IOGP / ISO TC 67 / SC 7 / WG 7 for ISO 19905-series Site-Specific Assessment of Mobile Offshore Units

Status Report to City, University of London, International Conference: The Jack-Up Platform, 2023

Mike Hoyle, Noble Denton marine services, Energy systems

06 September 2023

Outline

Aim:

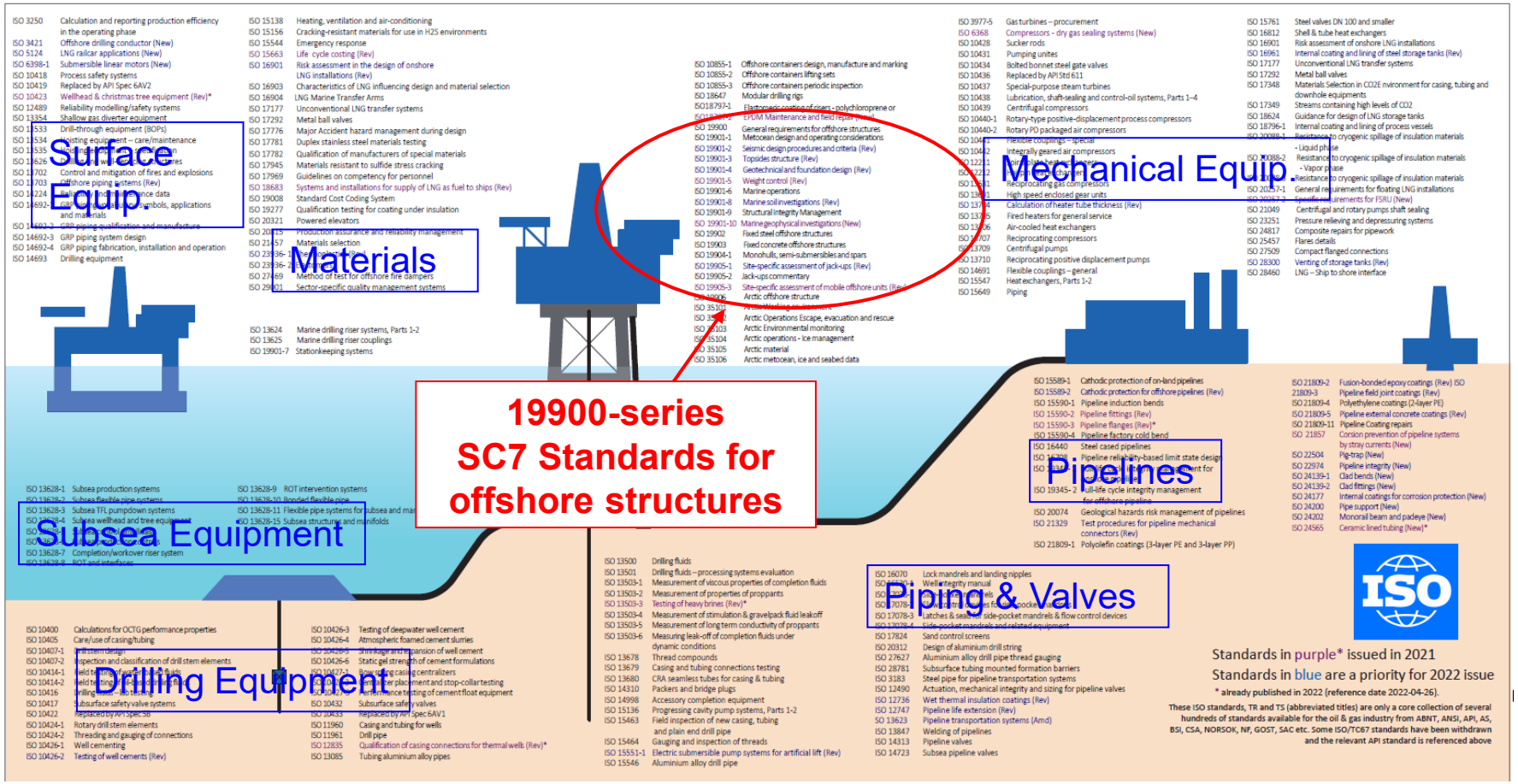
- To provide a brief update on WG7's standards ISO 19905-1, -2, -3 and -4 and their status.
- Some detail on the changes included in 3rd Edition of ISO 19905-1

