

ČESKÁ TECHNICKÁ NORMA

**Naftový a plynárenský průmysl –
Materiály pro využití v prostředí obsahujícím H₂S
z těžby ropy a zemního plynu –
Část 2: Litiny, uhlíkové a nízkolegované oceli odolné proti tvorbě trhlin**



EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 15156-2:2003/AC

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English version
Version Française
Deutsche Fassung

Petroleum, petrochemical and natural gas industries - Materials for use in H₂S-containing environments in oil and gas production - Part 2: Cracking-resistant carbon and low alloy steels, and the use of cast irons (ISO 15156-2:2003/Cor.1:2005)

Industries du pétrole, pétrochimiques et du gaz naturel - Matériaux pour utilisation dans des environnements contenant de l'hydrogène sulfuré (H₂S) dans la production de pétrole et de gaz - Partie 2: Aciers au carbone et aciers faiblement alliés résistants à la fissuration, et utilisation de fontes (ISO 15156-2:2003/Cor.1:2005)

Erdöl- und Erdgasindustrie - Werkstoffe für den Einsatz in H₂S-haltiger Umgebung bei der Öl- und Gasgewinnung - Teil 2: Gegen Rissbildung beständige unlegierte und niedriglegierte Stähle und Gusseisen (ISO 15156-2:2003/Cor.1:2005)

This corrigendum becomes effective on 1 March 2006 for incorporation in the three official language versions of the EN.

Ce corrigendum prendra effet le 1 mars 2006 pour incorporation dans les trois versions linguistiques officielles de la EN.

Die Berichtigung tritt am 1. März 2006 zur Einarbeitung in die drei offiziellen Sprachfassungen der EN in Kraft.



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

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English version

Endorsement Notice

The text of ISO 15156-2:2003/Cor.1:2005 has been approved by CEN as a European Corrigendum without any modifications.

Version française

Notice d'entérinement

Le texte de l'ISO 15156-2:2003/Cor.1:2005 a été approuvé par le CEN comme Corrigendum européen sans aucune modification.



INTERNATIONAL STANDARD ISO 15156-2:2003
TECHNICAL CORRIGENDUM 1

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**Petroleum and natural gas industries — Materials for use in
H₂S-containing environments in oil and gas production —**

Part 2:

**Cracking-resistant carbon and low alloy steels, and the use of
cast irons**

TECHNICAL CORRIGENDUM 1

Industries du pétrole et du gaz naturel — Matériaux pour utilisation dans des environnements contenant de l'hydrogène sulfuré (H₂S) dans la production de pétrole et de gaz —

Partie 2: Aciers au carbone et aciers faiblement alliés résistants à la fissuration, et utilisation de fontes

RECTIFICATIF TECHNIQUE 1

Technical Corrigendum 1 to ISO 15156-2 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*.

Page 2, Table 1 — List of equipment:

Replace Table 1 with the following:

Table 1— List of equipment

ISO 15156-2 is applicable to materials used for the following equipment	Permitted exclusions
Drilling, well construction and well-servicing equipment	Equipment only exposed to drilling fluids of controlled composition ^a Drill bits Blowout Preventer (BOP) shear blades ^b Drilling riser systems Work strings Wireline and wireline equipment ^c Surface and intermediate casing
Wells, including subsurface equipment, gas lift equipment, wellheads and christmas trees	Sucker rod pumps and sucker rods ^d Electric submersible pumps Other artificial lift equipment Slips
Flowlines, gathering lines, field facilities and field processing plants	Crude oil storage and handling facilities operating at a total absolute pressure below 0,45 MPa (65 psi)
Water-handling equipment	Water-handling facilities operating at a total absolute pressure below 0,45 MPa (65 psi) Water injection and water disposal equipment ^e
Natural gas treatment plants	—
Transportation pipelines for liquids, gases and multiphase fluids	Lines handling gas prepared for general commercial and domestic use
For all equipment above	Components loaded only in compression
<p>^a See A.2.3.2.3 for more information.</p> <p>^b See A.2.3.2.1 for more information.</p> <p>^c Wireline lubricators and lubricator connecting devices are not permitted exclusions.</p> <p>^d For sucker rod pumps and sucker rods, reference can be made to NACE MR0176.</p> <p>^e For water injection and water disposal, reference can be made to NACE RP0475.</p>	

Page 2, Clause 2, Normative references:

Add the following reference after ISO 15156-1:2001:

ISO 15156-3:2003, *Petroleum and natural gas industries — Materials for use in H₂S-containing environments in oil and gas production — Part 3: Cracking-resistant CRAs (corrosion-resistant alloys) and other alloys*

Page 3, 3.1:

Replace 3.1 with the following:

3.1

Brinell hardness

HBW

hardness value, measured in accordance with ISO 6506-1, normally using a 10-mm diameter tungsten carbide ball and a force of 29,42 kN

NOTE For the purposes of this provision, ASTM E 10 is equivalent to ISO 6506-1.

