

SLOVENSKI STANDARD
oSIST prEN ISO 16530:2025

01-februar-2025

**Naftna in plinska industrija, vključno z nizkoogljično energijo - Celovitost vrtine -
Upravljanje življenjskega cikla (ISO/DIS 16530:2024)**

Oil and gas industries including lower carbon energy - Well integrity - Life cycle
governance (ISO/DIS 16530:2024)

Öl- und Gasindustrie einschließlich kohlenstoffarmer Energieträger - Bohrungsintegrität -
Lebenszykluslenkung (ISO/DIS 16530:2024)

Industries du pétrole et du gaz, y compris les énergies à faible teneur en carbone -
Intégrité du puits - Gouvernance du cycle de vie (ISO/DIS 16530:2024)

Ta slovenski standard je istoveten z: prEN ISO 16530

oSIST prEN ISO 16530:2025

ICS:

13.020.60	Življenjski ciklusi izdelkov	Product life-cycles
75.180.10	Oprema za raziskovanje, vrtanje in odkopavanje	Exploratory, drilling and extraction equipment

oSIST prEN ISO 16530:2025

en,fr,de



DRAFT International Standard

ISO/DIS 16530

Oil and gas industries including lower carbon energy — Well integrity — Life cycle governance

ICS: ISO ics

ISO/TC 67/SC 4

Secretariat: ANSI

Voting begins on:
2024-12-02

Voting terminates on:
2025-02-24

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[oSIST prEN ISO 16530:2025](https://standards.iteh.ai/catalog/standards/sist/789eccb1-be6c-4161-a14f-b00fc93cdd6f/osist-pren-iso-16530-2025)

<https://standards.iteh.ai/catalog/standards/sist/789eccb1-be6c-4161-a14f-b00fc93cdd6f/osist-pren-iso-16530-2025>

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENTS AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

ISO/DIS 16530:2024(en)

iTeh Standards (<https://standards.iteh.ai>) Document Preview

[oSIST prEN ISO 16530:2025](https://standards.iteh.ai/catalog/standards/sist/789eccb1-be6c-4161-ad4f-b00fc93cdd6f/osist-pren-iso-16530-2025)

<https://standards.iteh.ai/catalog/standards/sist/789eccb1-be6c-4161-ad4f-b00fc93cdd6f/osist-pren-iso-16530-2025>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, 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
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

ISO/DIS 16530:2024(en)

Contents

	Page
Foreword	vii
Introduction	viii
1 Scope	1
2 Normative references	2
3 Terms and definitions	2
4 Abbreviated terms	10
5 Non-Petroleum Wells	11
5.1 Abandoned Wells.....	11
5.2 Storage Wells - Flammable fluids (Gas, Oil, Hydrogen, etc).....	11
5.3 Storage Wells - Non-flammable fluids (Carbon Capture (predominantly carbon dioxide), Brines, Chemicals etc.).....	11
5.4 Disposal Wells.....	11
5.5 Geothermal Wells.....	11
5.6 Solution Mining.....	12
5.7 Aquifers.....	12
6 Common elements of the well integrity life cycle	12
6.1 General.....	12
6.2 Well integrity.....	12
6.3 Well integrity policy.....	12
6.4 Well integrity management system.....	12
6.5 Risk assessment.....	13
6.5.1 General.....	13
6.5.2 Risk register.....	14
6.5.3 Well type risk profile.....	15
6.6 Organizational structure and tasks.....	15
6.7 Barriers.....	15
6.7.1 General.....	15
6.7.2 Barrier philosophy.....	16
6.7.3 Well barriers.....	16
6.7.4 Operational barriers.....	18
6.7.5 Human barriers.....	18
6.7.6 Administrative controls.....	18
6.7.7 Impact barriers.....	19
6.8 Performance standards for equipment.....	19
6.8.1 General.....	19
6.8.2 Well operating limits.....	19
6.9 Well barrier verification.....	20
6.9.1 General.....	20
6.9.2 Function testing.....	20
6.9.3 Barrier verification testing.....	20
6.9.4 Direction of flow.....	21
6.9.5 Effects of temperature.....	21
6.9.6 Modelling verification.....	22
6.10 Reporting and documentation.....	22
6.10.1 General.....	22
6.10.2 Well integrity status reporting.....	22
6.10.3 Well life cycle phase deliverables.....	23
6.10.4 Well handover process.....	23
6.11 Management of change.....	24
6.11.1 General.....	24
6.11.2 Dispensation from the WIMS.....	25
6.12 Continuous improvement.....	25
6.12.1 General.....	25