Content:

- Some background
- WG7's standards
- ISO 19905-1 – Timeline and status
- ISO 19905-1 – What is new in the Third edition
- Status of ISO/TR 19905-2
- Status of ISO 19905-3
- Status of ISO 19905-4

Background

ISO Standards for use in the oil & gas industry



19900-series is part of a much larger suite of standards originally for the Petroleum & natural gas industries, now some are for Oil & gas industries including lower carbon energy

WG7 and its standards:

WG7 & its technical panels have met biannually for many years; 53rd WG7 meeting later today.

Published:

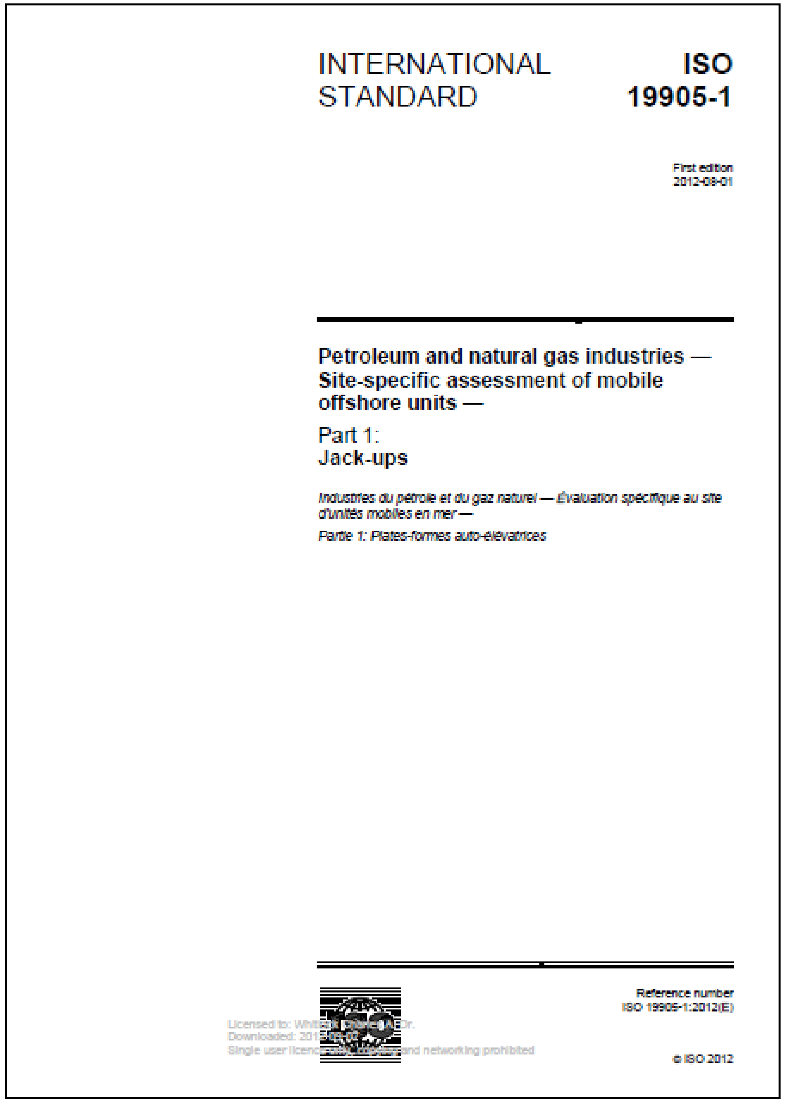
- 19905-1:2016 – Site Specific Assessment (SSA) of mobile jack-up units. (2nd Ed)
- 19905-2:2012 – Technical Report, including a Go-By (“detailed example calculation”). (1st Ed)
- 19905-3:2020 – SSA for Mobile floaters. (2nd Ed) (P53: Leader John Stiff)

