

**SLOVENSKI STANDARD**  
**SIST-TP CEN ISO/TR 19905-2:2014**  
**01-marec-2014**

---

**Industrija za predelavo nafte in zemeljskega plina - Ocenjevanje mobilnih naftnih ploščadi na področju postavitve - 2. del: Dvižne ploščadi, razlaga in podroben vzorčen izračun (ISO 19905-2:2012)**

Petroleum and natural gas industries - Site-specific assessment of mobile offshore units - Part 2: Jack-ups commentary and detailed sample calculation (ISO/TR 19905-2:2012)

Erdöl- und Erdgasindustrie - Offshore Anlagen: Beurteilung von mobilen Offshore Einheiten bezüglich ihres Einsatzgebietes - Teil 2: Hubinseln, Erläuterungen (ISO/TR 19905-2:2012)

Industries du pétrole et du gaz naturel - Evaluation liée au site des unités marines mobiles - Partie 2: Compléments sur les plates-formes auto-élevatrices (ISO/TR 19905-2:2012)

**Ta slovenski standard je istoveten z: CEN ISO/TR 19905-2:2013**

**ICS:**

75.180.10	Oprema za raziskovanje in odkopavanje	Exploratory and extraction equipment
-----------	---------------------------------------	--------------------------------------

**SIST-TP CEN ISO/TR 19905-2:2014 en**

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

[SIST-TP CEN ISO/TR 19905-2:2014](https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014)

<https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014>

TECHNICAL REPORT  
RAPPORT TECHNIQUE  
TECHNISCHER BERICHT

**CEN ISO/TR 19905-2**

December 2013

ICS 75.180.10

English Version

**Petroleum and natural gas industries - Site-specific assessment  
of mobile offshore units - Part 2: Jack-ups commentary and  
detailed sample calculation (ISO/TR 19905-2:2012)**

Industries du pétrole et du gaz naturel - Évaluation liée au  
site des unités marines mobiles - Partie 2: Compléments  
sur les plates-formes auto-élevatrices (ISO/TR 19905-  
2:2012)

Erdöl- und Erdgasindustrie - Offshore Anlagen; Beurteilung  
von mobilen Offshore Einheiten bezüglich ihres  
Einsatzgebietes - Teil 2: Hubinseln, Erläuterungen (ISO/TR  
19905-2:2012)

This Technical Report was approved by CEN on 11 May 2013. It has been drawn up by the Technical Committee CEN/TC 12.

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.

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

[SIST-TP CEN ISO/TR 19905-2:2014](https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014)

[https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-  
da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014](https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014)



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

Contents	Page
Foreword.....	3

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

[SIST-TP CEN ISO/TR 19905-2:2014](https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014)  
[https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-  
da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014](https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014)

## Foreword

This document (CEN ISO/TR 19905-2:2013) has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries" in collaboration with 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.

### Endorsement notice

The text of ISO/TR 19905-2:2012 has been approved by CEN as CEN ISO/TR 19905-2:2013 without any modification.

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

[SIST-TP CEN ISO/TR 19905-2:2014](https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014)

<https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014>

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

[SIST-TP CEN ISO/TR 19905-2:2014](https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014)

<https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014>

# TECHNICAL REPORT

# ISO/TR 19905-2

First edition  
2012-12-15

---

---

## Petroleum and natural gas industries — Site-specific assessment of mobile offshore units —

### Part 2: Jack-ups commentary and detailed sample calculation

iTeh STANDARD PREVIEW

(standards.iteh.ai)  
*Industries du pétrole et du gaz naturel — Évaluation liée au site des  
unités marines mobiles —*

*Partie 2: Compléments sur les plates-formes auto-élévatrices*

[https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-  
da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014](https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014)



Reference number  
ISO/TR 19905-2:2012(E)

© ISO 2012

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST-TP CEN ISO/TR 19905-2:2014](https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014)

<https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014>



### **COPYRIGHT PROTECTED DOCUMENT**

© ISO 2012

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing 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

