SLOVENSKI STANDARD
SIST EN ISO 21457:2012

01-november-2012

Petrokemična industrija ter industrija za predelavo nafte in zemeljskega plina - Izbira materialov in korozijska kontrola v sistemih za proizvodnjo olja in plina (ISO 21457:2010)

Petroleum, petrochemical and natural gas industries - Materials selection and corrosion control for oil and gas production systems (ISO 21457:2010)

Erdöl-, petrochemische und Erdgasindustrie - Werkstoffauswahl und Korrosionsschutzmaßnahmen für Öl- und Gasproduktionssysteme (ISO 21457:2010)

Industries du pétrole, de la pétrochimie et du gaz naturel - Choix de matériaux et contrôle de corrosion pour les systèmes de production de pétrole et de gaz (ISO 21457:2010)

Ta slovenski standard je istoveten z: **EN ISO 21457:2010**

ICS:

75.180.10	Oprema za raziskovanje in odkopavanje	Exploratory and extraction equipment

SIST EN ISO 21457:2012 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 21457

September 2010

ICS 75.180.01

English Version

Petroleum, petrochemical and natural gas industries - Materials selection and corrosion control for oil and gas production systems (ISO 21457:2010)

Industries du pétrole, de la pétrochimie et du gaz naturel - Choix des matériaux et contrôle de la corrosion pour les systèmes de production de pétrole et de gaz (ISO 21457:2010)

Erdöl-, petrochemische und Erdgasindustrie - Werkstoffauswahl und Korrosionsprüfung für Öl- und Gasproduktionssysteme (ISO 21457:2010)

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EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN ISO 21457:2010: E

Contents

Page

Foreword

This document (EN ISO 21457:2010) 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.

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The text of ISO 21457:2010 has been approved by CEN as a EN ISO 21457:2010 without any modification.

INTERNATIONAL STANDARD

ISO 21457

First edition
2010-09-01

Petroleum, petrochemical and natural gas industries — Materials selection and corrosion control for oil and gas production systems

Industries du pétrole, de la pétrochimie et du gaz naturel — Choix des matériaux et contrôle de la corrosion pour les systèmes de production de pétrole et de gaz

Reference number
ISO 21457:2010(E)

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword

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.

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ISO 21457 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*.

Introduction

The provision of well-established and robust material selection guidelines offers a means of satisfying long-term materials performance that meet the minimum requirements for a broad range of end users in the petroleum, petrochemical and natural gas industries. An additional benefit can be to enable product suppliers to develop, manufacture and provide off-the-shelf equipment that meets these requirements.

Oil and gas production projects benefit from a structured evaluation of materials used for the different fluids being handled. Therefore, the main objective of this International Standard is to provide general requirements with guidelines for the selection of materials for systems and components, with due consideration to the transported fluids and the external environment.

It is the end user's responsibility to provide a project document with respect to implementation of the requirements and guidelines of this International Standard, and to specify the design conditions for material selection. In addition to the end user, the organization responsible for the facility or for the equipment design, or for both, is regarded as responsible for materials selection.

This International Standard is developed to provide responsible parties with a structured process to carry out materials selection in a consistent manner as a part of the engineering work, based upon a design basis for a particular installation. This International Standard is intended for use by oil companies and engineering contractors.

Users of this International Standard are advised 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 can be particularly applicable where there is innovative or developing technology. Where an alternative is offered, it is advisable that the vendor identify any variations from this International Standard and provide details.

Petroleum, petrochemical and natural gas industries — Materials selection and corrosion control for oil and gas production systems

1 Scope

This International Standard identifies the corrosion mechanisms and parameters for evaluation when performing selection of materials for pipelines, piping and equipment related to transport and processing of hydrocarbon production, including utility and injection systems. This includes all equipment from and including the well head, to and including pipelines for stabilized products. This International Standard is not applicable to downhole components.

Guidance is given for the following:

— corrosion evaluations;

— materials selection for specific applications, or systems, or both;

— performance limitations for specific materials;

— corrosion control.

This International Standard refers to materials that are generally available, with properties that are known and documented. It also allows other materials to be evaluated and qualified for use.

This International Standard does not provide detailed material requirements or guidelines for manufacturing and testing of equipment. Such information can be found in particular product and manufacturing standards.