Under development:

- 19905-4 – Jack-up installation and removal at a site (P54: Leader Mike Hoyle)

19905-1 – SSA of jack-ups Time Line & Status

- ISO 19905-1 First Edition published August 2012
- OTC2012 launch session - the series of papers discussed a good number of technical advances.
- For further details on the development of 19905-1 see:
  - ISOPE 2006-PM-06 Jack-Up Assessment Past Present & ISO
    Hoyle, Stiff, Hunt, Morandi
  - OMAE2011-50056 Jack-Up Assessment – The Voyage to an ISO
    Hoyle, Stiff, Hunt


INTERNATIONAL STANDARD

ISO 19905-1

First edition
2012-08-01

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

Part 1:
Jack-ups

Industries du pétrole et du gaz naturel — Évaluation spécifique au site d'unités mobiles en mer —

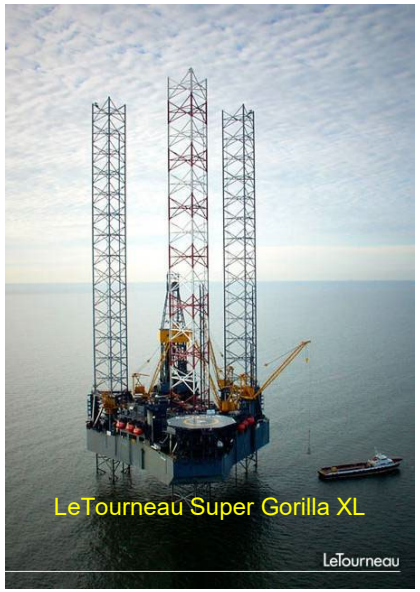
Partie 1: Plates-formes auto-élévatrices

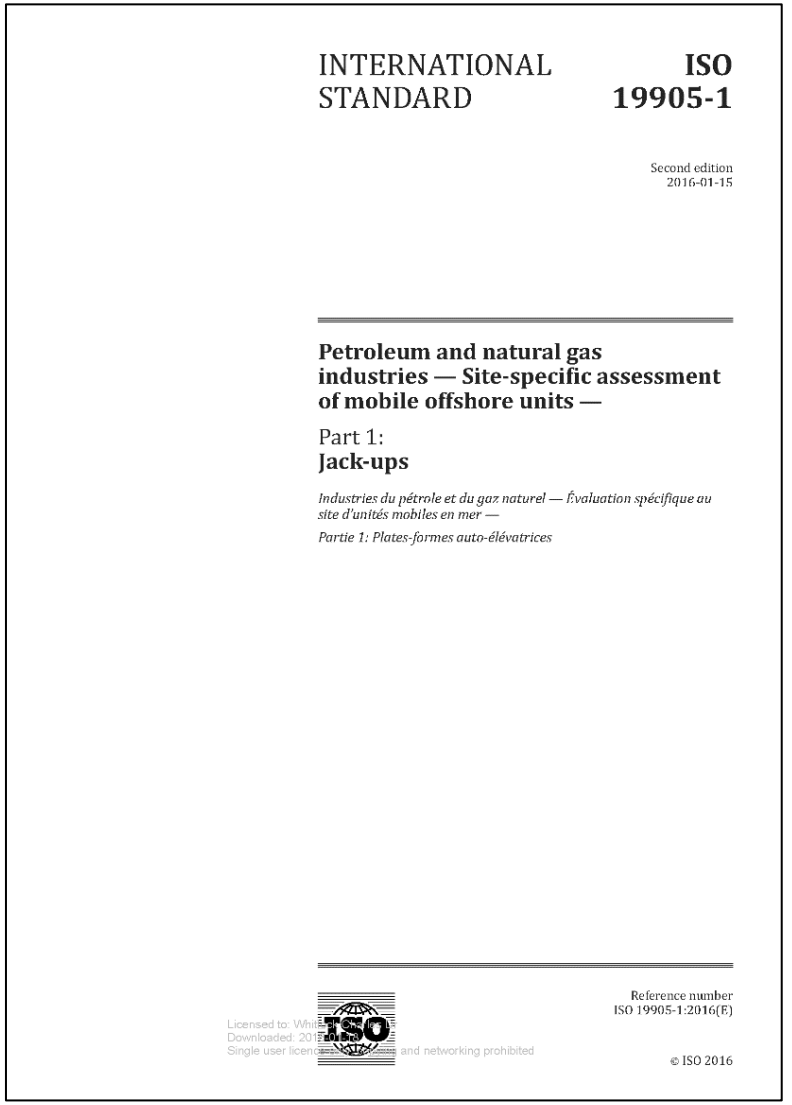
Reference number
ISO 19905-1:2012(E)

