BRITISH STANDARD

BS EN ISO 15463:2003

Incorporating corrigendum August 2009

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

ICS 75.180.10

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British Standards

Full document details: BS EN ISO 15463:2003

National foreword

This British Standard is the UK implementation of EN ISO 15463:2003. It is identical to ISO 15463:2003, incorporating corrigendum August 2009.

The UK participation in its preparation was entrusted by Technical Committee PSE/17, Materials and equipment for petroleum, petrochemical and natural gas industries, to Subcommittee PSE/17/-/5, Casing, tubing and drill pipe.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 19 December 2003

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 15463

December 2003

ICS 75.180.10

English version

Petroleum and natural gas industries - Field inspection of new casing, tubing and plain-end drill pipe (ISO 15463:2003)

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 (ISO 15463:2003)

This European Standard was approved by CEN on 2 December 2003.

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 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 Management Centre has the same status as the official versions.

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Foreword

This document (EN ISO 15463:2003) 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 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 June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

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

NOTE FROM CMC The foreword is susceptible to be amended on reception of the German language version. The confirmed or amended foreword, and when appropriate, the normative annex ZA for the references to international publications with their relevant European publications will be circulated with the German version.

Endorsement notice

The text of ISO 15463:2003 has been approved by CEN as EN ISO 15463:2003 without any modifications.

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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*.

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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.

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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.

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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

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

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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

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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

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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

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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

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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

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4.1.64
integral joint OCTG
OCTG with one end threaded externally and the other end threaded internally

4.1.65
internal thread
thread on the inside surface of OCTG

4.1.66
interpretation
process of determining the nature or forming an opinion of an indication based on objective data

4.1.67
label 1
dimensionless designation for the size or specified outside diameter, used when ordering OCTG

4.1.68
label 2
dimensionless designation for the mass per unit length or wall thickness, used when ordering OCTG

4.1.69
leakage field
magnetic field forced out of the material into the air by distortion of the field within the material, caused by the presence of a discontinuity

4.1.70
length
joint
complete section of pipe

4.1.71
longitudinal magnetic field
magnetic field which runs substantially parallel to the axis of the OCTG

4.1.72
longitudinal imperfection
imperfection oriented in the longitudinal or approximately longitudinal direction

4.1.73
magnetic particle field indicator
device containing artificial flaws which is used to verify the adequacy or direction, or both, of a magnetic field

4.1.74
magnetic particle
finely-divided ferromagnetic material capable of being individually magnetized and attracted to distortions in a magnetic field

4.1.75
magnetizing force
magnetic field strength

NOTE In the Gaussian system, the symbol is H_S and quantities are expressed in oersteds.

4.1.76
magnetometer
mechanical or electronic instrument used to measure magnetic field strength

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4.1.77
manufacturer
entity last responsible for manufacturing compliance with the applicable product specification(s)

4.1.78
marking
assorted marks on tubular products including marks made for inspection with paint sticks and stencils, and ball-point paint tubes

4.1.79
mill end
pipe end having the coupling, box and/or mill identification

4.1.80
mill scale
iron oxide that forms on the surface of hot steel

4.1.81
no-drift
length of pipe through which a drift mandrel of specified diameter will not pass without undue force

4.1.82
non-destructive test
NDT
test used to detect internal, surface and concealed defects or imperfections in materials, using techniques that do not damage or destroy the items being tested

4.1.83
non-full-crested thread
thread that does not have a complete thread crest

EXAMPLE Black-crested thread.

4.1.84
notch
reference indicator with specified geometry

4.1.85
oil country tubular goods
OCTG
casing, tubing, plain-end casing liners, pup joints, couplings, accessories and plain-end drill pipe

4.1.86
operator
person present throughout the inspection or testing process who is responsible for the unit, operates the controls and observes the readout to detect imperfections

4.1.87
owner
entity having ownership of the new OCTG at the time inspection is contracted, specifying the type of inspection or testing to be conducted and authorizing its performance

NOTE The owner might be the purchaser.

4.1.88
perfect thread length
design length from the end of pipe or coupling to a specified location

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4.1.89
permeability
measure of the ease with which material can become magnetized

NOTE Permeability is the ratio of flux density and magnetizing force, i.e. B/H.

4.1.90
pin end
externally-threaded end of a pipe without a coupling applied

4.1.91
pipe
oil field casing, tubing, plain-end casing liners, pup joints and plain-end drill pipe

4.1.92
pit
depression or cavity that can be caused by corrosion or removal of rolled-in or extraneous material

4.1.93
plain-end pipe
pipe without threads or tool-joint

4.1.94
planar imperfection
imperfection lying in one geometric plane that is normally parallel to, and within, the outer and inner surfaces

4.1.95
powder-dry
sufficiently dry to allow any type of powder, when applied to the surface, to be blown from the surface without residue remaining

4.1.96
power-tight
threaded connection that has been fully made up by mechanical means, using power tongs or a screw-on machine

4.1.97
prime pipe
pipe meeting all of the specified inspection and testing requirements

4.1.98
pulse
wave of short duration

4.1.99
pulser
electronic device and probe for generating a controlled-magnitude magnetic pulse, used for standardizing transducers

4.1.100
purchaser
entity that has purchased directly from the manufacturer the new OCTG being inspected

NOTE The purchaser might be the owner.