Foreword .....	v
Introduction.....	vii
1 Scope.....	1
2 References .....	1
3 Terms and definitions .....	1
4 Symbols.....	1
4.1 Symbols for Clause 6.....	1
4.2 Symbols for Clause 7.....	3
4.3 Symbols for Clause 8.....	5
4.4 Symbols for Clause 9.....	6
4.5 Symbols for Clause 10.....	6
4.6 Symbols for Clause 12.....	8
5 Commentary on ISO 19905-1:2012, Clauses 5 and A.5 .....	8
6 Commentary on ISO 19905-1:2012, Clauses 6 and A.6 .....	8
TR.6.4.1 Metocean data — General.....	8
TR.6.4.2 Waves .....	8
TR.6.4.3 Current.....	20
TR.6.4.4 Water depths.....	20
TR.6.4.5 Wind.....	21
7 Commentary to ISO 19905-1:2012, Clauses 7 and A.7 .....	24
TR.7.1 Scope .....	24
TR.7.3.2 Hydrodynamic model.....	24
TR.7.3.2.1.1 Length of members .....	24
TR.7.3.2.1.2 Spudcan.....	24
TR.7.3.2.1.3 Shielding and solidification.....	24
TR.7.3.2.2 “Detailed” leg model .....	25
TR.7.3.2.3 “Equivalent” leg model .....	25
TR.7.3.2.3.1 Equivalent drag coefficient.....	25
TR.7.3.2.3.2 Equivalent inertia coefficient.....	26
TR.7.3.3 Wave and current actions.....	48
TR.7.3.4 Wind actions .....	57
TR.7.8 Other considerations.....	57
APPENDIX TR.7.A : Example of equivalent model computations.....	58
APPENDIX TR.7.B: Comparison cases to assess implications of the ISO 19905-1 formulation .....	63
APPENDIX TR.7.C: Comparison of test results for chords.....	67
8 Commentary to ISO 19905-1:2012, Clauses 8 and A.8 .....	70
TR A.8.8.6 Derivation of the alternative simplified negative stiffness correction term for $P-\Delta$ effects .....	70
9 Commentary to ISO 19905-1:2012, Clauses 9 and A.9 .....	77
TR.9.3.6.2 Derivation of the limiting horizontal reaction given in ISO 19905-1:2012, Table A.9.3.7 .....	77
10 Commentary to ISO 19905-1:2012, Clauses 10 and A.10 .....	79
TR.10.4.2.1 Natural period — General .....	79
TR.10.4.2.2 Derivation of $K_e$ , effective stiffness used to calculate the jack-up natural period.....	82
TR.10.4.3.3 Hysteretic damping .....	95
TR.10.4.3.4 Vertical radiation damping in earthquake analysis .....	96
TR.10.5.3.4 / C.2.4 Guidance on the fourth method of ISO 19905-1:2012, Table A.10.5.1 — Application of the drag-inertia method .....	96

## ISO/TR 19905-2:2012(E)

11	Commentary to ISO 19905-1:2012, Clauses 11 and A.11.....	96
12	Commentary to ISO 19905-1:2012, Clauses 12 and A.12.....	96
	TR.12.6.2.2 Nominal bending strength .....	96
	TR.12.6.2.2.1 Example .....	96
	TR.12.6.3.2 Background for $\eta$ in interaction equation approach.....	97
13	Commentary to ISO 19905-1:2012, Annex C .....	98
	TR.C.2.4 Guidance on the fourth method of ISO 19905-1:2012, Table A.10.5.1 — Application of the drag-inertia method.....	98
	Annex A (informative) Detailed example calculation.....	99
	Annex B (informative) SIPM “drag-inertia method” for dynamic analysis and estimation of extreme response for jack-ups.....	266
	Bibliography .....	295

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST-TP CEN ISO/TR 19905-2:2014](https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014)

[https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-  
da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014](https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014)

## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

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 of all such patent rights.

ISO/TR 19905-2 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 7, *Offshore structures*.

ISO 19905 consists of the following parts, under the general title *Petroleum and natural gas industries — Site-specific assessment of mobile offshore units*:

- *Part 1: Jack-ups*
- *Part 2: Jack-ups commentary and detailed sample calculation* [Technical Report]

The following part is under preparation:

- *Part 3: Floating units*

ISO/TR 19905-2:2012 was prepared in 2012 and is referenced as ISO/TR 19905-2:2012. Users are advised, however, that it was published, and only became available, in 2013.

ISO 19905 is one of a series of International Standards for offshore structures. The full series consists of the following International Standards:

- 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 19901-3, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 3: Topsides structure*

## ISO/TR 19905-2:2012(E)

- ISO 19901-4, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 4: Geotechnical and foundation design considerations*
- ISO 19901-5, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 5: Weight control during engineering and construction*
- ISO 19901-6, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 6: Marine operations*
- ISO 19901-7, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 7: Stationkeeping systems for floating offshore structures and mobile offshore units*
- ISO 19901-8<sup>1)</sup>, *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*
- ISO 19903, *Petroleum and natural gas industries — Fixed concrete offshore structures*
- ISO 19904-1, *Petroleum and natural gas industries — Floating offshore structures — Part 1: Monohulls, semi-submersibles and spars*
- ISO 19905-1, *Petroleum and natural gas industries — Site-specific assessment of mobile offshore units — Part 1: Jack-ups*
- ISO/TR 19905-2, *Petroleum and natural gas industries — Site-specific assessment of mobile offshore units — Part 2: Jack-ups commentary and detailed sample calculation*
- ISO/TR 19905-3<sup>1)</sup>, *Petroleum and natural gas industries — Site-specific assessment of mobile offshore units — Part 3: Floating units*
- ISO 19906, *Petroleum and natural gas industries — Arctic offshore structures*

iTeH STANDARD PREVIEW  
(standards.iteh.ai)

SIST-TP CEN ISO/TR 19905-2:2014  
<https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-d0a831058111/iso-tr-19905-2:2014>

---

1) Under preparation.

