



SLOVENSKI STANDARD
oSIST prEN ISO 3421:2021
01-julij-2021

Industrija za predelavo nafte in zemeljskega plina - Vrtalna in proizvodna oprema - Načrtovanje plavajočih vodnikov, nastavitev globine in vgradnja (ISO/DIS 3421:2021)

Petroleum and natural gas industries - Drilling and production equipment - Offshore conductor design, setting depth, and installation (ISO/DIS 3421:2021)

Erdöl- und Erdgasindustrie - Bohr- und Förderausrüstung - Offshore-Leiterauslegung, Setztiefe und Einbau (ISO/DIS 3421:2021)

(standards.iteh.ai)

[oSIST prEN ISO 3421:2021](https://standards.iteh.ai/catalog/standards/sist/6cdc7a12-b670-4c69-a781-a0a9cb3d39b/osist-pr-en-iso-3421-2021)

[https://standards.iteh.ai/catalog/standards/sist/6cdc7a12-b670-4c69-a781-](https://standards.iteh.ai/catalog/standards/sist/6cdc7a12-b670-4c69-a781-a0a9cb3d39b/osist-pr-en-iso-3421-2021)

[a0a9cb3d39b/osist-pr-en-iso-3421-2021](https://standards.iteh.ai/catalog/standards/sist/6cdc7a12-b670-4c69-a781-a0a9cb3d39b/osist-pr-en-iso-3421-2021)

Ta slovenski standard je istoveten z: prEN ISO 3421

ICS:

75.180.10	Oprema za raziskovanje, vrtanje in odkopavanje	Exploratory, drilling and extraction equipment
-----------	--	--

oSIST prEN ISO 3421:2021

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN ISO 3421:2021](https://standards.iteh.ai/catalog/standards/sist/6cdc7a12-b670-4c69-a781-a0a9cbb3d39b/osist-pren-iso-3421-2021)

<https://standards.iteh.ai/catalog/standards/sist/6cdc7a12-b670-4c69-a781-a0a9cbb3d39b/osist-pren-iso-3421-2021>

DRAFT INTERNATIONAL STANDARD

ISO/DIS 3421

ISO/TC 67/SC 4

Secretariat: ANSI

Voting begins on:
2021-04-26Voting terminates on:
2021-07-19

Petroleum and natural gas industries – Drilling and production equipment – Offshore conductor design, setting depth, and installation

ICS: 75.180.10

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN ISO 3421:2021](https://standards.iteh.ai/catalog/standards/sist/6cdc7a12-b670-4c69-a781-a0a9cbb3d39b/osist-pren-iso-3421-2021)<https://standards.iteh.ai/catalog/standards/sist/6cdc7a12-b670-4c69-a781-a0a9cbb3d39b/osist-pren-iso-3421-2021>

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT 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.

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING



Reference number
ISO/DIS 3421:2021(E)

© ISO 2021

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN ISO 3421:2021
https://standards.iteh.ai/catalog/standards/sist/6cdc7a12-b670-4c69-a781-
a0a9cbb3d39b/osist-pren-iso-3421-2021](https://standards.iteh.ai/catalog/standards/sist/6cdc7a12-b670-4c69-a781-a0a9cbb3d39b/osist-pren-iso-3421-2021)