4.1.101
reference indicator
real or artificial discontinuity in a reference standard, which provides reproducible sensitivity levels for inspection equipment

EXAMPLES Artificial reference indicators can be holes, notches, grooves or slots.

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4.1.102
reference standard
pipe, or pipe section, containing one or more reference indicators, used as a basis for comparison or for inspection equipment standardization

4.1.103
relevant indication
NDT indication that is caused by a condition or type of discontinuity that requires evaluation

4.1.104
root
bottom of a thread

4.1.105
scanner
detector assembly carrying one or more transducers, used for detecting imperfections and defects in OCTG

NOTE The scanner is often equipped with a magnetizer and is a part of it.

4.1.106
seamless pipe
wrought steel tubular product made without a welded seam

NOTE Seamless pipe is manufactured by hot-working steel and, if necessary, by subsequently cold finishing the hot-worked tubular product to produce the desired shape, dimensions and properties.

4.1.107
sensitivity
size of the smallest discontinuity detectable by an NDT method with a reasonable signal-to-noise ratio

4.1.108
signal
response of electronic NDT equipment to an imperfection or defect

4.1.109
signal-to-noise ratio
ratio of the signal from a significant imperfection or defect to signals generated from surface noise

4.1.110
source
origin of radiation, which is an x-ray tube or radioisotope

4.1.111
standardization
the adjustment of an NDT instrument using an appropriate reference standard, to obtain or establish a known and reproducible response

4.1.112
standardization check
check of the standardization adjustments to ensure that they remain correct

4.1.113
straightness
degree to which the longitudinal axis of a length of OCTG is parallel to a straight line

4.1.114
tally, verb
add up lengths of OCTG to arrive at an aggregate

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4.1.15
test
two or more valid hardness test readings that have been made in the same test area

4.1.116
test area
area on OCTG that has been ground or filed smooth and flat to remove the decarburized surface material, on which a hardness test is performed

4.1.117
test block
special precision blocks, used as standards to verify calibration of an inspection instrument

4.1.118
thread form
profile of a thread in an axial (longitudinal) plane for a length of one pitch

4.1.119
thread protector
protection device placed on the end of OCTG to protect threads and seals from damage

4.1.120
threshold
investigation level established during EMI or UT inspection, above which indications are further investigated

4.1.121
tolerance
permissible deviation from the specified value

4.1.122
transducer
device which converts one form of energy to another

EXAMPLES Ultrasonic probes, search coils, eddy-current probes and most other detectors.

4.1.123
transverse
across, usually circumferential or substantially circumferential in direction

4.1.124
tubing
pipe placed within a well and serving as a conduit for produced well fluids or to inject fluids

4.1.125
ultrasonic test
NDT method using high-frequency sound waves

4.1.126
ultrasonic
having a frequency above the audible range, i.e. above 20 kHz

4.1.127
ultrasonic velocity
speed at which ultrasonic sound waves travel through a medium

4.1.128
upset, noun
forged metal end of OCTG with increased wall thickness and diameter, later to be threaded or welded

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4.1.129
vanish point
location where the external thread runs out or terminates on the OCTG outside surface

NOTE The vanish point is the point where the lead of the chaser tool makes its final cut.

4.1.130
vernier calliper
dial calliper
measuring device, usually with two legs or jaws, that can be adjusted to measure the thickness, diameter, and distance between surfaces

NOTE Vernier callipers have a vernier scale readout whereas dial callipers have a dial readout.

4.1.131
wetting agent
substance which lowers the surface tension of a liquid

4.1.132
yoke
U-shaped piece of soft magnetic material, either solid or laminated, around which a coil is wound to carry a magnetizing current

4.2 Symbols and abbreviated terms

A_1 length of pin face to base of triangle

D specified outside diameter for pipe

d calculated inside diameter

D_{ou} outside diameter of upset

d_{ou} inside diameter of upset

I electric current, expressed in amperes

J distance from end of pipe to centre of coupling, power-tight make-up

L_c minimum length full crest threads

L_{eu} upset external length

L_{iu} upset internal length

L_1 length from end of pipe to hand-tight plane

L_4 total length of threads: end of pipe to vanish point

N coupling length

t specified wall thickness

W specified outside diameter for ISO/API threaded couplings other than special-clearance couplings

W_C specified outside diameter of special-clearance couplings

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ALTFLD	full-length alternate drifted
BC	buttress thread casing
CPLG	unattached couplings
DC-block	distance calibration block
DSC block	distance sensitivity calibration block
DP	plain end drill pipe
EBW	effective beam width
EMI	electromagnetic inspection
EU	external upset tubing connection
EW	electric-welded casing or tubing (including attached couplings)
FLD	full-length drifted
FLEMI	full-length electromagnetic inspection
FLMPI	full length magnetic particle inspection (wet or dry MPI)
FLVI	full-length visual inspection
IJ	integral joint tubing connection
LC	long round thread casing connection
NDT	non-destructive testing
NU	non-upset tubing connection
OCTG	oil country tubular goods
OD	outside diameter
PD	pulse density
PTL	perfect thread length
SEA	end area inspection (formerly called special end area inspection)
SMLS	seamless casing or tubing (including attached couplings)
STC	short round thread casing connection
T&C	threaded and coupled
TESTED	hydrostatically pressure-tested
UCMPI	unattached coupling magnetic particle inspection
UT	ultrasonic testing
UTFL	full-length ultrasonic inspection