ISO/DIS 16530:2024(en)

6.12.2	Key performance indicator monitoring.....	25
6.12.3	Lessons learned.....	26
6.13	Auditing.....	26
6.13.1	General.....	26
6.13.2	Audit process.....	26
7	Basis of design phase.....	26
7.1	Basis of design phase objectives.....	26
7.2	Organizational structure and tasks.....	26
7.3	Well barriers.....	27
7.4	Hazard identification and assessment.....	28
7.5	Well integrity considerations for the basis of design.....	28
7.5.1	General information to be provided.....	28
7.5.2	Well objectives and life cycle.....	29
7.5.3	Inflow requirements.....	29
7.5.4	Outflow requirements.....	29
7.5.5	Well location and targets.....	29
7.5.6	Prognoses regarding geological formations, pore pressure, formation strength and temperature.....	29
7.5.7	Data acquisition requirements.....	30
7.5.8	Other considerations for well integrity.....	30
7.5.9	Production and injection characteristics affecting well integrity through the life cycle.....	30
7.6	Quality assurance and approval process.....	31
7.7	Deliverables.....	31
8	Well design phase.....	31
8.1	Well design phase objectives.....	31
8.2	Organizational structure and tasks.....	31
8.3	Risk controls in well design.....	32
8.3.1	Risk register.....	32
8.3.2	Lessons learned.....	32
8.3.3	Well life cycle risk considerations.....	32
8.3.4	Additional considerations during well design.....	33
8.4	Well barriers.....	35
8.4.1	General.....	35
8.4.2	Well barrier plan.....	36
8.4.3	WBE design performance standards.....	36
8.4.4	Verification of the final well barrier.....	37
8.4.5	Emergency shutdown related safety systems.....	37
8.5	Well operating limits.....	39
8.6	Contingency planning for well construction.....	39
8.7	Surveillance and monitoring requirements.....	39
8.8	Well design deliverables, reporting and documentation.....	39
9	Well construction phase.....	40
9.1	Well construction phase objectives.....	40
9.2	Organizational structure and tasks.....	40
9.3	Well programme.....	41
9.4	Well barrier schematic.....	41
9.5	Barrier verification.....	41
9.5.1	General.....	41
9.5.2	Wellhead movement and fatigue.....	41
9.5.3	Cement.....	42
9.5.4	Casing shoe testing.....	42
9.5.5	Wellhead seal profile.....	43
9.5.6	Tubular connections.....	43
9.5.7	Casing wear.....	43
9.6	Risk identification and assessment.....	43
9.7	Management of change.....	44

ISO/DIS 16530:2024(en)