COPYRIGHT PROTECTED DOCUMENT

© ISO 2021

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

Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Abbreviated terms and symbols	3
4.1 Abbreviated terms.....	3
4.2 Symbols for conductor design.....	3
4.3 Symbols for setting depth.....	4
5 General requirements	6
5.1 General.....	6
5.2 Contents.....	6
5.2.1 Basic data.....	6
5.2.2 Conductor design.....	6
5.2.3 Setting depth.....	7
5.2.4 Installation requirements.....	7
5.3 Design situations.....	7
5.3.1 General.....	7
5.3.2 Operational design situations.....	7
5.3.3 Extreme design situations.....	8
5.4 Use of this document.....	8
6 Basic data	8
6.1 General.....	8
6.2 Metocean and ice parameters.....	8
6.3 Soil parameters.....	8
6.4 Engineering design parameters.....	9
6.4.1 Platform parameters.....	9
6.4.2 Drilling, completion and production design parameters.....	9
7 Conductor design	10
7.1 General.....	10
7.2 Actions.....	10
7.2.1 General.....	10
7.2.2 Permanent actions (G).....	10
7.2.3 Metocean and ice actions.....	11
7.2.4 Thermal annulus pressure build-up action.....	11
7.3 Factored actions.....	11
7.4 Boundary restraints.....	12
7.4.1 General.....	12
7.4.2 Platform conductors.....	12
7.4.3 Jack-up supported conductors.....	12
7.4.4 Free-standing conductors.....	12
7.4.5 Subsea wellhead conductors.....	13
7.5 Strength and stability checks.....	13
7.5.1 Design method.....	13
7.5.2 Axial compression.....	13
7.5.3 Bending.....	14
7.5.4 Shear.....	15
7.5.5 Combined stress.....	16
7.6 Fatigue.....	16
8 Setting depth	17
8.1 General.....	17

ISO/DIS 3421:2021(E)

8.2	Setting depth for drilling fluid circulation channel.....	17
8.3	Setting depth for wellbore foundation bearing structure.....	18
8.3.1	General.....	18
8.3.2	Installation by driving or drilling/cementing.....	18
8.3.3	Installation by jetting.....	22
9	Installation.....	24
9.1	General.....	24
9.2	Driving.....	24
9.2.1	Applicability.....	24
9.2.2	Driveability analysis.....	24
9.2.3	Installation procedures.....	24
9.2.4	Data documentation.....	25
9.3	Drilling/cementing.....	25
9.3.1	Applicability.....	25
9.3.2	Size match of bit and conductor.....	25
9.3.3	Wait on cement.....	26
9.4	Jetting.....	26
9.4.1	Applicability.....	26
9.4.2	Size match of bit and conductor.....	26
9.4.3	Jetting bottom hole assembly.....	26
9.4.4	Jetting operating parameters.....	27
9.4.5	Installation quality requirements.....	27
Annex A	(informative) Calculation methods for fracture pressure of seabed soil.....	28
Annex B	(informative) Calculation methods for ultimate bearing capacity of seabed soil.....	30
Annex C	(informative) Installation sequence for platform conductors when driving.....	33
Annex D	(informative) Calculation of bit stick out when jetting.....	35
Bibliography	37

oSIST prEN ISO 3421:2021
<https://standards.iteh.ai/catalog/standards/sist/6cdc7a12-b670-4c69-a781-a0a9cbb3d39b/osist-pren-iso-3421-2021>

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 of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 4, *Drilling and production equipment*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

ISO/DIS 3421:2021(E)

Introduction

This document is applicable to conductors utilized by the offshore petroleum and natural gas industries. It provides requirements and guidance on the design, setting depth, and installation of offshore conductors, without hindering innovation. Sound engineering judgment is necessary in the use of this document.

Conductor design addresses actions and action combinations, strength and stability checks, and fatigue analysis. Setting depth provides calculation methodologies for different installation methods. Installation addresses selection of the installation method, and of procedures and operation parameters.

[Annex A](#) provides calculation methods for fracture pressure of seabed soil.

[Annex B](#) provides calculation methods for ultimate bearing capacity of seabed soil.

[Annex C](#) provides a means to optimize platform conductor installation sequence when driving considering pile group effect.