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UTW ultrasonic inspection, weld line

VTI Visual thread inspection

5 Application

5.1 Basis for inspection

This International Standard contains practices recommended for use in the inspection of new OCTG subsequent to production by the manufacturer. The basis for performing an inspection has its origin in either ISO 11960, ISO 11961 or API Spec 5D, API Spec 5B, or in a supplemental specification or contract prepared by the owner. The inspections represented by the practices are placed in one of three categories as follows:

a) inspections specified in ISO 11960, ISO 11961 or API Spec 5D, or API Spec 5B;

b) inspections specified as one of several options in ISO 11960, ISO 11961 or API Spec 5D, or API Spec 5B;

c) inspections not specified in ISO 11960, ISO 11961 or API Spec 5D, or API Spec 5B.

5.2 Applicability of inspections

Some of the practices contained in this International Standard are applicable to OCTG regardless of size and type. Other practices typically might have limited applicability. Table A.1 indicates those inspections that are available in the field and covered by this International Standard, in relation to OCTG type. It is the owner's responsibility to specify which inspections shall be used when completing the ordering information (see Clause 6) to accompany an inspection contract.

5.3 Repeatability of results

Every inspection and measurement process is characterized by an inherent variability of results. The NDT methods and measurements included in this International Standard are characterized by additional inherent variability attributable to the following factors.

a) ISO 11960, ISO 11961 or API Spec 5D, or API Spec 5B permits options in the selection of practices to be used in the inspection for specific attributes.

b) Within a single practice, ISO 11960 or ISO 11961 or API Spec 5D, or API Spec 5B permits options in the selection of calibration standards.

c) Each manufacturer of NDT systems uses different mechanical and electronic designs.

d) Certain practices contained in this International Standard are based on operation of the system at high, and even maximum, sensitivity without the use of the reference standards specified in ISO 11960 or ISO 11961 or API Spec 5D.

e) Within the performance capability of a single NDT system installation, there will not be perfect repeatability of results.

5.4 Consequences of variability

5.4.1 Disposition

For any of the reasons given in 5.3, the results of field inspection may not replicate corresponding inspections performed during manufacture. Variability within and among the results of practices contained in this International Standard is to be expected. When field inspection results in the classification of OCTG as other than prime, it shall not be presumed that the material is defective until an evaluation has been performed in accordance with Clause 19 to establish final disposition.

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5.4.2 Responsibility for rejections

In some cases, an OCTG inspected using practices described in this International Standard may be classified as a reject even though it was inspected in conformance with ISO 11960, ISO 11961 or API Spec 5D, or API Spec 5B and classified by the manufacturer as an acceptable product in conformance with ISO 11960, ISO 11961 or API Spec 5D, or API Spec 5B. Responsibility for a rejection shall be based on the acceptance criteria contained in ISO 11960, ISO 11961 or API Spec 5D, or API Spec 5B, or an additional or more restrictive criteria previously negotiated with the manufacturer. The results of field NDT shall under no circumstances stand alone as a basis for rejection without corroborating evidence that the material is properly classified as defective based on the evaluation(s) performed in accordance with Clause 19 of this International Standard. If disposition is disputed between the purchaser and the manufacturer, the provisions of ISO 11960:2001, Clause 10, or ISO 11961:1996, Clause 8 or API Spec 5D:2001, Clause 10, or API Spec 5B shall apply.

6 Ordering information

6.1 In specifying the application of this International Standard to an order for the inspection of new OCTG, the owner shall specify, for each size and type of OCTG, the following order information:

a) the inspection(s) to be applied;

b) the frequency of sampling for inspection;

c) the reference standard, if applicable;

d) the acceptance criteria;

e) the permissible disposition of all classifications of OCTG (see Table A.19);

f) the instructions for marking.

6.2 The applicability of methods and procedures contained in this International Standard in accordance with ISO 11960, ISO 11961 or API Spec 5D, or API Spec 5B is indicated in 11.2, 12.2, 13.2, 14.3, 15.2, 16.2, 17.2, 18.2, 19.2 and 20.2. Some procedures in this International Standard are beyond the scope of the inspection requirements of ISO 11960, ISO 11961 or API Spec 5D, and API Spec 5B.

7 Quality assurance

7.1 The agency performing field inspection shall have a quality programme consistent with the provisions of a recognized quality standard. The agency's quality programme shall be documented and shall include written procedures for all inspections performed.

7.2 The agency's quality programme shall include documented procedures for the calibration and verification of the accuracy of all measuring, testing and inspection equipment and materials.

7.3 The agency's quality programme shall include records that verify inspection system capability for detecting the required reference indicators. In order to meet the requirements of ISO 11960, and ISO 11961 or API Spec 5D, the verification of inspection system capability shall address the following.

a) Standardization and operating procedures: The standardization procedures will vary with the different types of equipment, but as a minimum the written procedures shall address the method for assuring coverage (minimum 100 % for longitudinal and transverse flaws), minimum notch response, and maximum signal-to-noise ratio. The written operating procedures shall provide the required steps, control settings and parameter limits, such as use of special electronic circuits, use of special detector array configurations (pig tails), and maximum velocities to be used.

b) Equipment description: The equipment used to conduct the inspection shall be described in sufficient detail to demonstrate that it meets the requirements of ISO 11960, or ISO 11961 or API Spec 5D.