9.7.1	Potential changes to the well plan	44
9.7.2	Suspended well considerations	44
9.8	Deliverables (reporting and documentation)	44
9.8.1	Well handover information	44
9.8.2	Risk register	45
9.9	Continuous improvement	45
10	Well operational phase	45
10.1	Well operational phase objectives	45
10.2	Well barriers	46
10.2.1	General	46
10.2.2	Performance standards	46
10.2.3	Leak rates	47
10.3	Well monitoring and surveillance	49
10.3.1	General	49
10.3.2	Monitoring and surveillance frequency	49
10.3.3	Well operating limits	50
10.3.4	Suspended and shut-in wells	51
10.3.5	Visual inspection	51
10.3.6	Well logging	52
10.3.7	Corrosion, Erosion and structural integrity	52
10.3.8	Well head elevation monitoring	54
10.3.9	Reservoir subsidence	54
10.4	Annulus pressure management	55
10.4.1	Management considerations	55
10.4.2	Sources of annulus pressure	55
10.4.3	Annulus pressure monitoring and testing	56
10.4.4	Frequency of monitoring tubing and annulus casing pressures	57
10.4.5	Investigation of annulus pressure	57
10.4.6	Maximum allowable annulus surface pressure	58
10.4.7	Maintaining annulus pressure within the thresholds	61
10.4.8	Review and change of MAASP and thresholds	61
10.5	Well maintenance	62
10.5.1	General	62
10.5.2	Replacement parts	63
10.5.3	Frequency of maintenance	63
10.5.4	Component testing methods	64
10.6	Risk assessment of well integrity failure and its management	64
10.6.1	General	64
10.6.2	Integrity failure ranking and prioritization	64
10.6.3	Well failure model	64
10.7	Reporting and documentation	66
10.8	Periodic well review	67
10.8.1	Well use review	67
10.8.2	End of well life review	67
10.9	Change of well use / repurposing of wells	67
10.10	Well stock performance review	67
10.11	Continuous improvement	69
11	Well intervention / workover phase	70
11.1	Well intervention phase objectives	70
11.2	Organizational structure and tasks	70
11.3	Well handover	71
11.4	Well intervention programme	71
11.5	Well barriers	71
11.5.1	General	71
11.5.2	Well barrier plans	71
11.5.3	Well barrier qualification	71
11.5.4	Well barrier verification	72
11.5.5	Well operating limits	72

ISO/DIS 16530:2024(en)

11.6	Risk management.....	72
11.7	Management of change.....	72
11.8	Deliverables (documentation and reports).....	73
12	Well abandonment phase.....	73
12.1	Well abandonment phase objectives.....	73
12.2	Organizational structure and tasks.....	73
12.3	Well abandonment programme.....	74
12.4	Well barriers for abandonment.....	74
	12.4.1 General.....	74
	12.4.2 Well barrier material selection and qualification.....	75
	12.4.3 Well barrier placement, configuration and redundancy.....	75
	12.4.4 Well barrier verification.....	75
	12.4.5 Reference documents for well abandonment barriers.....	75
12.5	Risk management.....	76
12.6	Management of change.....	76
12.7	Deliverables (documentation and reports).....	76
Annex A	(informative) Risk assessment techniques.....	78
Annex B	(informative) Examples of risk register.....	81
Annex C	(informative) Example of well integrity roles and responsibilities chart.....	83
Annex D	(informative) Example of a well integrity competence matrix.....	84
Annex E	(informative) Examples of well barrier elements, functions and failure characteristics.....	86
Annex F	(informative) Examples of well barriers during the well life cycle and a well barrier schematic.....	89
Annex G	(informative) Example of performance standard for well barrier elements.....	96
Annex H	(informative) Function testing by analysing hydraulic signature.....	98
Annex I	(informative) Determination of leak rate.....	100
Annex J	(informative) Well handover.....	104
Annex K	(informative) Examples of key performance indicators.....	106
Annex L	(informative) Example of hazard identification checklist.....	107
Annex M	(informative) Example plot of pore pressure versus formation strength.....	108
Annex N	(informative) Well barrier element performance requirements.....	109
Annex O	(informative) Example of leak testing of gas-lift valves.....	110
Annex P	(informative) Example of well operating limits.....	112
Annex Q	(informative) Example of possible well leak paths.....	113
Annex R	(informative) MAASP calculations.....	115
Annex S	(informative) Example of a change in MAASP calculations.....	122
Bibliography	125

ISO/DIS 16530:2024(en)

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).