2 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 15156-1[1)], *Petroleum and natural gas industries — Materials for use in H_2S-containing environments in oil and gas production — Part 1: General principles for selection of cracking-resistant materials*

ISO 15156-2[1)], *Petroleum and natural gas industries — Materials for use in H_2S-containing environments in oil and gas production — Part 2: Cracking-resistant carbon and low-alloy steels, and the use of cast irons*

ISO 15156-3[1)], *Petroleum and natural gas industries — Materials for use in H_2S-containing environments in oil and gas production — Part 3: Cracking-resistant CRAs (corrosion-resistant alloys) and other alloys*

1) ISO 15156 (all parts) has been adopted by NACE as NACE MR0175/ISO 15156.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

3.1.1
aquifer water
water from an underground layer of water-bearing permeable rock or unconsolidated materials

3.1.2
carbon steel
alloy of carbon and iron containing up to 2 % mass fraction carbon and up to 1,65 % mass fraction manganese and residual quantities of other elements, except those intentionally added in specific quantities for deoxidation (usually silicon and/or aluminium)

NOTE Carbon steels used in the petroleum industry usually contain less than 0,8 % mass fraction carbon.

[ISO 15156-1:2009, definition 3.3]

3.1.3
corrosion-resistant alloy
alloy intended to be resistant to general and localized corrosion by oilfield environments that are corrosive to carbon steels

NOTE This definition is in accordance with ISO 15156-1 and is intended to include materials such as stainless steel with minimum 11,5 % (mass fraction) Cr, and nickel, cobalt and titanium base alloys. Other ISO standards can have other definitions.

3.1.4
end user

owner or organization that is responsible for operation of an installation/facility

3.1.5
free-machining steel
steel composition to which elements such as sulfur, selenium or lead have been intentionally added to improve machinability

3.1.6
fugacity
non-ideal partial pressure that a component in a mixture exerts in the vapour phase when in equilibrium with the liquid mixture

NOTE The fugacity factor depends on the temperature and the total pressure.

3.1.7
glass-fibre-reinforced plastic
composite material made of thermosetting resin and reinforced with glass fibres

3.1.8
hydrogen-induced cracking
HIC
planar cracking that occurs in carbon and low alloy steels when atomic hydrogen diffuses into the steel and then combines to form molecular hydrogen at trap sites

NOTE Cracking results from the pressurization of trap sites by hydrogen. No externally applied stress is needed for the formation of hydrogen-induced cracks. Trap sites capable of causing HIC are commonly found in steels with high impurity levels that have a high density of planar inclusions and/or regions of anomalous microstructure (e.g. banding) produced by segregation of impurity and alloying elements in the steel. This form of hydrogen-induced cracking is not related to welding.

[ISO 15156-1:2009, definition 3.12]

3.1.9
hydrogen stress cracking
HSC
cracking that results from the presence of hydrogen in a metal and tensile stress (residual and/or applied)

NOTE HSC describes cracking in metals that are not sensitive to SSC but which can be embrittled by hydrogen when galvanically coupled, as the cathode, to another metal that is corroding actively as an anode. The term “galvanically induced HSC” has been used for this mechanism of cracking.

[ISO 15156-1:2009, definition 3.13]

3.1.10
liquid metal embrittlement
form of cracking caused by certain liquid metals coming into contact with specific alloys

3.1.11
low alloy steel
steels containing a total alloying element content of less than 5 % mass fraction, but more than that specified for carbon steel

EXAMPLE AISI 4130; AISI 8630; ASTM A182 Grade F22[20].

3.1.12
manufacturer

firm, company or corporation responsible for making a product in accordance with the requirements of the order, or with the properties specified in the referenced product specification, or both

3.1.13
marine atmosphere
atmosphere over and near the sea

NOTE A marine atmosphere will extend a certain distance inland, depending on topography and prevailing wind direction. It is heavily polluted with sea-salt aerosols (mainly chlorides).

[ISO 12944-2:1998, definition 3.7.4]

3.1.14
maximum operating temperature
maximum temperature to which a component is subjected, including during deviations from normal operations, such as start-up/shutdown

3.1.15
onshore
inland area with a non-chloride-containing atmosphere

3.1.16
operating temperature
temperature to which a component is subjected during normal operation