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c) Personnel qualification: documentation of qualification of inspection personnel shall meet the requirements of Clause 8.

d) Dynamic test data demonstrating the system capabilities for detecting the reference indicators: there are many methods of verifying system capability, two of which are as follows:

   1) Inspection system capability is established by using statistical techniques for assessment of inspection performance. By establishing inspection system setup parameters and response amplitude of the applicable reference flaws, data points are established to determine the distribution of response amplitudes. These data then become the basis for establishing the capability of the inspection system.

   2) Inspection system capability is demonstrated for each inspection order by use of a reference standard with the required reference notches. After the system is standardized according to the written procedures, the test standard is inspected at a number of positions to establish the reliability in all quadrants.

e) Reports: reports shall include all system settings, strip charts (if applicable), traceability of calibration, standardization and setup procedure, and a map of the test standard.

7.4 The agency's quality programme shall include provisions for the education, training and qualification of personnel performing inspections in accordance with this International Standard.

8 Qualification of inspection personnel

8.1 General

This clause sets forth the minimum requirements for qualification and certification (where applicable) of personnel performing field inspection of OCTG.

8.2 Written procedure

Agencies performing inspection of OCTG in accordance with this International Standard shall have a written procedure for education, training and qualification of personnel. The written procedure shall include the following:

a) establish administrative duties and responsibilities for execution of the written procedure;

b) establish personnel qualification requirements;

c) require documentation verifying all qualifications.

8.3 Qualification of inspection personnel

The qualification inspection personnel shall be the responsibility of the agency. ISO 11484 or ASNT SNT-TC-1A may be used as a guideline.

The requirements for each applicable qualification shall include the following as a minimum:

a) training and experience commensurate with the inspector's level of qualification;

b) written and practical examinations with acceptable grades;

c) a vision examination;

d) knowledge of the related sections of the applicable ISO/API standards and this document.

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8.4 Training programmes

8.4.1 All qualified personnel shall have completed a documented training programme designed for that level of qualification. The programme shall include the following:

a) principles of each applicable inspection method;

b) procedures for each applicable inspection method, including calibration and operation of inspection equipment;

c) related sections of the applicable ISO/API standards.

8.4.2 Training may be given by the agency or an outside agent.

8.5 Examinations

8.5.1 All inspection personnel shall have successfully completed the following examinations.

a) Written examinations addressing the general and specific principles of the applicable inspection method, the inspection procedures, and the applicable ISO/API standards.

b) A practical examination that shall include apparatus assembly, standardization, inspection techniques, operating procedures, interpretation of results for appropriate levels, and related report preparation.

c) Natural or corrected vision to read J-2 letters on a Jaeger number-2 test chart at a distance of 304,8 mm to 381,0 mm (12 in to 15 in). Equivalent tests, such as the ability to perceive a Titmus number-8 target, a Snellen fraction 20/25, or vision examinations with optical apparatus administered by physicians, are also acceptable.

8.5.2 Examinations shall be given by the agency or an outside agent.

8.6 Experience

All candidates for qualification shall have the experience required by the written procedure.

8.7 Requalification

8.7.1 Requalification requirements shall be defined in the written procedure.

8.7.2 Requalification is required at least every five years for all personnel.

8.7.3 Requalification of personnel is required if an individual has not performed defined functions within the previous 12 months, or if an individual changes employers.

8.7.4 As a minimum requirement for requalification, all personnel shall achieve an acceptable grade on a written examination addressing the current applicable OCTG inspection procedures, and the applicable ISO/API documents.

8.8 Documentation

8.8.1 Record retention and documentation are required for all qualification programmes. The following are minimum requirements:

a) all qualified personnel shall receive an attestation of qualification stating their level of qualification;

b) the records of all qualified personnel showing training program completion, experience, and examinations shall be maintained by the agency for a minimum period of 5 years and made available for review upon request.

8.8.2 All qualifications and related documents shall be approved by authorized agency personnel.

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8.9 NDT personnel certification

8.9.1 A programme for certification of NDT personnel shall be developed by the agency. ISO 11484 or ASNT-TC-1A may be used as a guideline.

8.9.2 The administration of the NDT personnel certification programme shall be the responsibility of the agency.

8.9.3 ISO and API are neither responsible for administering the NDT certification programme nor acting as a certifying agent in the programme.

9 General inspection procedures

9.1 General

This clause covers general procedures applicable to all inspection methods contained in this International Standard.

9.2 Documents at job site

The following inspection-related documents shall be available at the job site:

a) applicable ISO standards listed in Clause 3;

b) additionally, when ISO/API thread gauging is being conducted, a copy of API RP 5B1;

c) all applicable agency-controlled and qualified inspection procedure documents;

d) the field inspection contract or agency inspection order based on the contract.

9.3 Pre-inspection procedures

9.3.1 Each inspection shall start with the correct equipment available and in good working condition.

9.3.2 Prior to equipment setup, the agency shall assure that the OCTG to be inspected is the OCTG the owner has ordered to be inspected by comparing the information on the job order with the OCTG markings, i.e. diameter, nominal mass, grade, manufacturer, and whether seamless or welded.

