

**SLOVENSKI STANDARD**  
**SIST EN ISO 15156-3:2004/AC:2007****01-maj-2007**

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Petroleum, petrochemical and natural gas industries - Materials for use in H<sub>2</sub>S-containing environments in oil and gas production - Part 3: Cracking-resistant CRAs (corrosion-resistant alloys) and other alloys (ISO 15156-3:2003/Cor.1:2005 and ISO 15156-3:2003/Cor.2:2005)

**STANDARD PREVIEW****(standards.iteh.ai)**

Erdöl- und Erdgasindustrie - Werkstoffe für den Einsatz in H<sub>2</sub>S-haltiger Umgebung bei der Öl- und Gasgewinnung - Teil 3: Hochlegierte Stähle (CRAs) und andere Legierungen (ISO 15156-3:2003/Cor.1:2005 und ISO 15156-3:2003/Cor.2:2005)

<https://standards.iteh.ai/en/standards/ISO/ISO-15156-3:2004/AC:2007>

Industries du pétrole, pétrochimiques et du gaz naturel - Matériaux pour utilisation dans des environnements contenant de l'hydrogène sulfuré (H<sub>2</sub>S) dans la production de pétrole et de gaz - Partie 3: ARC (alliages résistants à la corrosion) et autres alliages résistants à la fissuration (ISO 15156-3:2003/Cor.1:2005 et ISO 15156-3:2003/Cor.2:2005)

**Ta slovenski standard je istoveten z: EN ISO 15156-3:2003/AC:2006****ICS:**

75.180.10	Oprema za raziskovanje in odkopavanje	Exploratory and extraction equipment
77.060	Korozija kovin	Corrosion of metals

**SIST EN ISO 15156-3:2004/AC:2007 en**

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SIST EN ISO 15156-3:2004/AC:2007

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EUROPEAN STANDARD

EN ISO 15156-3:2003/AC

NORME EUROPÉENNE

March 2006

EUROPÄISCHE NORM

Mars 2006

März 2006

ICS 75.180.10; 77.060

English version  
Version Française  
Deutsche Fassung

Petroleum, petrochemical and natural gas industries - Materials for use in H<sub>2</sub>S-containing environments in oil and gas production - Part 3: Cracking-resistant CRAs (corrosion-resistant alloys) and other alloys (ISO 15156-3:2003/Cor.1:2005 and ISO 15156-3:2003/Cor.2:2005)

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Erdöl- und Erdgasindustrie - Werkstoffe für den Einsatz in H<sub>2</sub>S-haltiger Umgebung bei der Öl- und Gasgewinnung - Teil 3: Hochlegierte Stähle (CRAs) und andere Legierungen (ISO 15156-3:2003/Cor.1:2005 und ISO 15156-3:2003/Cor.2:2005)

PRE-STANDARD PREVIEW  
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SIST EN ISO 15156-3:2004/AC:2007

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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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Ref. No.: EN ISO 15156-3:2003/AC:2006 D/E/F

## English version

### Endorsement Notice

The text of ISO 15156-3:2003/Cor.1:2005 and ISO 15156-3:2003/Cor.2:2005 has been approved by CEN as a European Corrigendum without any modifications.

## Version française

### Notice d'entérinement

Le texte de l'ISO 15156-3:2003/Cor.1:2005 et de l'ISO 15156-3:2003/Cor.2:2005 a été approuvé par le CEN comme Corrigendum européen sans aucune modification.

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**INTERNATIONAL STANDARD ISO 15156-3:2003**  
**TECHNICAL CORRIGENDUM 1**

Published 2005-02-15

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

**Petroleum and natural gas industries — Materials for use in  
H<sub>2</sub>S-containing environments in oil and gas production —**

**Part 3:  
Cracking-resistant CRAs (corrosion-resistant alloys) and other  
alloys**

**TECHNICAL CORRIGENDUM 1**

*Industries du pétrole et du gaz naturel — Matériaux pour utilisation dans des environnements contenant  
de l'hydrogène sulfuré (H<sub>2</sub>S) dans la production de pétrole et de gaz —*

*Partie 3: ARC (alliages résistants à la corrosion) et autres alliages résistants à la fissuration*

RECTIFICATIF TECHNIQUE 1

[SIST EN ISO 15156-3:2004/AC:2007](https://standards.iteh.ai/catalog/standards/sist/855565ed-d306-4d54-969e-fe1e71402f45/sist-en-iso-15156-3-2004-ac-2007)

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fe1e71402f45/sist-en-iso-15156-3-2004-ac-2007](https://standards.iteh.ai/catalog/standards/sist/855565ed-d306-4d54-969e-fe1e71402f45/sist-en-iso-15156-3-2004-ac-2007)

Technical Corrigendum 1 to ISO 15156-3:2003 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*.