© ISO 2012

19905-1 Time Line & Status (cont.)

- Second Edition was published in January 2016.
- The updated areas and some new glitches were presented at this conference six years ago.
- Project initiation for 3rd Edition was approved by IOGP at the end of 2017.




INTERNATIONAL STANDARD **ISO 19905-1**

Second edition
2016-01-15

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

Part 1:
Jack-ups

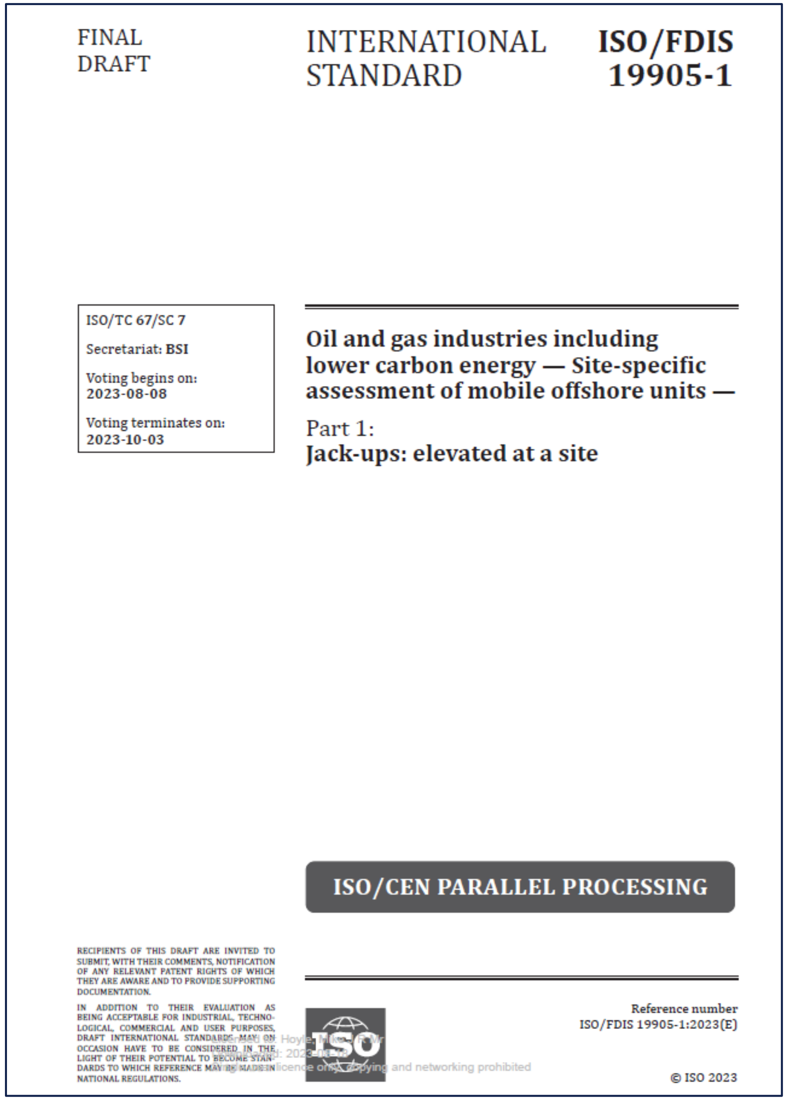
Industries du pétrole et du gaz naturel — Évaluation spécifique au site d'unités mobiles en mer —