9.3.3 All inspection shall begin by uniquely numbering or renumbering each length with a paint marker. Place the sequence number on the outside surface, preferably on the coupling end, box end, or identified end and printed in white paint so that it can be read from the end of the length. Do not place numbers over mill paint stencils. Unique numbering of unattached couplings is not required, however rejected couplings shall be identified and segregated from prime couplings. If a defect is found on a length of OCTG, complete all specified inspections on that length unless otherwise stipulated in the inspection contract.

9.4 Records and notification

As inspection progresses, maintain a record of the classification of the OCTG inspected. If at any time after 50 lengths or couplings have been inspected or tested, the reject rate exceeds 10 % of the OCTG inspected, notify the owner or his/her representative. If appropriate, it is suggested that the manufacturer, or his/her representative, be notified in turn through the purchaser.

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9.5 Post-inspection procedures

9.5.1 Classification

Classify each length of pipe or coupling into one of the categories listed below (see Clause 21 for details):

a) prime pipe with good connections, or prime unattached couplings;

b) prime pipe with defective connections;

c) pipe that contains conditionable defects;

d) pipe that contains non-conditionable defects;

e) non-conditionable unattached couplings (rejects);

f) unattached couplings requiring conditioning;

g) pipe or unattached couplings not meeting special owner-specified tests.

9.5.2 Marking

Mark the classification of each pipe and coupling with paint markings and apply all applicable inspection markings as described in Clause 21.

9.5.3 Cleaning

Remove all magnetic powder and cleaning material from the pipe and coupling surfaces. Do not contaminate nearby pipe during this process.

Material Safety Data Sheets should be read and the precautions observed when handling products of this type. Consideration should be given to the storage, transport, use and disposal of excess materials and containers. Observe appropriate regulations relative to disposal of used solvents and generated waste materials.

NOTE Solvents and other cleaning agents might contain hazardous materials. Solvents are normally volatile and can build up pressure in containers.

9.5.4 Count and tally lengths

Count and tally the lengths in each of the classification categories. Be sure to verify the totals after the initial count. Segregate the prime OCTG from all other OCTG if practical. Tally each length of casing and tubing using the overall length (including pin threads and coupling). By agreement between the owner and the agency, a “makeup” tally as described in ISO 10405:2000, 4.1.7 c) or API RP 5C1:1999, 4.1.7 c) shall be substituted on acceptable OCTG. An overall tally shall be used on rejected OCTG.

9.5.5 Thread protection

After inspection, ensure that the threads are clean and dry. Lubricate the threads with a thread compound that meets the performance objectives of ISO 13678 or API RP 5A3 or with a specific thread compound if specified by the owner. Lubricate the entire threaded area, including seals and thread roots, for the full thread circumference. In very cold climates, it might be necessary to warm the thread compound in order to apply it.

The Material Safety Data Sheets for thread compounds should be read and observed. Storage and disposal of containers and unused compound should be in accordance with appropriate regulations.

9.5.6 Thread protectors

Reinstall clean thread protectors and tighten them wrench-tight.

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9.6 Job site checklist

Before leaving the job site, the agency shall ensure that the following items have been accomplished.

a) Pipe racking. The agency shall ensure that each row of pipe has been properly secured (e.g. with chocks) for safety, and that no loose or unsecured pipe is left free to roll or fall from the racks. No pipe shall be left on the ground. Ensure that the pipe has been properly racked, and that all pipe has stripping between layers. Stripping shall be placed directly over the centreline of each sill.

b) Unattached couplings. Unattached couplings shall be stored for protection against the environment. Unless otherwise specified by the owner, they shall be returned to their original shipping container.

c) Debris removal. The job site shall be left neatly arranged and clean of all job-related debris.

d) Solvent disposal. Cleaning solvents used at the job site shall be disposed of properly.

9.7 Documentation

A field copy of the completed inspection report and supporting documents shall be delivered to the customer or specified representative upon completion of the job. Terminology for defects shall comply with API Std 5T1, where applicable.

10 Acceptance criteria, disposition and responsibility

10.1 General

This clause sets forth the principles for determining acceptance criteria, disposition, and responsibility for OCTG inspected in accordance with this International Standard.

10.2 Basis for acceptance

ISO 11960, ISO 11961 or API Spec 5D, or API Spec 5B constitute the basis for acceptance of OCTG inspected in accordance with this International Standard, except that additional or more restrictive criteria may be contracted between the owner and the agency.

10.3 Responsibility for rejections

10.3.1 The manufacturer shall be responsible for rejects which, after evaluation, are demonstrated to be nonconforming to the requirements of ISO 11960, ISO 11961 or API Spec 5D, or API Spec 5B. Manufacturer responsibility for defects attributable to handling or shipping damage shall be limited to those conditions reported to the manufacturer at, or prior to, delivery to the purchaser. Rejection shall not be based solely on unevaluated imperfections or indications (see 10.3.3).

10.3.2 In an identical manner to 10.3.1, the manufacturer shall be responsible for rejects that, after evaluation, are demonstrated to be conforming to the requirements of ISO 11960, ISO 11961 or API Spec 5D, or API Spec 5B but nonconforming to additional or more restrictive criteria for which the manufacturer is contractually liable (see 10.3.3).

