test is generally considered a method to verify the structural integrity of the pipe but not the threaded connection.

4.1.56
imperfection
flaw
discontinuity or irregularity in the product

NOTE For more detailed definitions and illustrations of specific imperfections, see API Std 5T1.

4.1.57
indication
response or evidence from NDT

4.1.58
indicator
readout
device for displaying a condition, a current or a potential

EXAMPLES Analog and digital galvanometers, A-scan displays, warning lights, alarms.

4.1.59
induction
act of inducing a magnetic field in a ferromagnetic body

4.1.60
inspection
process of examining OCTG for possible defects or for deviation from established standards

4.1.61
inspection job
inspection of one or more lots of OCTG by an agency subject to a single contract or subcontract

4.1.62
inspection system
combination of equipment, procedures and personnel required for the detection of reference indicators

4.1.63
inspector
employee of an agency qualified and responsible for one or more of the inspections or tests specified in the contract