Partie 1: Plates-formes auto-élévatrices

Reference number
ISO 19905-1:2016(E)

ISO 19905-1 – Third edition updates

- The DIS ballot ran from 2022-02-11 to 2022-05-06. >430 comments, 172 for P4 and 199 for ERP/P0. Panel comments finalised last July. Editorials took longer. FDIS to ISO March.
- The FDIS of the 3rd edition was published for ballot on 8th August, closing 3rd October, after which publication is expected within 6 weeks i.e. by mid-November.
- In this edition we have addressed a list of carry-forwards from the first edition that were not covered in second addition and a list of new/updated topics that has grown with time.
- Title updated to reflect change in scope for TC67 & SC7 and to differentiate SSA-E from “Part 4: Jack-ups: installation and removal at a site”, SSA-I.
- The more significant updates are discussed in the following slides.


FINAL DRAFT

INTERNATIONAL STANDARD

ISO/FDIS 19905-1

ISO/TC 67/SC 7

Secretariat: BSI

Voting begins on: 2023-08-08

Voting terminates on: 2023-10-03

Oil and gas industries including lower carbon energy — Site-specific assessment of mobile offshore units —

Part 1: Jack-ups: elevated at a site

ISO/CEN PARALLEL PROCESSING

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.

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.

Reference number
ISO/FDIS 19905-1:2023(E)

ISO 19905-1 – Third edition updates (cont.)

- Foreword, Introduction and Scope updated to align with latest ISO protocols
- Added note to Introduction regarding SSA-E and SSA-I.
- Need for Classification revised in Scope and expanded in 5.1.8.
- Improved interaction with 19906:2019 for Artic regions and updates across the standard regarding ice loads/management. This was done in liaison with WG8 for Arctic offshore structures, ISO 19906.
  Changes made in: Scope, 5.1.5, Figure 5.2 1, 6.7, 7.2, 7.6, 7.8, 10.8, Table 10.3 1 and A.10.8. Added 8.8.9.
- Clause 3, Definitions: Updated to improve alignment with ISO19900:2019 and definitions from other ISOs. Includes:
  - Updates to many definitions;
  - Added definitions;
  - Deletion of Consequence and Life-Safety text with exposure Levels to be taken according to ISO:19900; Clause 5.5 updated accordingly.

ISO 19905-1 – Third edition updates (cont.)

- Clause 4:
  - Symbols that were in A.4.x moved to 4.1.x (with pointers from A.4.x).
  - Symbols added for undrained shear strength and horizontal and moment capacity coefficients and cyclic degradation factors.

- Clause 5:
  - 5.1: Explains interaction with SSA-I
  - 5.5: Exposure levels revised to align with ISO 19900:2019

- Requirements and information on earthquake response analysis gathered in 10.7 and A.10.7 respectively and referenced from their original locations (8.6, 8.7, 8.8, A.8.6.3, A.8.7).

ISO 19905-1 – Third edition updates (cont.)

- 9.3, A.9.3.1.2, A.9.3.3.1 and A.9.4.1 expanded to include foundation capacities and stiffnesses based on strength parameters rather than applied preload. Clause E.4 added to address the former.