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).

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 voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 67, Oil and gas industries including lower carbon energy, Subcommittee SC 4, *Drilling, production and injection equipment*.

iteh Standards
(<https://standards.iteh.ai>)
Document Preview

[oSIST prEN ISO 16530:2025](https://standards.iteh.ai/catalog/standards/sist/789eccb1-be6c-4161-ad4f-b00fc93cdd6f/osist-pren-iso-16530-2025)

<https://standards.iteh.ai/catalog/standards/sist/789eccb1-be6c-4161-ad4f-b00fc93cdd6f/osist-pren-iso-16530-2025>

ISO/DIS 16530:2024(en)

Introduction

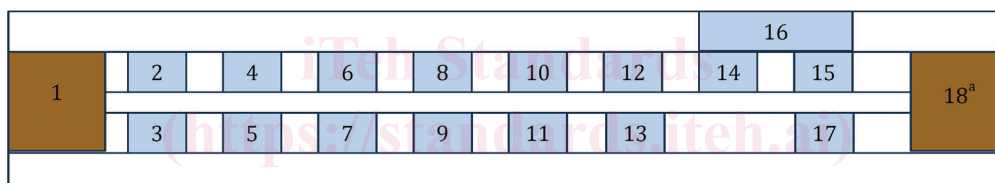
This document has been developed by oil and gas producing operating companies and is intended for use in the petroleum and natural gas industries worldwide. This document is intended to provide guidance to the well operator on managing well integrity throughout the well life cycle. Furthermore, this document addresses the minimum compliance requirements for the well operator in order to claim conformity with this document.

The principles for well integrity defined in this document can be applied for wells that are not classed as petroleum related, but the level of risk presented by the particular well type should be understood in order to make an informed decision on the applicability of the standard.

It is necessary that users of this document are aware that requirements over and above those outlined herein may be needed for individual applications.

This document addresses the process of managing well integrity during each of the well life cycle phases, namely: basis of design; design; construction; operation; intervention (including work-over) and abandonment.

The phases of a well life cycle have separate and distinct requirements for achieving well integrity management objectives, but all phases have common elements and techniques. [Clause 6](#) discusses these common elements and techniques. [Clauses 7 to 12](#) discuss each individual phase and its requirements. Additionally, each clause highlights the aspects to be considered within the common elements and techniques as applicable to that phase.



Key

1	Reservoir	7	Production casing	13	Wellhead Penetrations
2	Production Liner / casing	8	Downhole Safety Valve	14	Master Valve(s)
3	Wellbore	9	Intermediate Casing	15	Wing Valve
4	Production Packer	10	Wellhead	16	Swab Valve / Tree Cap
5	Cement Shoe	11	Wellhead Seals	17	Annulus Valves
6	Tubing	12	Tree Flange	18	Production System

^a The choke valve is typically part of the production system.

Figure 1 — Well pressure system and boundaries

ISO/DIS 16530:2024(en)

The figure gives an example of how the well system can be represented, from the reservoir to the wing valves, in this case assuming the production choke is part of the production system.