[Annex D](#) provides a method for determining the bit stick-out when jetting.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN ISO 3421:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/6cdc7a12-b670-4c69-a781-a0a9cbb3d39b/osist-pren-iso-3421-2021>

Petroleum and natural gas industries – Drilling and production equipment – Offshore conductor design, setting depth, and installation

1 Scope

This document gives requirements for the design, setting depth and installation of conductors used by the offshore petroleum and natural gas industries. This document covers:

- design of the conductor, i.e. determination of the diameter, wall thickness, and steel grade;
- determination of the setting depth for three installation methods, namely, driving, drilling/cementing, and jetting;
- installation requirements for the installation methods, i.e. selection principles, operating procedures and parameters.

This document is applicable to:

- Platform conductors: installed through a guide hole in the platform drill floor and then through guides attached to the jacket at appropriate intervals through the water column to support the conductor withstand metocean actions and prevent excessive displacements.
- Jack-up supported conductors: a temporary conductor used only during drilling operations, which is installed by a jack-up drilling rig. In some cases, the conductor is tensioned by tensioners attached to the drilling rig.
- Free-standing conductors: a self-supporting caisson in cantilever mode installed in shallow water, typically depths of about 10 m to 20 m. It provides sole support for the well and sometimes supports a small access deck and boat landing.
- Subsea wellhead conductors: a fully submerged conductor extending only a few metres above the seafloor.

This document does not apply to drilling risers.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 19900, *Petroleum and natural gas industries — General requirements for offshore structures*

ISO 19901-1, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 1: Metocean design and operating considerations*

ISO 19901-4, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 4: Geotechnical and foundation design considerations*

ISO 19901-8, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 8: Marine soil investigations*

ISO 19902, *Petroleum and natural gas industries — Fixed steel offshore structures*

API RP 16Q, *Design, Selection, Operation, and Maintenance of Marine Drilling Riser Systems*

ISO/DIS 3421:2021(E)

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1 bearing capacity

capacity of conductor to resist vertical action effects without soil failure

Note 1 to entry: Bearing capacity can be divided into initial bearing capacity, real-time bearing capacity and ultimate bearing capacity, based on the interaction time between the conductor and the soil. Initial bearing capacity refers to the capacity immediately after installation; real-time bearing capacity refers to the capacity after a period of time; and ultimate bearing capacity refers to the capacity when the soil recovers its strength before disturbance.

3.2 conductor

outermost casing and foundation of offshore oil and gas well

3.3 design situation

set of physical conditions for which the conductor (3.2) is verified

Note 1 to entry: The design situations typically addressed are operational design situations that occur during installation and normal use of the conductor, and extreme design situations that occur rarely during the use of the conductor. Extreme design situations include survival conditions, e.g. the emergency capping condition for a subsea wellhead conductor.

<https://standards.iteh.ai/catalog/standards/sist/6cdc7a12-b670-4c69-a781-a0a9cbb3d39b/osist-pren-iso-3421-2021>

3.4 effective weight

weight in sea water or drilling fluid

3.5 metocean action

effect of wind, wave and current on a conductor

Note 1 to entry: The determination of these effects includes the influence of marine growth, tide, surge, and related processes, as appropriate.

3.6 seabed

materials below the seafloor, whether of soil such as sand, silt or clay, cemented materials or of rock

[SOURCE: ISO 19901-4:2016, 3.15]

3.7 seafloor

interface between the sea and the seabed

[SOURCE: ISO 19901-4:2016, 3.16]

3.8 setting depth

depth-into-seabed vertical depth from the seafloor to the conductor shoe

Note 1 to entry: A minimum setting depth is set to provide sufficient bearing capacity to ensure formation integrity at the conductor shoe during the surface drilling phase.