- 9.3.6 Clarifications of Step 2 foundation checks.

- 9.4.6 on cyclic mobility expanded to address liquefaction and liquefaction-induced lateral flow and A.9.4.6 expanded accordingly. Added E.5 providing an example of a simplified free-field liquefaction assessment calculation method.

- Earthquake analysis requirements updated and gathered in 10.7 and A.10.7 respectively and referenced from their original locations (8.6, 8.7, 8.8, A.8.6.3, A.8.7); reference to 5.5 added.

ISO 19905-1 – Third edition updates (cont.)

- 10.10, formerly 10.9: Alternative analysis methods updated.
- 13.2: Clarifications to UC formulations.
- A.6.4.2.2: Clarification that the H_{max} to H_{srp} relationships are defaults in the absence of site-specific data.
- A.6.4.2.3: Clarification that the application of kinematics reduction should no longer be by means of wave height reduction.
- A.6.4.2.7: Most probable peak enhancement factor is now given as a range, with the most conservative to be used in the absence of site-specific information.
- A.6.4.3: Revised default current profile.

ISO 19905-1 – Third edition updates (cont.)

- A.6.4.6.2: Alternative wind profiles now allowed.
- A.6.5.1.1 Geoscience data: Added references to ISO 19901-8 and ISO 19901-10.
- Table A.6.5-1: Added reference to liquefaction-induced lateral flows.
- A.6.5.1.5.3: Requirements for the geotechnical report revised and expanded especially in espect of shear strength.
- A.9.3.2.2: Penetration in clays updated to address strain rate dependency and strain softening.

ISO 19905-1 – Third edition updates (cont.)

- A.9.3.2.6.2: Squeezing of clays revised.
- A.9.3.2.6.4: Punch-through for sand overlying clay in clarified and formula revised.
- A.9.3.3.2: Major updates to the ultimate vertical/horizontal/rotational capacity interaction function and parameters in A.9.3.3.2 for spudcans in sand and clay due to the inclusion of further soil profiles in clay and an approach for including the effects of cyclic loading on foundation capacities.
- A.9.3.3.7: The effect of cyclic loading on the yield surface has been added; incorporates text that was in A.9.3.4.2.2.
- A.9.3.4: Revised guidance on the selection of shear modulus for clay.

ISO 19905-1 – Third edition updates (cont.)

- A.9.3.6.4: Step 2a foundation capacity and sliding checks in A.9.3.6.4 revised and the figures corrected.
- A.9.4.6: Guidance on Cyclic mobility in A.9.4.6 significantly expanded, and this clause now also addresses liquefaction and liquefaction-induced lateral flow.
- A.10.7.3.2: Guidance on structural and foundation modelling expanded with particular reference to modelling for earthquake response analysis.
- A.10.8: Guidance on ice added.
- A.12.2.3.2: Guidance on non-circular prismatic member classification clarified in respect of slender components.
- A.12.2.3.3: Guidance on reinforced components clarified in respect of slender components.

ISO 19905-1 – Third edition updates (cont.)

- Table 12.3-1 b), Effective widths for slender sections: Sketch corrected.
- Table 12.4-1 Effective length and moment reduction factors: Clarifications.
- Figure A.12.4-1 Effective length alignment chart: Formula corrected.
- A.12.5: Updated guidance on strength of tubular members to align with ISO 19902:2020 (combined axial and bending loading now of cosine interaction form instead of previous form using linear interaction) and addition of simplified combined axial, bending, beam shear and torsion checks.

ISO 19905-1 – Third edition updates (cont.)