Page 5, 3.16:

Replace 3.16 with the following:

3.16

Rockwell C hardness

HRC

hardness value, measured in accordance with ISO 6508-1, obtained using a diamond cone indenter and a force of 1 471 N

NOTE For the purposes of this provision, ASTM E 18 is equivalent to ISO 6508-1.

Page 5, 3.23:

Replace 3.23 with the following:

3.23

Vickers hardness

HV

hardness value, measured in accordance with ISO 6507-1, obtained using a diamond pyramid indenter and one of a variety of possible applied loads

NOTE For the purposes of this provision, ASTM E 92 is equivalent to ISO 6507-1.

Page 11, 7.3.3.2 Hardness testing methods for welding procedure qualification:

Replace 7.3.3.2 with the following:

Hardness testing for welding procedure qualification shall normally be carried out using the Vickers HV 10 or HV 5 method in accordance with ISO 6507-1, or the Rockwell method in accordance with ISO 6508-1 or ASTM E18 using the 15N scale.

NOTE For the purposes of this provision, ASTM E 92 is equivalent to ISO 6507-1 and ASTM E 18 is equivalent to ISO 6508-1.

The HRC method may be used for welding procedure qualification if the design stress does not exceed two-thirds of SMYS and the welding procedure specification includes post weld heat treatment. The use of the HRC method for welding procedure qualification in all other cases shall require the agreement of the equipment user.

NOTE Hardness surveys using the Vickers or Rockwell 15N testing method produce a more detailed picture of weld hardness and its variations. Hardness surveys using the HRC testing method might not detect small zones in welds or HAZs where the hardness exceeds the acceptance criteria for the Vickers or Rockwell 15N testing method. The significance of such small hard zones is not well understood.

The use of other hardness testing methods shall require the agreement of the equipment user.

The Vickers or Rockwell 15N hardness testing method shall be used for the qualification of alternative weld hardness acceptance criteria as permitted in 7.3.3.4.

Page 11, 7.3.3.3 Hardness surveys for welding procedure qualification:

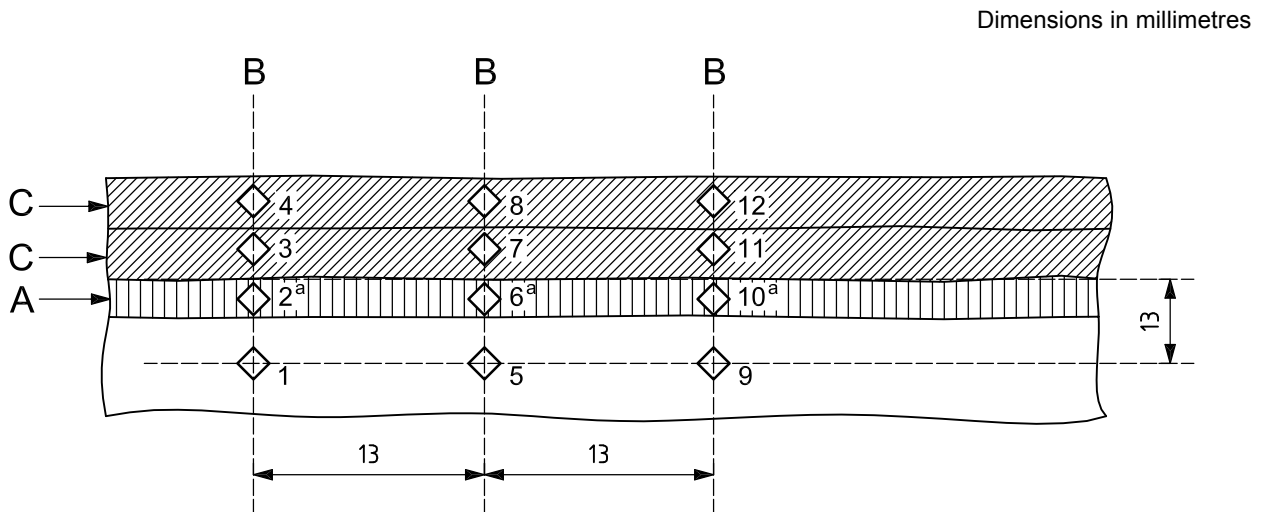
Replace 7.3.3.3 with the following:

Vickers hardness surveys shall be in accordance with Figure 2 for butt welds, Figure 3 for fillet welds and Figure 4 for repair and partial penetration welds. HRC surveys of butt welds shall be in accordance with Figure 5. Survey requirements for other joint configurations shall be developed from these figures.

Hardness surveys for qualification of overlay welding procedures shall be in accordance with Figure 6.