10.3.3 In the event the manufacturer may be responsible for the rejection, but the purchaser and manufacturer are unable to agree that the OCTG is defective, a destructive test may be performed. If tests that require the destruction of material are made, any product that is proven to have not met the requirements of the specification shall be rejected. Disposition of rejected product shall be a matter of agreement between the manufacturer and purchaser.

10.3.4 Disposition of defects shall be in compliance with the applicable specification. Dispositions shall be recorded and shall be traceable to the OCTG inspection number (see 9.3.3).

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11 Visual and dimensional inspection

11.1 General

This clause provides descriptions, mechanical equipment requirements, and procedures for visual and dimensional inspection of OCTG.

11.2 Application

The inspections described in this clause are applicable to all sizes and all types of OCTG.

11.3 Drift mandrels

The diameter of the drift mandrel shall be measured with a vernier calliper or micrometer having flat contacts.

The instrument used shall be calibrated using a known precision setting standard at least once every 4 months.

The calibration check shall be recorded on the instrument, and in a log book, giving the date of the calibration check, the due date, and the initials of the person who performed the check. Length measurements may be made using one of the devices listed in 11.5.

11.4 Precision callipers (micrometer, vernier calliper or dial calliper)

The instrument shall be calibrated using a known precision reference standard at least once every 4 months. The calibration check shall be recorded on the calliper, and in a log book, giving the date of the calibration check, the due date, and the initials of the person who performed the check.

11.5 Length- and diameter-measuring devices (steel rules, steel length- or diameter-measuring tapes, and other non-adjustable measuring devices)

Accuracy verification shall be defined as a visual check of the legibility of the markings and the general wear of fixed reference points. The verification procedure of these devices shall be documented.

11.6 Depth gauges

11.6.1 General

The following conditions and checks apply to gauges used for imperfection evaluation in Clause 19.

11.6.2 External depth gauges

For external depth gauges the following shall apply.

a) Set the gauge to zero on a flat surface.

b) Check measuring accuracy of the gauge over a range of standard depths, at least once every 4 months or after repair or replacement.

c) Accuracy shall be within 0,025 mm (0.001 in) of actual depths of the reference standard.

d) The calibration check shall be recorded on the gauge, and in a log book, giving the date of the calibration check, the due date, and the initials of the person who performed the check.

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11.6.3 Internal depth gauges

For internal depth gauges and wall thickness callipers the following shall apply.

a) Set the gauge to read zero or a specified thickness when the contact points touch or when a standard thickness is placed between the contacts.

b) Check the measuring accuracy of the gauge over a range of standard thicknesses, different from those used in 11.6.2.b), at least once every 4 months or after repair.

c) Accuracy of readings shall be within 2 % of the actual wall thickness of the thickest standard used.

d) The calibration check shall be recorded on the gauge, and in a log book, giving the date of the calibration check, the due date, and the initials of the person who performed the check.

11.7 External surface illumination

11.7.1 Direct daylight

Direct daylight conditions do not require a check for surface illumination.

11.7.2 Night and enclosed-facility lighting

The diffused light level at the surfaces being inspected shall be at least 500 lx (50 fc). Illumination shall be checked once every 4 months. The check shall be recorded in a log book, giving the date, the reading, and the initials of the person who performed the check. This record shall be available on site. Illumination shall be checked whenever lighting fixtures change position or intensity, relative to surfaces being inspected.

11.7.3 Night-lighting with portable equipment

The diffused light level at the surfaces being inspected shall be at least 500 lx (50 fc). Proper illumination shall be verified at the beginning of the job to assure that portable lighting is directed effectively for surfaces being inspected. Illumination shall be checked during the job whenever lighting fixtures change positions or intensity relative to the surfaces being inspected.

11.7.4 Light-meter calibration

Light-meters used to verify illumination shall be calibrated at least once a year. The calibration check shall be recorded on the meter, and in a log book, giving the date of the calibration check, the due date, and the initials of the person who performed the check.

11.8 Internal surface illumination

11.8.1 Mirrors for illumination

The reflecting surface shall be a non-tinted mirror that provides a non-distorted image. The reflecting surface shall be flat and clean.

11.8.2 Spotlights

A light source having documented, demonstrated capability shall be used for illumination of inside surfaces. A spotlight producing an illumination greater than 1 000 lx (100 fc) at the maximum inspection distance may be used for this. The lens of the light source shall be kept clean.

11.8.3 Borescope equipment

The borescope lamp shall meet the requirements shown in Table A.2. The resolution of the borescope shall be checked at the start of a job, and whenever all or part of the borescope is assembled or re-assembled during a job. The date on a coin [not to exceed 1,02 mm (0.040 in) in height] or Jaeger J-4 letters placed within 101,60 mm (4 in) of the objective lens, shall be readable through the assembled borescope.

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11.9 Full-length visual inspection (FLVI) of new OCTG

11.9.1 Description

A full-length visual inspection of the entire outside and inside surfaces, excluding the threads, shall be conducted to detect gouges, cuts, pits, dents, grinds, mechanical damage, lack of straightness, and other visually detectable imperfections. On electric-welded pipe, special attention should be given to weld flash and trim. Each length shall be rolled and the entire surface viewed. The entire inside surface shall be inspected using a high intensity light, mirror or borescope (depending on size) meeting the requirements of 11.8.

11.9.2 External visual inspection procedure

Inspect lengths in groups by first rolling them together. Observe the pipe while rolling to detect straightness problems. Evaluate bent or bowed pipe in accordance with Clause 19.