- A.12.6.2.3: Clarified calculation for *e* in axial compressive local strength check.
- A.12.6.2.5.4: Clarified F_y for Class 4 slender-section bending moment strength.
- A.12.6.3.4: Beam shear area formulations for chord cross sections updated.
- Table B-2: Revised (less conservative) partial resistance factor for horizontal foundation capacity for total stress (clay/undrained) and added partial resistance factors for vertical-horizontal foundation bearing capacity when considering material factored representative soil strength and for calculated foundation capacities.
- Figure C.2.4-1 Drag Inertia method including DAF scaling factor: Corrections to formulae.
- Figure E.1-1: Corrected formulae.
- Figure E.3-1 b): Corrected.

ISO 19905-1 – Third edition updates (cont.)

- E.4: Added on calculated foundation capacities.
- E.5: Added. Provides an example of a simplified free-field liquefaction assessment calculation method.
- H.2, Norway regional requirements: Updated. H.2.2 Regulatory framework and H.2.4 Technical commentary deleted. Added new H.2.3 Technical requirements for jack-up rigs operating close to a permanent occupied installation.
- H.3, US GoMex regional requirements: Updated for latest metocean data – deletion of superseded data hurricane data and reference added to latest in API-RP-2MET, with some adjustment of requirements to meet API approach.

ISO 19905-1 – Updates carried forward

- Updates carried forward to the 4th next edition:
  - Do we need 'a' for sands VHM envelope?
  - V-H envelope for a spudcan that penetrates through very soft clay into underlying sand.
  - Review UWA CPT method for penetration in sand and test against sand site data.
  - Method for multi-layer soils.
  - loose sand over dense sand (e.g., North Sea).
  - Investigate squeezing - and implementation of Meyerhof.
  - Should the yield surface be expressed as “net” and not “gross”?
  - Can we have additional moment when the spudcan is resting on sand overlain by clay?
  - FOS for punch-through.

ISO 19905-1 – Updates carried forward (cont.)

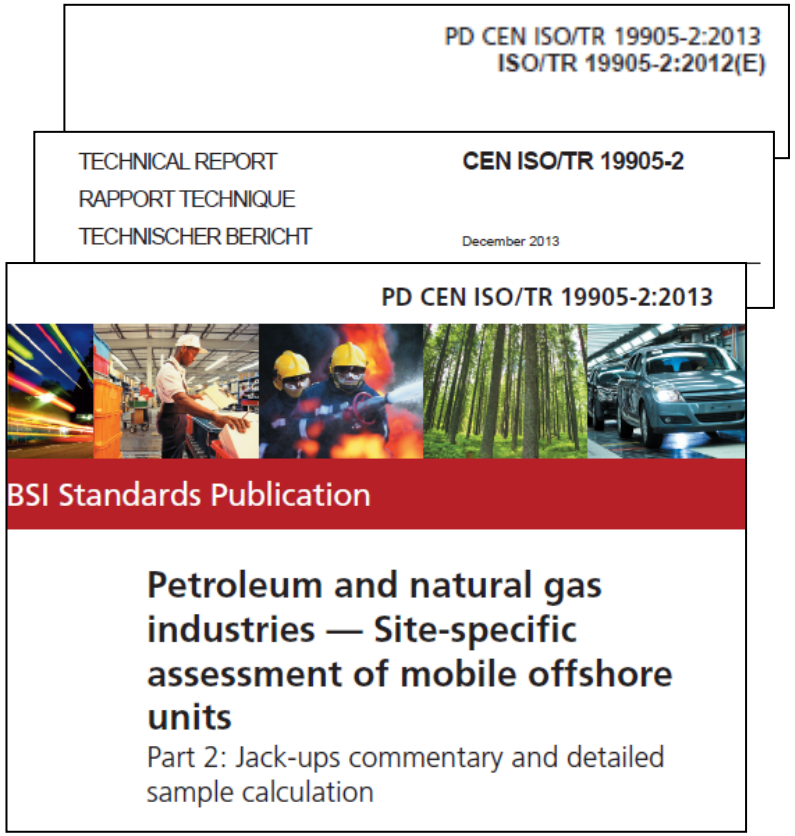
- Updates carried forward to the 4th next edition:
  - Review adequacy of additional load cases near resonance. Stock/Perry have proposal in with IADC Jack-Up Committee (IJUC) that was updated at Nov 2014 P3 meeting. Now IADC's second priority (after editing of 19905-4), so little chance progress in the near future.
  - Testing of improved approach to spudcan-soil dynamics for earthquakes. This is dependent on the initiation of a JIP. Attempt at DeepStar funding failed. May try SNAME managed JIP with potential of some funding from the wind-farm sector.

