

STN P	Ropný a plynárenský priemysel Prevádzka v Arktíde Materiálové požiadavky na prevádzku v Arktíde (ISO/TS 35105: 2018)	STN P CEN ISO/TS 35105 45 0215
------------------	---	--

Petroleum and natural gas industries - Arctic operations - Material requirements for arctic operations (ISO/TS 35105:2018)

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. 03/20

Táto predbežná STN je určená na overenie. Pripomienky zasielajte ÚNMS SR najneskôr do septembra 2021.

Obsahuje: CEN ISO/TS 35105:2019, ISO/TS 35105:2018

130594

TECHNICAL SPECIFICATION
SPÉCIFICATION TECHNIQUE
TECHNISCHE SPEZIFIKATION

CEN ISO/TS 35105

October 2019

ICS 75.020

English Version

**Petroleum and natural gas industries - Arctic operations -
Material requirements for arctic operations (ISO/TS
35105:2018)**

Industries du pétrole et du gaz naturel - Opérations en
Arctique - Exigences applicables aux matériaux pour
les opérations en Arctique (ISO/TS 35105:2018)

Erdöl- und Erdgasindustrie - Arktisbetrieb -
Werkstoffanforderungen für den Arktisbetrieb (ISO/TS
35105:2018)

This Technical Specification (CEN/TS) was approved by CEN on 13 October 2019 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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, 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: Rue de la Science 23, B-1040 Brussels

CEN ISO/TS 35105:2019 (E)

Contents	Page
European foreword.....	3

European foreword

The text of ISO/TS 35105:2018 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 35105:2019 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 NEN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN 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 implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO/TS 35105:2018 has been approved by CEN as CEN ISO/TS 35105:2019 without any modification.

TECHNICAL SPECIFICATION

ISO/TS 35105

First edition
2018-04

Petroleum and natural gas industries — Arctic operations — Material requirements for arctic operations

*Industries du pétrole et du gaz naturel — Opérations en Arctique —
Exigences relatives au matériel requis pour les opérations en Arctique*



Reference number
ISO/TS 35105:2018(E)

© ISO 2018

ISO/TS 35105:2018(E)**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2018

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
Fax: +41 22 749 09 47
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	2
5 Symbols	3
6 Technical basis	3
6.1 Design considerations.....	3
6.1.1 Present applications and industrial achievements.....	3
6.1.2 Developments for future applications.....	4
6.1.3 Areas of concern in design for Arctic structures.....	4
6.1.4 Fracture assessment.....	4
6.2 Effects of low temperatures on mechanical properties of steels.....	5
6.2.1 Tensile properties.....	5
6.2.2 Fracture toughness.....	8
6.2.3 Arrest toughness.....	9
6.2.4 Fatigue.....	10
6.2.5 Residual stresses and crack pattern.....	11
6.3 Environmental conditions.....	11
6.3.1 General.....	11
6.3.2 Temperature and definition of LAST.....	11
6.3.3 Seawater conditions.....	12
6.4 Principles for qualification and quality assurance.....	12
6.4.1 Steel making technology.....	12
6.4.2 Welding technology.....	12
7 Material and fabrication requirements	12
7.1 Material selection and qualification.....	12
7.2 Mechanical properties.....	13
7.2.1 Tensile properties.....	13
7.2.2 Fracture toughness.....	13
7.2.3 Pre-qualification testing.....	16
7.3 Crack arrest assessment.....	16
7.4 Fatigue properties, alternative testing.....	17
7.5 Welding and fabrication requirements.....	18
7.5.1 Contractor certification.....	18
7.5.2 Base material.....	18
7.5.3 Welding consumables.....	18
7.5.4 Welding procedure qualification.....	18
7.6 Welding procedure qualification test requirements.....	18
7.6.1 General requirements.....	18
7.6.2 Welding procedure qualification testing.....	18
7.6.3 Testing requirements.....	19
7.6.4 Fillet weld on plates.....	20
7.7 Protection against corrosion and wear.....	20
7.7.1 General.....	20
7.7.2 Corrosion protecting coating at low temperature.....	20
7.7.3 Cathodic protection (CP).....	20
8 Quality control, quality assurance and documentation	21
8.1 Structural steel requirements.....	21
8.2 Welding and fabrication requirements.....	21

ISO/TS 35105:2018(E)

9	Operational topics	21
9.1	Requirements for operations in remote areas.....	21
9.1.1	General.....	21
9.1.2	Low temperature operations.....	21
9.1.3	Ice and snow removal.....	22
9.2	Corrosion and wear control.....	22
9.2.1	General.....	22
9.2.2	Splash zone surfaces in direct contact with sea ice.....	22
9.2.3	Submerged surfaces and cathodic protection.....	22
9.2.4	Topside surfaces.....	23
	Bibliography	24

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, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 8, *Arctic operations*.

ISO/TS 35105:2018(E)**Introduction**

Operations in an Arctic environment are characterized by low ambient temperatures, the presence of sea ice and ice bergs and icing of structures and components. In many cases they are also associated with remote locations relative to infrastructure and logistics. Maintenance operations are therefore expensive and accidents leading to emissions can have severe environmental consequences.

Structural failure is in most cases failure of materials and caused by well-known degradation mechanisms such as fatigue and corrosion. Under Arctic conditions, failure due to possible brittle materials behaviour needs to be given special consideration.

This document was developed to bridge the gap between the functional requirements to offshore structures in Arctic environments given in design standards and the material requirements given in material and fabrication specifications where Arctic operating conditions have not been considered in sufficient detail.

Petroleum and natural gas industries — Arctic operations — Material requirements for arctic operations

1 Scope

This document provides recommendations for material selection, manufacturing and fabrication requirements, testing and qualification of steel structures and components for offshore and onshore petroleum and natural gas facilities operating in Arctic and cold environments.

This document is intended to be used as a supplement to existing standards for steel structures where the particular operating conditions in Arctic regions are not sufficiently addressed.

This document gives particular requirements to ensure safe operation with respect to the risk of brittle fracture at low temperatures. These requirements will affect the selection of material grade and design class as well as the technical delivery conditions for steel. They will also affect the fabrication requirements as well as testing and qualification requirements.

This document also gives recommendations:

- to mitigate the operational and integrity aspects related to snow and ice accretion on topside structures;
- to take into account the particular Arctic operating conditions in corrosion assessments and requirements for corrosion protection systems;
- for particular operational requirements to ensure safe operation in Arctic regions.

The requirements in this document are applicable to any operating temperatures, but particular requirements related to de-rating (loss of strength) at high temperatures are not addressed. Limitations to the applicable minimum design temperature caused by the capability of the materials' low temperature performance can exist, but are not a limitation for the scope of this document.

As a practical guideline for the use of this document, low temperature is defined as lowest anticipated service temperature (LAST) below $-10\text{ }^{\circ}\text{C}$.

NOTE For determination of LAST, see [6.3.2](#).

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 19901-2, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 2: Seismic design procedures and criteria*

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

ISO 19902:2007, *Petroleum and natural gas industries — Fixed steel offshore structures*

ISO/TS 35105:2018(E)

ISO 19906, *Petroleum and natural gas industries — Arctic offshore structures*

EN 10225:2009, *Weldable structural steels for fixed offshore structures — Technical delivery conditions*

API RP 2Z, *Preproduction Qualification for Steel Plates for Offshore Structures*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN