SLOVENSKI STANDARD
SIST EN ISO 17945:2015

01-julij-2015

Petrokemična industrija ter industrija za predelavo nafte in zemeljskega plina - Kovinski materiali, odporni proti nastajanju razpok zaradi sulfidov v korozivnih okoljih naftnih rafinerij (ISO 17945:2015)

Petroleum, petrochemical and natural gas industries - Metallic materials resistant to sulfide stress cracking in corrosive petroleum refining environments (ISO 17945:2015)

Erdöl-, petrochemische und Erdgasindustrie - Metallische Werkstoffe beständig gegen Schwefelwasserstoff-Rissbildung in korrosiver Erdölraffinerieumgebung (ISO 17945:2015)

Industries du pétrole, de la pétrochimie et du gaz naturel - Matériaux métalliques résistant à la fissuration sous contrainte induite par les sulfures pour utilisation dans des environnements corrosifs de raffinage du pétrole (ISO/FDIS 17945:2014)

Ta slovenski standard je istoveten z: **EN ISO 17945:2015**

ICS:

75.180.10	Oprema za raziskovanje in odkopavanje	Exploratory and extraction equipment

SIST EN ISO 17945:2015 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 17945

April 2015

ICS 75.180.10

English Version

Petroleum, petrochemical and natural gas industries - Metallic materials resistant to sulfide stress cracking in corrosive petroleum refining environments (ISO 17945:2015)

Industries du pétrole, de la pétrochimie et du gaz naturel - Matériaux métalliques résistant à la fissuration sous contrainte induite par les sulfures pour utilisation dans des environnements corrosifs de raffinage du pétrole (ISO 17945:2015)

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This European Standard was approved by CEN on 7 February 2015.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN ISO 17945:2015 E

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Foreword

This document (EN ISO 17945:2015) has been prepared by Technical Committee ISO/TC 67 “Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries” in collaboration with Technical Committee CEN/TC 12 “Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries” the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2015, and conflicting national standards shall be withdrawn at the latest by October 2015.

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

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Endorsement notice

The text of ISO 17945:2015 has been approved by CEN as EN ISO 17945:2015 without any modification.

INTERNATIONAL STANDARD

ISO 17945

First edition
2015-04-15

Petroleum, petrochemical and natural gas industries — Metallic materials resistant to sulfide stress cracking in corrosive petroleum refining environments

Industries du pétrole, de la pétrochimie et du gaz naturel — Matériaux métalliques résistant à la fissuration sous contrainte induite par les sulfures pour utilisation dans des environnements corrosifs de raffinage du pétrole

Reference number
ISO 17945:2015(E)

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Published in Switzerland

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*.

Introduction

The term “wet H_2S cracking”, as used in the refining industry, covers a range of damage mechanisms that can occur because of the effects of hydrogen charging in wet H_2S refinery or gas plant process environments. One of the types of material damage that can occur as a result of hydrogen charging is sulfide stress cracking (SSC) of hard weldments and microstructures, which is addressed by this International Standard. Other types of material damage include hydrogen blistering, hydrogen-induced cracking (HIC), and stress-oriented hydrogen-induced cracking (SOHIC), which are not addressed by this International Standard.

Historically, many end users, industry organizations (e.g. API), and manufacturers that have specified and supplied equipment and products such as rotating equipment and valves to the refining industry have used NACE MR0175/ISO 15156 to establish materials requirements to prevent SSC. However, it has always been recognized that refining environments are outside the scope of NACE MR0175/ISO 15156, which was developed specifically for the oil and gas production industry. In 2003, the first edition of NACE MR0103 was published as a refinery-specific sour service metallic materials standard. This International Standard is based on the good experience gained with NACE MR0175/ISO 15156, but tailored to refinery environments and applications. Other references for this International Standard are NACE SP0296, NACE Publication 8X194, NACE Publication 8X294, and the refining experience of the task group members who developed NACE MR0103.

The materials, heat treatments, and material property requirements set forth in NACE MR0103 are based on extensive experience in the oil and gas production industry, as documented in NACE MR0175/ISO 15156, and were deemed relevant to the refining industry by the task group.

This International Standard was developed on the basis of NACE MR0103.

Petroleum, petrochemical and natural gas industries — Metallic materials resistant to sulfide stress cracking in corrosive petroleum refining environments

1 Scope

This International Standard establishes material requirements for resistance to SSC in sour petroleum refining and related processing environments containing H_2S either as a gas or dissolved in an aqueous (liquid water) phase with or without the presence of hydrocarbon. This International Standard does not include and is not intended to include design specifications. Other forms of wet H_2S cracking, environmental cracking, corrosion, and other modes of failure are outside the scope of this International Standard. It is intended to be used by refiners, equipment manufacturers, engineering contractors, and construction contractors.