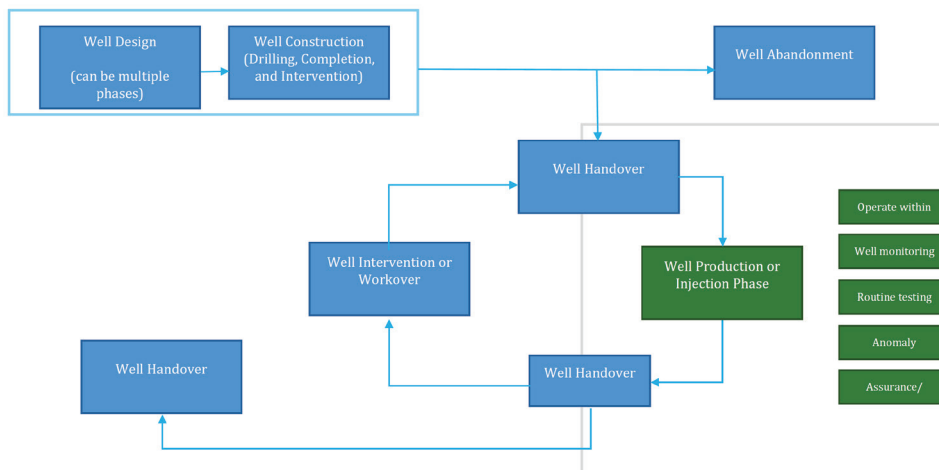


Figure 2 — The well integrity lifecycle

iTeh Standards (<https://standards.iteh.ai>) Document Preview

[oSIST prEN ISO 16530:2025](https://standards.iteh.ai/catalog/standards/sist/789eccb1-be6c-4161-ad4f-b00fc93cdd6f/osist-pren-iso-16530-2025)

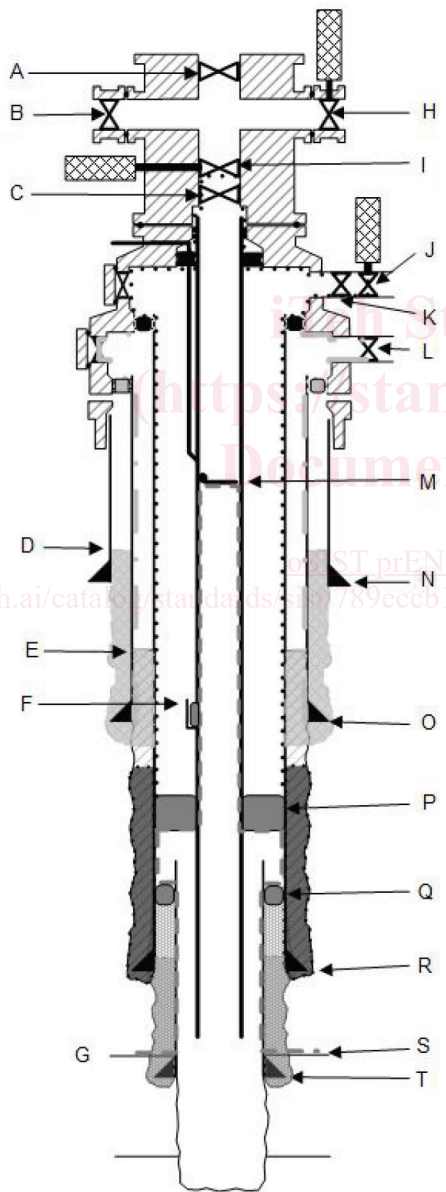
<https://standards.iteh.ai/catalog/standards/sist/789eccb1-be6c-4161-ad4f-b00fc93cdd6f/osist-pren-iso-16530-2025>

ISO/DIS 16530:2024(en)

A well lifecycle diagram can be used to explain how the responsibility for the well is transferred at different stages in the well life

Example Well Barrier Schematic – Gas Lifted Producer Well

ABC Oil and Gas Operator				
XYZ Field	Well: AA-01	Prepared by:	Date:	█ Primary Well Barrier to the Reservoir
Welltype: Gas Lifted Oil Producer	Approved by:	Date:	●●● Secondary Well Barrier to the Reservoir, also Primary Barrier to the Lift Gas	█ Secondary Well Barrier to the Lift Gas
Date Original Well Completed	X-mas Tree is rated to:	psi	A-annulus MAASP:	
Date Workover 1 Completed	Wellhead is rated to:	psi	B-annulus MAASP:	
Date Workover 2 Completed	Tubing is rated to:	psi	C-annulus MAASP:	
Drawing Ref. Rev.	N.O. = Normally Open N.C. = Normally Closed			
Current Well Status: Producing with Lift Gas			Date:	



