

<b>STN</b>	<b>Integrita sond. Časť 2: Integrita sond počas prevádzkovej fázy (ISO/TS 16530-2: 2014).</b>	<b>STN P CEN ISO/TS 16530-2</b>  45 0954
------------	---	--

Well integrity - Part 2: Well integrity for the operational phase (ISO/TS 16530-2:2014)

Táto norma obsahuje anglickú verziu európskej normy.  
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 04/16

Táto predbežná STN je určená na overenie. Pripomienky zasielajte ÚNMS SR najneskôr do novembra 2017.

Obsahuje: CEN ISO/TS 16530-2:2015, ISO/TS 16530-2:2014

**122736**

---

ICS 75.180.10

English Version

## Well integrity - Part 2: Well integrity for the operational phase (ISO/TS 16530-2:2014)

Intégrité du puits - Partie 2: Intégrité du puits pour la phase opérationnelle (ISO/TS 16530-2:2014)

Bohrungsintegrität - Teil 2: Bohrungsintegrität für die Betriebsphase (ISO/TS 16530-2:2014)

This Technical Specification (CEN/TS) was approved by CEN on 28 March 2015 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

## Contents

	Page
European foreword.....	3

## European foreword

The text of ISO/TS 16530-2:2014 has been prepared by Technical Committee ISO/TC 67 “Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries” of the International Organization for Standardization (ISO) and has been taken over as CEN ISO/TS 16530-2:2015 by 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.

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.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Report: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### Endorsement notice

The text of ISO/TS 16530-2:2014 has been approved by CEN as CEN ISO/TS 16530-2:2015 without any modification.

---

---

**Well integrity —**

Part 2:

**Well integrity for the operational  
phase**

*Intégrité du puits —*

*Partie 2: Intégrité du puits pour la phase opérationnelle*





**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2014

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

<b>Foreword</b> .....	<b>vi</b>
<b>Introduction</b> .....	<b>vii</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>2</b>
<b>3 Terms, definitions and abbreviated terms</b> .....	<b>2</b>
<b>4 Abbreviated terms</b> .....	<b>8</b>
<b>5 Well integrity management system</b> .....	<b>10</b>
5.1 Well integrity management.....	10
5.2 Well integrity management system.....	10
<b>6 Well integrity policy and strategy</b> .....	<b>10</b>
6.1 Well integrity policy.....	10
6.2 Well integrity strategy.....	10
<b>7 Resources, roles, responsibilities and authority levels</b> .....	<b>11</b>
7.1 Organizational structure.....	11
7.2 Competency.....	11
<b>8 Risk assessment aspects of well integrity management</b> .....	<b>11</b>
8.1 General.....	11
8.2 Risk assessment considerations for well integrity.....	12
8.3 Risk assessment techniques.....	15
8.4 Application of risk assessment in establishing monitoring, surveillance and maintenance requirements.....	16
8.5 Application of risk assessment in the assessment of well integrity anomalies.....	17
8.6 Failure rate trending.....	17
<b>9 Well barriers</b> .....	<b>18</b>
9.1 General.....	18
9.2 Barrier philosophy.....	18
9.3 Well barrier envelopes.....	19
9.4 Well barrier element.....	19
9.5 Documenting of well barrier envelopes and well barrier elements.....	20
<b>10 Well component performance standard</b> .....	<b>20</b>
10.1 General.....	20
10.2 Acceptance criteria and acceptable leak rates.....	21
10.3 Measuring the leak rate.....	23
10.4 Effects of temperature.....	23
10.5 Direction of flow.....	23
10.6 Integrity of barriers to conduct well maintenance and repair.....	23
10.7 ESD/related safety systems.....	23
10.8 Well component operating procedure.....	24
<b>11 Well operating and component limits</b> .....	<b>24</b>
11.1 Well operating limits.....	24
11.2 Well load and tubular stress analysis.....	25
11.3 Further well-use review.....	26
11.4 End-of-life review.....	26
11.5 Management of change to the operating limits.....	26
<b>12 Well monitoring and surveillance</b> .....	<b>26</b>
12.1 General.....	26
12.2 Monitoring and surveillance frequency.....	27
12.3 Shut-in wells.....	27
12.4 Suspended wells.....	27

**ISO/TS 16530-2:2014(E)**

12.5	Visual inspection .....	28
12.6	Well logging .....	28
12.7	Corrosion monitoring .....	29
12.8	Cathodic protection monitoring.....	29
12.9	Erosion monitoring .....	30
12.10	Structural integrity monitoring.....	30
<b>13</b>	<b>Annular pressure management.....</b>	<b>32</b>
13.1	General.....	32
13.2	Management.....	32
13.3	Sources of annular pressure.....	32
13.4	Annulus pressure monitoring and testing .....	33
13.5	Frequency of monitoring tubing and annulus casing pressures.....	33
13.6	Identification of an annulus pressure source.....	34
13.7	Maximum allowable annular surface pressure.....	34
13.8	Maintaining annulus pressure within the thresholds.....	37
13.9	Review and change of MAASP and thresholds.....	37
<b>14</b>	<b>Well handover.....</b>	<b>38</b>
14.1	General.....	38
<b>15</b>	<b>Well maintenance .....</b>	<b>39</b>
15.1	General.....	39
15.2	Replacement parts.....	40
15.3	Frequency of maintenance.....	40
15.4	Component testing methods.....	40
15.5	Leak testing.....	42
<b>16</b>	<b>Well integrity failure management .....</b>	<b>43</b>
16.1	General.....	43
16.2	Integrity failure ranking and prioritization .....	43
16.3	Well failure model.....	43
<b>17</b>	<b>Management of change .....</b>	<b>44</b>
17.1	General.....	44
17.2	Integrity deviation process.....	45
17.3	Deviation from the well performance standard.....	45
17.4	MOC Process.....	45
<b>18</b>	<b>Well records and well integrity reporting.....</b>	<b>46</b>
18.1	General.....	46
18.2	Well records.....	47
18.3	Reports.....	47
<b>19</b>	<b>Performance monitoring of well integrity management systems.....</b>	<b>48</b>
19.1	Performance monitoring and continuous improvement.....	48
19.2	Performance review.....	48
19.3	Key performance indicator monitoring.....	50
<b>20</b>	<b>Compliance audit.....</b>	<b>51</b>
20.1	General.....	51
20.2	Audit process.....	52
	<b>Annex A (informative) Well integrity roles and responsibilities chart .....</b>	<b>53</b>
	<b>Annex B (informative) Example of competency matrix.....</b>	<b>54</b>
	<b>Annex C (informative) Barrier element acceptance table.....</b>	<b>55</b>
	<b>Annex D (informative) Well barrier schematic.....</b>	<b>56</b>
	<b>Annex E (informative) Example — Performance standard for well safety critical elements .....</b>	<b>58</b>
	<b>Annex F (informative) Well barrier elements, functions and failure modes.....</b>	<b>59</b>
	<b>Annex G (informative) Example of possible well leak paths.....</b>	<b>62</b>



<b>Annex H</b> (informative) <b>Example of leak testing gas lift valves</b> .....	<b>64</b>
<b>Annex I</b> (informative) <b>Leak rate determination calculations</b> .....	<b>66</b>
<b>Annex J</b> (informative) <b>Well operating limits</b> .....	<b>69</b>
<b>Annex K</b> (informative) <b>MAASP calculations</b> .....	<b>71</b>
<b>Annex L</b> (informative) <b>Example — A change in MAASP calculation</b> .....	<b>79</b>
<b>Annex M</b> (normative) <b>Information required of well handover</b> .....	<b>81</b>
<b>Annex N</b> (informative) <b>Function testing by analysing hydraulic signature</b> .....	<b>84</b>
<b>Bibliography</b> .....	<b>86</b>

## 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](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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*, Subcommittee SC 4, *Drilling and production equipment*.

ISO/TS 16530 consists of the following parts, under the general title *Well integrity*:

— *Part 2: Well integrity for the operational phase*

The following parts are under preparation:

— *Part 1: Life cycle governance manual*

## Introduction

This Technical Specification has been developed by producing operating companies for oil and gas, and is intended for use in the petroleum and natural gas industry worldwide. This Technical Specification is intended to give requirements and information to the Well Operator on managing well integrity for the operational phase. Furthermore, this Technical Specification addresses the minimum compliance requirements for the Well Operator, in order to claim conformity with this Technical Specification.

It is necessary that users of this Technical Specification are aware that requirements above those outlined in this Technical Specification can be needed for individual applications. This Technical Specification is not intended to inhibit or replace legal requirements; it is in addition to the legal requirements; where there is a conflict the legal requirement always takes precedence. This can be particularly applicable where there is innovative or developing technology, with changes in field or well design operating philosophy.