Page 15, 7.3.3.3 Hardness surveys for welding procedure qualification:

Add the following Figure 6.



Key

- A weld heat affected zone (visible after etching)
- B ——— lines of hardness survey indentations 1 to 12
- C layer of weld overlay (visible after etching)

^a Using the Vickers or Rockwell 15N measurement methods, hardness impressions 2, 6 and 10 should be entirely within the heat-affected zone and located as close as possible to, but no more than 1 mm from, the fusion boundary between the weld overlay and HAZ.

The Rockwell C hardness measurement method may be used subject to the requirements of 7.3.3.2. HRC hardness impressions in the HAZ shall be located within 2 mm of the fusion boundary

Figure 6 — Weld overlay

Page 18, A.2.1.4 Welding:

Replace A.2.1.4 with the following:

Welding and weld hardness determinations shall be performed in accordance with 7.3.3.

Acceptable maximum hardness values for carbon steel, carbon manganese steel and low alloy steel welds are given in Table A.1.

As-welded carbon steels, carbon manganese steels and low alloy steels that comply with the hardness requirements of Table A.1 do not require post weld heat treatment.

Tubular products with an SMYS not exceeding 360 MPa (52 ksi) and listed in Table A.2 are acceptable in the as-welded condition. For these products, hardness testing of welding procedures may be waived if agreed by the equipment user.

Some tubular products with an SMYS exceeding 360 MPa (52 ksi) (see A.2.2.2) may be acceptable in the as-welded condition if suitable qualified welding procedures are used. The conditions in Table A.1 shall be met.

Carbon steel and low alloy steel weldments that do not comply with other paragraphs of this subclause shall be stress-relieved at a minimum temperature of 620 °C (1 150 °F) after welding. The maximum weld zone hardness, determined in accordance with 7.3, shall be 250 HV (or, subject to the restrictions described in 7.3.3, 22 HRC).

Welding consumables and procedures that produce a deposit containing more than 1 % nickel are acceptable after successful weld SSC qualification by testing in accordance with Annex B.

Page 19, Table A.1 — Maximum acceptable hardness values for carbon steel, carbon manganese steel and low alloy steel welds:

Replace Table A.1 with the following:

Table A.1 — Maximum acceptable hardness values for carbon steel, carbon manganese steel and low alloy steel welds

Hardness test methods	Hardness test locations for welding procedure qualification	Maximum acceptable hardness
Vickers HV 10 or HV 5 or Rockwell HR 15N	Weld root: Base metal, HAZ and weld root metal as shown in Figure 2, Figure 3 or Figure 4	250 HV 70,6 HR 15N
	Base metal and HAZ for weld overlays as shown in Figure 6, see also A.2.1.5 b)	250 HV 70,6 HR 15N
	Weld cap: Base metal, HAZ and weld metal of unexposed weld cap as shown in Figure 2 or Figure 4	275 HV ^a 73,0 HR 15N
Rockwell HRC (see 7.3.3.2)	As shown in Figure 5	22 HRC
	Base metal and HAZ for weld overlays as shown in Figure 6, see also A.2.1.5 b)	22 HRC
^a The maximum shall be 250 HV or 70,6 HR 15N unless <ul style="list-style-type: none"> — the equipment user agrees the alternative weld cap hardness limit; and — the parent material(s) are over 9 mm thick; and — the weld cap is not exposed directly to the sour environment; and — the escape of hydrogen is not impeded, e.g. by cathodic protection. 		

Page 19, A.2.1.5 b):

Replace A.2.1.5 b) with the following:

- b) The maximum hardness and final heat-treated condition of the base metal substrate comply with A.2.1.2 and, in the case of welded overlays, A.2.1.4. This requirement may be waived in accordance with

ISO 15156-3:2003, A.13.1. The maximum hardness and/or other properties of the weld deposit shall comply with the requirements of ISO 15156-3 or this part of ISO 15156, as applicable.

Page 44, Bibliography:

Delete ISO 15156-3:2003, *Petroleum and natural gas industries — Materials for use in H₂S-containing environments in oil and gas production — Part 3: Cracking-resistant CRAs (corrosion-resistant alloys) and other alloys*

Renumber the remaining references as appropriate.

Add the following references:

- [32] NACE RP0475, *Selection of Metallic Materials to Be Used in All Phases of Water Handling for Injection into Oil-Bearing Formations*
- [33] ASTM E 10, *Test Method for Brinell Hardness of Metallic Materials*
- [34] ASTM E 18, *Test Method for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials*
- [35] ASTM E 92, *Test Method for Vickers Hardness of Metallic Materials*

U p o z o r n ě n í : Změny a doplňky, jakož i zprávy o nově vydaných normách jsou uveřejňovány ve Věstníku Úřadu pro technickou normalizaci, metrologii a státní zkušebnictví.

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