Use the following procedure for external visual inspection:

a) identify the upper one-third of each length with a chalk mark;

b) examine each pipe surface by walking the length of each pipe from one end to the other. The number of lengths inspected on each pass will depend on the diameter. As each imperfection is found, mark it and evaluate it in accordance with Clause 19;

c) after the top one-third of this group has been inspected, roll each length one-third of a turn and mark with chalk;

d) repeat b) and c) until the entire outside surface of the pipe has been inspected.

11.9.3 Internal visual inspection procedures

Inspect the entire inside surface, excluding the threads, for imperfections. Pipe sizes Label 1: 10-3/4 and larger shall be visually inspected from each end using an illumination source meeting the requirements of 11.8.1, 11.8.2 or 11.8.3. For pipe sizes smaller than Label 1: 10-3/4, the best quality inspections are done with a borescope; see 11.8.3 for resolution requirements.

11.10 Outside diameter verification

11.10.1 If requested by the owner, the diameter of each length shall be verified to assure compliance with ISO 11960 and with ISO 11961 or API Spec 5D.

11.10.2 Verification of minimum and maximum diameter may be performed with snap gauges.

11.10.3 Micrometers or mechanical callipers that display the readout in hundredths of a millimetre (thousandths of an inch) shall be used to measure actual diameter.

11.10.4 Diameter tapes shall be used to measure average diameter.

11.11 Straightness

11.11.1 A visual inspection shall be performed to detect hooked ends or bowed pipe. Pipe to be examined shall be placed on a rack or joists where it can be rolled while visually examining for straightness.

11.11.2 Pipe sizes Label 1: 4-1/2 and larger shall be measured to determine the amount of straightness deviation whenever a visual examination has shown them to have hooked ends or to be bowed. This measurement shall be performed using a straight edge or taut string (wire) and a steel scale or rule.

11.11.3 Straightness shall be evaluated in accordance with Clause 19.

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11.12 Drift testing

11.12.1 General

Casing or tubing shall be drifted throughout its entire length to detect reduction in inside diameter. Group 1 external upset drill pipe, except sizes Label 1: 3-1/2 to Label 2: 13.30, shall be drifted throughout the length of the end upsets. Drift mandrels manufactured in accordance with ISO 11960, ISO 11961 or API Spec 5D, or this International Standard shall be used for this test.

11.12.2 Drift mandrel specifications

Drift mandrel specifications are as follows.

a) The minimum diameter of the cylindrical portion of a drift mandrel for bare casing, tubing, and drill pipe shall be in accordance with Table A.4, Table A.5 and Table A.8. Diameters for sizes and masses not included in these tables shall be calculated in accordance with Table A.3. A drift mandrel for internally-coated pipe shall be made of plastic, or hardwood such as oak and, as a guide, should meet the dimensions specified in Table A.6 and Table A.7. Because of the extra thickness added by the coating, a “no-drift” coated length might not need to be classified as a reject.

b) The drift mandrel shall be cylindrical in shape and may have attachments on one or both ends. Disk and barbell-shaped mandrels shall not be used. The ends of the drift mandrel extending beyond the specified cylindrical portion shall be shaped to permit easy entry into the pipe.

Sometimes pipe is drifted in the field to allow drilling with commonly used bit sizes. Drift sizes that are in use to allow passage of these commonly used bit sizes are shown in Table A.4. Pipe through which this specified drift passes should be marked as recommended in Clause 21.

NOTE Pipe rejected for failure to pass this specified or alternative drift is not the responsibility of the manufacturer unless the pipe was ordered that way.

11.12.3 Drift mandrel verification procedures

The following drift mandrel verification procedures shall be followed.

a) The length of the cylindrical portion of the drift mandrel shall be measured (a steel scale may be used for this measurement). Specified drift mandrel lengths are tabulated in Table A.3.

b) The mandrel diameter shall be measured using a micrometer or mechanical calliper that displays the readout in hundredths of a millimetre (thousandths of an inch). These measurements shall be made with the drift mandrel and micrometer at the same temperature. Measurements shall be made at each end of the drift mandrel. Each measurement shall be made in two locations, 90° apart. The allowable mandrel tolerance shall be 0,000 mm to +0,013 mm (0.000 in to +0.005 in) from the specified ISO/API dimensions. Drift mandrels larger than the upper tolerance of +0,013 mm (+0.005 in) may be used for acceptance but not for rejection. In case of dispute, a precision steel drift mandrel made to the appropriate ISO/API dimensions shall be used to resolve whether the lengths are acceptable or rejectable.

11.12.4 Drifting procedures

The following drifting procedures shall be followed.

a) Select and measure the correct drift mandrel prior to starting the inspection job, and re-measure the mandrel at least once for every 500 lengths thereafter.

b) The drift mandrel shall be at approximately the same temperature as the pipe being inspected.

c) Pass the drift mandrel through the entire length of each casing and tubing and through the upset length of drill pipe. The drift mandrel shall pass through the pipe or upset freely using a reasonably exerted force

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that does not exceed the weight of the drift mandrel. The drift should be inserted and removed carefully so that neither the threads nor the seals are scratched or damaged.

d) If the drift does not pass through the entire length of casing or tubing or the drill pipe upset, remove and clean the drift mandrel. Clean out the pipe if necessary. Check the pipe for sagging and provide additional support if needed.

e) Attempt the drift test again from the other end of the pipe. If the drift mandrel does not pass through the entire length on the second attempt, the length shall be considered a reject and identified immediately as a “no-drift.”