Barrier Element Table	
Barrier Element	Element Verification
Primary Well Barrier to the Reservoir	
Cap Rock	Xxx Equivalent Mud Wt s.g.
7" Liner Cement	TOC xxx ft. Total Cmt length xxx ft.
7" Liner Hanger/Packer	PT to xxx psi w/ MW yy s.g.
7" Liner	PT to xxx psi w/ MW yy s.g.
9-5/8" Casing (below Packer)	PT to xxx psi w/ MW yy s.g.
9-5/8" Production Packer	PT to xxx psi w/ MW yy s.g.
Gas Lift Valve	PT to xxx psi w/ MW yy s.g.
4-1/2" Tubing	PT to xxx psi w/ MW yy s.g.
TR SSSV Flapper	PT to xxx psi w/ MW yy s.g.
Secondary Well Barrier to the Reservoir	
9-5/8" Casing Shoe Strength	Xxx Equivalent Mud Wt s.g.
9-5/8" Cement inside 13-3/8"	TOC xxx ft. Total Cmt length xxx ft.
9-5/8" Casing	PT to xxx psi w/ MW yy s.g.
9-5/8" Casing Hanger seals	PT to xxx psi w/ MW yy s.g.
9-5/8" Wellhead section	PT to xxx psi w/ MW yy s.g.
9-5/8" Wellhead Annulus Valves	PT to xxx psi w/ MW yy s.g.
Tubing Hanger Seals	PT to xxx psi w/ MW yy s.g.
X-mas Tree Connector	PT to xxx psi w/ MW yy s.g.
Hydraulic Master Valve	PT to xxx psi w/ MW yy s.g.
Secondary Well Barrier to the Lift Gas	
13-3/8" Casing Shoe Strength	Xxx Equivalent Mud Wt s.g.
13-3/8" Cement	TOC xxx ft. Total Cmt length xxx ft.
13-3/8" Casing	PT to xxx psi w/ MW yy s.g.
13-3/8" Casing Hanger seals	PT to xxx psi w/ MW yy s.g.
13-3/8" Wellhead section	PT to xxx psi w/ MW yy s.g.
13-3/8" Wellhead Annulus Valves	PT to xxx psi w/ MW yy s.g.
Well Integrity Notes:	
1. the 410 ft of cement overlap inside the 13-3/8" is considered good cement	

ISO/DIS 16530:2024(en)**Key**

A	Swab Valve N.C.	H	Actuated Wing Valve	O	13-3/8 Intermediate Casing Shoe 4 910 ft.
B	Kill Wing Valve N.C.	I	Actuated Master Valve	P	Production Packer 5 100 ft.
C	Lower Master Valve N.O.	J	Actuated lift gas wing valve	Q	Liner Hanger 5 430 ft.
D	Top of 13-3/8 Cement 3 090 ft.	K	Manual lift gas wing valve N.O.	R	9-5/8 Production Casing Shoe 5 950 ft.
E	Top of 9-5/8 Cement 4 500 ft.	L	Intermediate Annulus Valve N.C.	S	Reservoir 8 250 ft.
F	Gas Lift Valve 4 905 ft.	M	Sub Surface Safety Valve 1 950 ft.	T	7" liner shoe 8 270 ft.
G	Cap Rock	N	20 in. Surface Casing Shoe 3 250 ft.		

Figure 3 — An example of a well barrier diagram, highlighting the physical well barriers.

iTech Standards
(<https://standards.iteh.ai>)
Document Preview

[oSIST prEN ISO 16530:2025](https://standards.iteh.ai/catalog/standards/sist/789eccb1-be6c-4161-ad4f-b00fc93cdd6f/osist-pren-iso-16530-2025)

<https://standards.iteh.ai/catalog/standards/sist/789eccb1-be6c-4161-ad4f-b00fc93cdd6f/osist-pren-iso-16530-2025>