*Page 59, D.2:*

Replace D.2 with the following:

These tables provide a link between the UNS numbers used in the tables of Annex A and the chemical compositions of the alloys to which they refer. Document users are encouraged to consult Reference [19] where they will find a written description of each alloy, its chemical composition, common trade names and cross references to other industry specifications.

*Pages 60 to 70, Tables D.1 to D.12:*

Delete column 2.

*Page 72:*

Amend Reference [19] to read as follows:

[19] SAE - ASTM, *Metals and Alloys in the Unified Numbering System* <sup>6)</sup>

Add footnote 6:

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6) Available from ASTM online, as searchable CD and in printed form.

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[SIST EN ISO 15156-3:2004/AC:2007](https://standards.iteh.ai/catalog/standards/sist/855565ed-d306-4d54-969e-fe1e71402f45/sist-en-iso-15156-3-2004-ac-2007)  
[https://standards.iteh.ai/catalog/standards/sist/855565ed-d306-4d54-969e-  
fe1e71402f45/sist-en-iso-15156-3-2004-ac-2007](https://standards.iteh.ai/catalog/standards/sist/855565ed-d306-4d54-969e-fe1e71402f45/sist-en-iso-15156-3-2004-ac-2007)



**INTERNATIONAL STANDARD ISO 15156-3:2003**  
**TECHNICAL CORRIGENDUM 2**

Published 2005-09-01

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

**Petroleum and natural gas industries — Materials for use in  
H<sub>2</sub>S-containing environments in oil and gas production —**

**Part 3:  
Cracking-resistant CRAs (corrosion-resistant alloys) and other  
alloys**

**TECHNICAL CORRIGENDUM 2**

*Industries du pétrole et du gaz naturel — Matériaux pour utilisation dans des environnements contenant de  
l'hydrogène sulfuré (H<sub>2</sub>S) dans la production de pétrole et de gaz —*

*Partie 3: ARC (alliages résistants à la corrosion) et autres alliages résistants à la fissuration*

RECTIFICATIF TECHNIQUE 2

[SIST EN ISO 15156-3:2004/AC:2007](https://standards.iteh.ai/catalog/standards/sist/855565ed-d306-4d54-969e-fe1e71402f45/sist-en-iso-15156-3-2004-ac-2007)

[https://standards.iteh.ai/catalog/standards/sist/855565ed-d306-4d54-969e-  
fe1e71402f45/sist-en-iso-15156-3-2004-ac-2007](https://standards.iteh.ai/catalog/standards/sist/855565ed-d306-4d54-969e-fe1e71402f45/sist-en-iso-15156-3-2004-ac-2007)

Technical Corrigendum 2 to ISO 15156-3 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*.

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*Page iii, Contents:*

Replace the title for Annex A with the following:

**Annex A (normative) Environmental cracking-resistant CRAs and other alloys (including  
Table A.1 — Guide to the use of the materials selection tables of Annex A)**

Page 2, Table 1 — List of equipment:

Replace Table 1 with the following:

**Table 1— List of equipment**

ISO 15156-3 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 <sup>a</sup> Drill bits Blowout Preventer (BOP) shear blades <sup>b</sup> Drilling riser systems Work strings Wireline and wireline equipment <sup>c</sup> Surface and intermediate casing
Wells, including subsurface equipment, gas lift equipment, wellheads and christmas trees	Sucker rod pumps and sucker rods <sup>d</sup> 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 <sup>e</sup>
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><sup>a</sup> See ISO 15156-2:2003, A.2.3.2.3 for more information.</p> <p><sup>b</sup> See ISO 15156-2:2003, A.2.3.2.1 for more information.</p> <p><sup>c</sup> Wireline lubricators and lubricator connecting devices are not permitted exclusions.</p> <p><sup>d</sup> For sucker rod pumps and sucker rods, reference can be made to NACE MR0176.</p> <p><sup>e</sup> For water injection and water disposal, reference can be made to NACE RP0475.</p>	

Page 7, 6.2.2.2.2 Hardness testing methods for welding procedure qualification:

Replace 6.2.2.2.2 with the following:

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

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 use of other methods shall require explicit user approval.



*Page 7, 6.2.2.2.3 Hardness surveys for welding procedure qualification:*

Replace 6.2.2.2.3 with the following:

Hardness surveys for butt welds, fillet welds, repair and partial penetration welds and overlay welds shall be carried out as described in 7.3.3.3 of ISO 15156-2:2003.