3.9**undrained shear strength**

maximum shear strength in the undrained condition

4 Abbreviated terms and symbols**4.1 Abbreviated terms**

APB annulus pressure build-up

BHA bottom hole assembly

BOP blowout preventer

WOB weight on bit

WOC wait on cement

4.2 Symbols for conductor design

A	cross-sectional area of the conductor
C_m	moment reduction factor
D	outer diameter of the conductor
D_R	a non-dimensional number
E	Young's modulus of elasticity
E_e	extreme quasi-static metocean action due to wind, waves and current
E_o	metocean action due to owner defined operating wind, wave and current parameters
F_d	factored design actions
f_b	representative bending strength
f_c	representative axial compressive strength
f_e	Euler buckling strength
f_v	representative shear strength
f_y	representative yield strength
G	permanent action
I	moment of inertia of the conductor's cross-section
K	effective length factor
K_{LE}	local experience factor
L	unbraced length of the conductor
L_f	calculated fatigue life
M	maximum bending moment on the cross-section due to factored actions

ISO/DIS 3421:2021(E)

N_i	number of cycles to failure under constant amplitude stress range
n_i	number of cycles of stress range
Q_{th}	thermal annulus pressure build-up (APB) action
r	conductor's radius of gyration
T	time period over which Palmgren-Miner's sum was determined
t	wall thickness of the conductor
U_m	utilization of the conductor
V	shear due to factored actions
Z_e	elastic section modulus
Z_p	plastic section modulus
σ_b	bending stress due to forces from factored actions
σ_c	axial compressive stress due to forces from factored actions
τ_b	shear stress due to forces from factored actions
γ_G	partial action factor for permanent actions
γ_f	partial action factor of which the value reflects the uncertainty or randomness of the action (in accordance with ISO 19900)
γ_{FD}	a fatigue damage design factor
$\gamma_{R,b}$	partial resistance factor for bending strength
$\gamma_{R,c}$	partial resistance factor for axial compressive strength
$\gamma_{R,v}$	partial resistance factor for shear strength

4.3 Symbols for setting depth

A_s	the side surface area of the conductor in soil
D	outer diameter of the conductor
d_{mud}	surface section drilling fluid (mud) density
F_{s1}, F_{s2}	partial safety factors
F_{xial}	axial force in the conductor
F_{xsur}	axial force applied to the conductor during the surface casing installation stage
F'_{xsur}	axial force applied to the conductor after the surface casing cementing
F_{xBOP}	axial force applied to the conductor during the BOP installation stage
F_{xst}	axial force applied to the conductor during the subsequent casings and tubing installation stage
F_{xwt}	axial force applied to the conductor in the wellhead and christmas tree installation stage

F_{xcap}	axial force applied to the conductor in the extreme design situation
$f(z)$	unit skin friction
G_{con}	conductor effective self-weight
g	acceleration of gravity
H	setting depth for a jetted conductor
h_{min}	minimum setting depth of the conductor meeting the circulation channel function
K_{con}	axial stiffness of the conductor
K_{cs}	axial stiffness of the coupled foundation composed of the surface casing and the conductor
K_{sys}	stiffness of the wellbore coupled system composed of all casings and conductor
L_{a}	length of conductor above the seafloor
N_{load}	axial force applied to a jetted conductor
P_{f}	soil fracture pressure at the conductor shoe
P_{l}	annular pressure loss of drilling fluid
P_{mud}	drilling fluid circulation pressure at the conductor shoe during surface section drilling
Q	axial bearing capacity for a driven or drilled conductor
Q_{f}	skin friction resistance for a driven or drilled conductor
Q_{t}	real-time bearing capacity for the conductor after jetting
Q_0	initial bearing capacity right after jetting
Q_{setup}	real-time recovery bearing capacity for a jetted conductor
R	design safety factor of conductor bearing capacity
S	utilization rate of WOB
Su_{ave}	mean soil undrained shear strength within the setting depth range
W_{BHA}	effective weight of the jetting BHA
W_{BOP}	effective weight of BOP
W_{cap}	effective weight of capping equipment
W_{con}	effective weight of the conductor
W_{land}	effective weight of surface casing in cementing condition
W_{RT}	effective weight of running tool
W_{sur}	effective weight of the surface casing applied on conductor during cementing
W_{squ}	effective weight of subsequent casings after cementing
W_{tub}	effective weight of tubing