11.13 Visual thread inspection (VTI)

11.13.1 General

Visual thread inspection is a method for locating thread imperfections without the use of magnetic particle inspection or thread gauges other than a profile gauge. This inspection applies to exposed round threads on casing and tubing and exposed buttress threads on casing. Visually evident manufacturing defects or mechanical damage to the threads are detected by this inspection method.

NOTE Extreme-line threads are excluded from these inspection procedures. For extreme-line threads, refer to API Spec 5B.

11.13.2 Evaluation tools

Though imperfections can be visually located during this inspection, the following tools shall be used to evaluate the magnitude of the imperfections found:

a) a steel scale for accurately determining the L_c area on the pin and the perfect thread length of internal threads [see 11.13.4c)];

b) mirror for inspection of load flanks and roots of internal threads;

c) bright light, meeting the requirements of 11.8.2, for inspection of internal threads;

d) profile gauge, for detection of thread profile errors;

e) flexible steel measuring tape for measuring circumferential nonfull-crested or black-crested thread length on buttress threads.

A copy of API Spec 5B and this International Standard shall be available on location.

11.13.3 Thread repair

Repair of threads is not a part of this inspection. However, by agreement between the owner and the agency, cosmetic (minor) repair of threads may be made.

11.13.4 Visual thread inspection procedures

Proceed as follows.

a) Remove the thread protectors and stack them out of the way so that they will not be a work hazard. From this step, until the thread protectors are reinstalled, great care shall be taken to ensure that two lengths of pipe do not strike each other and damage the unprotected threads. Pipe shall never be loaded, unloaded, or removed to another rack without thread protectors installed. Never leave threads unprotected from moisture or condensation overnight. Use of a light corrosion inhibitor is recommended.

NOTE 1 Martensitic chromium steels (ISO 11960, grades L80-9Cr and L80-13Cr) are sensitive to galling. Special precautions might be necessary for thread surface treatment and/or lubrication to minimize galling.

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b) Clean all exposed threads thoroughly. Ensure that no thread compound, dirt, or cleaning material remains on the threads.

c) Determine the L_c length of pin end threads and record this number. Refer to Table A.9 and Table A.10 of this International Standard, or to API Spec 5B from which these tables were taken.

Internal threads do not have an L_c area. All of the threads within the interval from the counterbore to a plane located at a distance J plus one thread turn from the centre of the coupling or small end of integral joint OCTG shall be inspected to the L_c area requirements. This area is defined as the internal perfect thread length (PTL). The calculated perfect threads are listed in the Table A.9 and Table A.10.

NOTE 2 Thread classification depends on the location of an imperfection. Imperfections located in the L_c area of external threads or in the PTL of internal threads have different criteria for acceptance and rejection than those outside these regions. Measurement might be required to determine if imperfections are in the L_c or box PTL.

d) Slowly roll individual lengths at least one full revolution while examining the threads.

e) For external threads, inspect for imperfections on the face, chamfer, L_c area and non-L_c area. The thread profile gauge shall be applied to the threads to detect machining errors.

f) For internal threads, inspect for imperfections in the counterbore, PTL, and threaded area beyond the PTL. Seal-ring grooves shall be inspected for fins, wickers, and ribbons that are loose, or could become loose, on each side of the groove. The profile gauge shall be applied to the threads to detect machining errors. Caution shall be exercised when applying the profile gauge to avoid damaging thread coating. Exploratory grinding or filing to determine the depth of an imperfection is not permitted in the L_c area of external threads or the total length of internal threads.

11.13.5 Categories of imperfections

Types of imperfections that may cause thread rejection are listed below. Refer to 19.12 or API Spec 5B for dimensional data for acceptance and rejection.

a) Threaded area imperfections:

1) broken threads;

2) cuts;

3) grinds;

4) shoulders or steps;

5) seams;

6) non-full-crested threads (including black-crested threads);

7) laps;

8) pits;

9) dents;

10) tool marks;

11) fins;

12) dings;

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13) burrs;

14) torn threads (tears);

15) handling damage;

16) thick threads;

17) narrow threads (shaved threads);

18) galls;

19) improper thread height;

20) wicker (or whisker);

21) cracks;

22) chattered threads;

23) wavy or drunken threads;

24) improper thread form;

25) arc burns;

26) threads not extending to the centre of the coupling (threads within the *J*-area may not be perfect);

27) imperfections, other than those listed above, that break the continuity of the thread.

NOTE 1 Non-full-crested threads have historically been, and continue to be, referred to as black-crested threads because the original mill surface has not been removed. The term black-crested thread is a useful descriptive term, however, it should be understood that there can also be non-full-crested threads that are not black.

b) Conventional chamfer area:

1) not present 360°;

2) thread running out on the face;

3) razor edge;

4) feather edge;

5) burrs;

6) false starting thread engaging actual starting thread;

7) mashes;

8) cuts.

NOTE 2 The surfaces of the chamfers need not be perfectly smooth. Chamfers on the pipe ends have no effect on the sealing capability of the threads.

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