Specifically, this International Standard is directed at the prevention of SSC of equipment (including pressure vessels, heat exchangers, piping, valve bodies, and pump and compressor cases) and components used in the refining industry. Prevention of SSC in carbon steel categorized under P-No. 1 in Section IX of the ASME Boiler and Pressure Vessel Code (BPVC) is addressed by requiring compliance with NACE SP0472.

This International Standard applies to all components of equipment exposed to sour refinery environments (see Clause 6) where failure by SSC would (1) compromise the integrity of the pressure-containment system, (2) prevent the basic function of the equipment, and/or (3) prevent the equipment from being restored to an operating condition while continuing to contain pressure.

2 Normative references

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

NACE Standard TM0177, *Laboratory Testing of Metals for Resistance to Sulfide Stress Cracking and Stress Corrosion Cracking in H2S Environments*[1)]

ANSI/NACE MR0175/ISO 15156, *Petroleum and natural gas industries — Materials for use in H2S-containing environments in oil and gas production*[1)]

ASTM A833, *Standard Practice for Indentation Hardness of Metallic Materials by Comparison Hardness Testers*

ASTM E384, *Standard Test Method for Knoop and Vickers Hardness of Materials*

ASTM E562, *Standard Test Method for Determining Volume Fraction by Systematic Manual Point Count*

SAE AMS2430, *Shot Peening, Automatic*

3 Terms and definitions

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

3.1
lower transformation temperature
A_{c1}
temperature at which austenite begins to form during heating

1) NACE International, 1440 South Creek Dr., Houston, TX 77084-4906, USA.

3.2
upper transformation temperature
A_{c3}
temperature at which transformation of ferrite to austenite is completed during heating

3.3
alloy steel
iron-based alloy containing carbon (usually less than 2,5 %) and manganese (usually not less than 0,25 %), that contains specified minimum quantities for one or more alloying elements other than manganese, silicon, and copper, and that does not specify a minimum chromium content greater than or equal to 10 %

3.4
austenitic stainless steel
stainless steel whose microstructure, at room temperature, consists predominantly of austenite

3.5
carbon steel
iron-based alloy containing carbon (usually less than 2,0 %) and manganese (usually not less than 0,25 %), with no specified minimum quantity for any alloying element other than manganese, silicon, and copper, and that contains only an incidental amount of any element other than carbon, silicon, manganese, copper, sulfur, and phosphorus

3.6
cladding
metallurgically bonded layer (roll bonded, explosion bonded, or weld overlaid) of a corrosion-resistant alloy material applied to the entire wetted surface of a substrate material that is relatively less corrosion-resistant

Note 1 to entry: See also weld overlay.

3.7
duplex stainless steel
austenitic/ferritic stainless steel
stainless steel whose microstructure at room temperature consists primarily of a mixture of austenite and ferrite

3.8
end user
company or agency that owns and operates the component (e.g. vessel, piping, pump, compressor, etc.)

3.9
ferritic stainless steel
stainless steel whose microstructure, at room temperature, consists predominantly of ferrite

3.10
stainless steel
iron-based alloy containing 10,5 % mass fraction or more chromium, possibly with other elements added to secure special properties

3.11
sulfide stress cracking
SSC
cracking of a metal under the combined action of tensile stress and corrosion in the presence of water and H_2S (a form of hydrogen stress cracking)

3.12
thermal spray coating
high-temperature process by which finely divided metallic or nonmetallic materials are deposited in a molten or semi-molten condition to form a coating on a surface when cooled

3.13
weld overlay, corrosion resistant
deposition of one or more layers of corrosion resistant weld metal to the surface of a base material in an effort to improve the corrosion resistance properties of the surface

Note 1 to entry: See also cladding.

3.14
weld overlay, hard facing
deposition of one or more layers of a weld metal to the surface of a material in an effort to improve the wear resistance properties of the surface

4 Symbols and abbreviated terms

ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	ASME (formerly American Society of Mechanical Engineers)
AWS	American Welding Society
BPVC	boiler and pressure vessel code
HAZ	heat-affected zone
HI	heat input
HIC	hydrogen-induced cracking
NACE	NACE International (formerly National Association of Corrosion Engineers)
ppmw	parts per million by weight, commonly expressed as mg/kg in SI units
PQR	procedure qualification record
PREN	pitting resistance equivalent number
PWHT	postweld heat treatment
SOHIC	stress-oriented hydrogen-induced cracking
SSC	sulfide stress cracking
UNS	unified numbering system (for metals and alloys)
WPQT	welding procedure qualification test

5 Responsibilities

5.1 Responsibilities of the end user

5.1.1 It is the responsibility of the end user (or the end user's agent) to determine the operating conditions and to specify when this International Standard applies.

5.1.2 It is the end user's (or the end user's agent's) responsibility to ensure that a material is satisfactory in the intended environment. The end user (or the end user's agent) may select specific materials for use on the basis of operating conditions that include pressure, temperature, corrosiveness, and fluid