This Technical Specification addresses the process of managing well integrity by assuring compliance to the specified operating limits for identified well types, that are defined based on exposure of risk to people, environment, assets and reputation, supported by associated well maintenance/monitoring plans, technical reviews and management of change.

The following terminology is used in this Technical Specification.

- a) The term “shall” or “must” denotes a minimum requirement in order to conform to this Technical Specification.
- b) The term “should” denotes a recommendation or that which is advised but not required in order to conform to this Technical Specification.
- c) The term “may” is used to indicate a course of action permissible within the limits of the document.
- d) The term “consider” is used to indicate a suggestion or to advise.
- e) The term “can” is used to express possibility or capability.

## Well integrity —

### Part 2:

## Well integrity for the operational phase

**IMPORTANT** — The electronic file of this document contains colours which are considered to be useful for the correct understanding of the document. Users should therefore consider printing this document using a colour printer.

### 1 Scope

This Technical Specification provides requirements and methods to the oil and gas industry to manage well integrity during the well operational phase.

The operational phase is considered to extend from handover of the well after construction, to handover prior to abandonment. This represents only the period during the life cycle of the well when it is being operated and is illustrated in [Figure 1](#).

The scope of the Technical Specification includes:

- A description of the processes required to assess and manage risk within a defined framework. The risk assessment process also applies when deviating from this Technical Specification.
- The process of managing well integrity by operating wells in compliance with operating limits for all well types that are defined based on exposure of risk to people, environment, assets and reputation. The management of well integrity is supported by associated maintenance/monitoring plans, technical reviews and the management of change.
- The assessment of existing assets (wells / fields) in order to start the process of Well Integrity Management in accordance with this technical specification.
- The handover process required when changing from one activity to another during the operational phase.

The scope of the Technical Specification applies to all wells that are utilized by the oil and gas industry, regardless of their age, type or location.

The scope of the Technical Specification does NOT apply to:

- The periods during well intervention or work-over activities but it DOES include the result of the intervention and any impact that this can have to the well envelope and the associated well barriers.
- The equipment that is required or used outside the well envelope for a well intervention such as wire-line or coiled tubing or a pumping package.

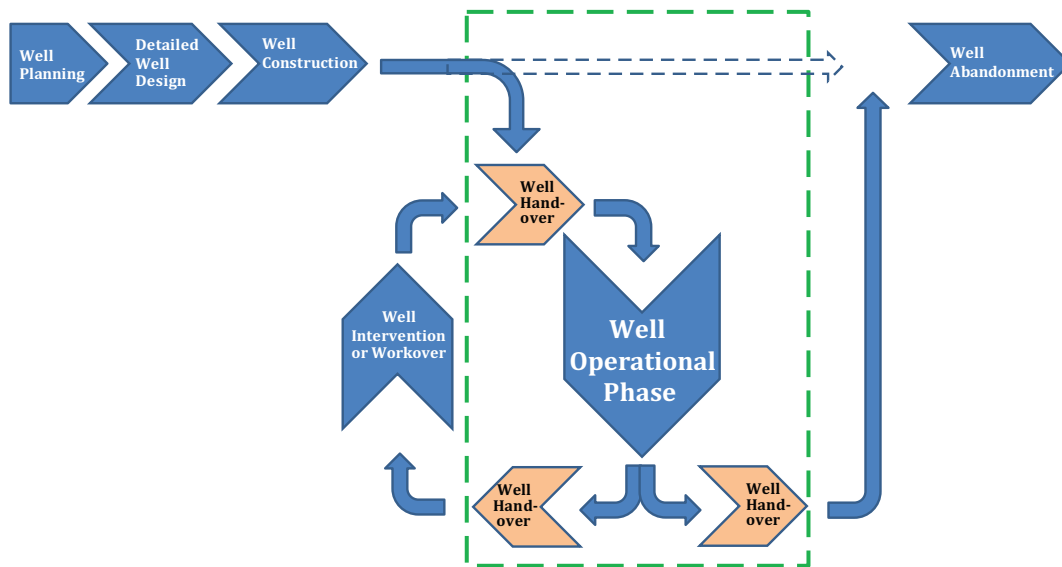


Figure 1 — Illustration of the scope of this Technical Specification

## 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.

ISO 10417:2004, *Petroleum and natural gas industries — Subsurface safety valve systems — Design, installation, operation and redress*

API RP 14H, *Recommended Practice for Installation, Maintenance and Repair of Surface Safety Valves and Underwater Safety Valves Offshore, Fifth*

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**