## Introduction

The series of International Standards applicable to types of offshore structures, ISO 19900 to ISO 19906, addresses design requirements and assessments for all offshore structures used by the petroleum and natural gas industries worldwide. Through their application, the intention is to achieve reliability levels appropriate for manned and unmanned offshore structures, whatever the type of structure and the nature or combination of the materials used.

It is important to recognize that structural integrity is an overall concept comprising models for describing actions, structural analyses, design or assessment rules, safety elements, workmanship, quality control procedures and national requirements, all of which are mutually dependent. The modification of one aspect of the design or assessment in isolation can disturb the balance of reliability inherent in the overall concept or structural system. The implications involved in modifications, therefore, need to be considered in relation to the overall reliability of offshore structural systems.

The series of International Standards applicable to the various types of offshore structure is intended to provide a wide latitude in the choice of structural configurations, materials and techniques without hindering innovation. Sound engineering judgement is therefore necessary in the use of these International Standards.

ISO 19905-1 was developed from SNAME T&R Bulletin 5-5A<sup>[5]</sup>, but has been considerably altered from that original document. Some of the alterations have involved a restructuring and modification of terminology, but there have been additional changes of greater technical consequence. New material has been added based on studies undertaken since the original development of SNAME T&R 5-5A; new calculation techniques have been addressed because of improved computational capabilities allowing more complex assessments; gaps that existed in the original SNAME T&R 5-5A have been filled, thereby ensuring a more thorough assessment; and changes have been made to align ISO 19905-1 with other standards within the 19900 series. A description of the more important changes, along with the reasoning for the changes, can be found in a series of papers published in 2012 by Offshore Technology Conference. These papers can be of considerable value in helping the analyst, particularly those who are familiar with SNAME T&R 5-5A, in understanding ISO 19905-1. The papers, part of the Technical Session *ISO 19905-1: A Site-Specific Assessment of Mobile Jack-Up Units* are listed in the Bibliography:

- Reference [6], *Background to the ISO 19905-Series and an Overview of the New ISO 19905-1 for the Site-Specific Assessment of Mobile Jack-Up Units*
- Reference [7], *Environmental Actions in the New ISO for the Site-Specific Assessment of Mobile Jack-Up Units*
- Reference [8], *Structural Modeling and Response Analysis in the New ISO Standard for the Site-Specific Assessment of Mobile Jack-Up Units*
- Reference [9], *Foundation Modeling and Assessment in the New ISO Standard 19905-1*
- Reference [10], *Long-Term Applications in the ISO Standard for Site Specific Assessment of Mobile Jack-Up Units and the Use of Skirted Spudcans*
- Reference [11], *Structural Acceptance Criteria in the New ISO for the Site-Specific Assessment of Mobile Jack-Up Units*
- Reference [12], *The Benchmarking of the New ISO for the Site-Specific Assessment of Mobile Jack-Up Units*

This part of ISO 19905, which has been developed from SNAME T&R Bulletin 5-5A, provides a commentary to some clauses of ISO 19905-1 including background information, supporting documentation, and additional or alternative calculation methods as applicable and also provides a detailed sample “go-by” calculation in Annex A. The reader is advised that the information presented herein is intended for use in conjunction with ISO 19905-1 and that the cautions and limitations discussed in ISO 19905-1 apply.

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

[SIST-TP CEN ISO/TR 19905-2:2014](https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014)

<https://standards.iteh.ai/catalog/standards/sist/d0f38919-8f42-4c5c-ad74-da4931c9902f/sist-tp-cen-iso-tr-19905-2-2014>

# Petroleum and natural gas industries — Site-specific assessment of mobile offshore units —

## Part 2: Jack-ups commentary and detailed sample calculation

### 1 Scope

This part of ISO 19905 provides a commentary to some clauses of ISO 19905-1 including background information, supporting documentation, and additional or alternative calculation methods as applicable and also provides a detailed sample 'go-by' calculation. ISO 19905-1 specifies requirements and guidance for the site-specific assessment of independent leg jack-up units for use in the petroleum and natural gas industries.

### 2 References

The following referenced documents are indispensable for the application 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 19905-1:2012, *Petroleum and natural gas industries — Site-specific assessment of mobile offshore units — Part 1: Jack-ups*

### 3 Terms and definitions

For the purposes of this document the terms and definitions given in ISO 19905-1 apply.

### 4 Symbols

#### 4.1 Symbols for Clause 6

$C_D$	drag coefficient
$C_{De}D_e$	equivalent drag coefficient times effective diameter
$d$	water depth
$D_2$	depth attenuation
$D(\theta)$	directional spreading function from ISO 19901-1
$F(\alpha)$	directional spreading function from SNAME
$f$	frequency (Hz)
$g$	acceleration due to gravity