*Page 10, Annex A:*

Replace the title for Annex A with the following:

**Annex A (normative) Environmental cracking-resistant CRAs and other alloys (including Table A.1 — Guide to the use of the materials selection tables of Annex A)**

*Page 13, Table A.1 — Guide to the use of the materials selection tables of Annex A:*

Replace Table A.1 with the following:

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Table A.1 — Guide to the use of the materials selection tables of Annex A

Equipment or components	Material selection table numbers for various materials groups									
	Austenitic stainless steel (see A.2)	Highly-alloyed austenitic stainless steels (see A.3)	Solid-solution nickel-based alloys (see A.4)	Ferritic stainless steels (see A.5)	Martensitic stainless steels (see A.6)	Duplex stainless steels (see A.7)	Precipitation-hardened stainless steels (see A.8)	Precipitation-hardened nickel-based alloys (see A.9)	Cobalt-based alloys (see A.10)	Titanium and tantalum (see A.11)
Any equipment or component	A.2	A.8	A.13, A.14	A.17	A.18	A.24	A.26	A.31, A.32, A.33	A.38	A.41, A.42
<b>Additional materials selection tables for casing, tubing and downhole equipment</b>										
Downhole tubular components	—	A.9	—	—	A.19	A.25	—	—	—	—
Packers and other subsurface equipment	—	A.9	—	—	A.20, A.21	A.25	A.27	—	—	—
Gas lift equipment	A.7	A.10	A.16	—	—	—	—	A.37	—	—
Injection tubing and equipment	A.7	—	—	—	—	—	—	—	—	—
Downhole control line tubing and downhole screens	A.7	A.11	—	—	—	—	—	—	—	—
<b>Additional materials selection tables for wellheads, christmas trees, valves, chokes and level controllers</b>										
Wellhead and tree components (with various specified exclusions)	—	—	A.13	—	A.23	—	A.27	A.34	—	—
Valve and choke components (with various specified exclusions)	—	—	—	—	A.23	—	A.27	A.34	—	—
Shafts, stems and pins	A.3	—	—	—	—	—	—	—	—	—
Non-pressure-containing internal-valve, pressure-regulator, and level-controller components	—	—	—	—	—	—	A.28	A.35	—	—
<b>Additional materials selection tables for process plant</b>										
Compressor components	A.6	—	—	—	A.22	—	A.30	—	—	—
<b>Additional materials selection tables for other equipment</b>										
Instrumentation and control devices	A.6	—	—	—	—	—	—	—	—	—
Instrument tubing and associated compression fittings, surface control line tubing and surface screens	A.4	A.11	—	—	—	—	—	—	—	—
Springs	—	—	—	—	—	—	—	A.36	A.39	—
Diaphragms, pressure measuring devices and pressure seals	—	—	—	—	—	—	—	—	A.40	—
Seal rings and gaskets	A.5	—	—	—	—	—	—	—	—	—
Snap rings	—	—	—	—	—	—	A.29	—	—	—
Bearing pins	—	—	A.15	—	—	—	—	—	—	—
Miscellaneous equipment as named in the tables (including hardware (e.g. set screws, etc.), downhole and surface temporary-service tool applications)	A.7	—	A.16	—	—	—	A.28	A.35	—	—

Page 14, Table A.2 — Environmental and materials limits for austenitic stainless steels used for any equipment or components:

Replace Table A.2 with the following:

**Table A.2 — Environmental and materials limits for austenitic stainless steels used for any equipment or components**

Materials type/ Individual alloy UNS Number	Temperature  max. °C (°F)	Partial pressure H <sub>2</sub> S, p <sub>H<sub>2</sub>S</sub>  max. kPa (psi)	Chloride conc.  max. mg/l	pH	Sulfur- resistant?	Remarks
<b>Any equipment or components</b>						
Austenitic stainless steel from materials type described in A.2	60 (140)	100 (15)	See remarks	See remarks	No	Any combinations of chloride concentration and <i>in situ</i> pH occurring in production environments are acceptable.
	See remarks	See remarks	50	See remarks	No	These materials have been used without restrictions on temperature, p <sub>H<sub>2</sub>S</sub> , or <i>in situ</i> pH in production environments. No limits on individual parameters are set but some combinations of the values of these parameters might not be acceptable.
S20910	66 (150)	100 (15)	See remarks	See remarks	No	Any combinations of chloride concentration and <i>in situ</i> pH occurring in production environments are acceptable.
<b>Any equipment or components in oil and gas processing and injection facilities in operations after separation</b>						
Austenitic stainless steel from materials type described in A.2	See remarks	See remarks	50	See remarks	No	These materials have been used without restrictions on temperature, p <sub>H<sub>2</sub>S</sub> , or <i>in situ</i> pH in production environments. No limits on individual parameters are set but some combinations of the values of these parameters might not be acceptable.
<p>These materials shall also</p> <ul style="list-style-type: none"> <li>— be in the solution-annealed and quenched, or annealed and thermally-stabilized heat-treatment condition;</li> <li>— be free of cold work intended to enhance their mechanical properties; and</li> <li>— have a maximum hardness of 22 HRC.</li> </ul> <p>However, S20910 is acceptable in the annealed or hot-rolled (hot/cold-worked) condition at a maximum hardness of 35 HRC.</p> <p>A limit on the martensite content of these austenitic stainless steels should be considered.</p>						