ISO 19905-1 – Fourth edition

- Intend to maintain the ongoing activity which has enabled us to keep the core Panels together; in some instances, we need to identify succession plans.
- Work on including J-Reg JIP updates.
- Numbering of Figures and Tables. Current format is C.SC-N as was permitted for our standards at the outset. ISO wanted us to change to C-N format for third edition, but reneged when we suggested they do the work. However, they are likely to insist upon the update for 4th edition. It will have to be done by ISO or BSI and will need close checking of cross-references afterwards. It will provide an unnecessary challenge for both us and our users.
- Any other topics?

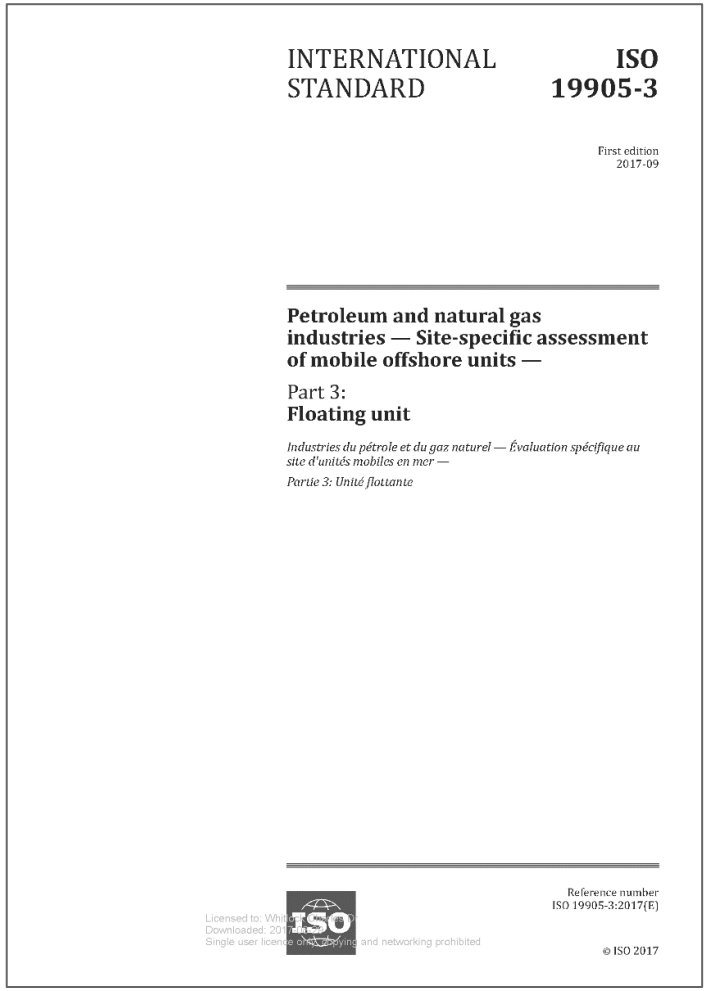
Status of ISO/TR 19905-2 Jack-Ups, Commentary and Example Calculation

- Published December 2013, but dated 2012, to match references in 19905-1, CEN & BSI dated their wrappers 2013.
- Limited feedback on 1st Edition – mostly minor typos, etc.
- 2nd Edition of 19905-2 will address feedback and include additional text supporting the main updates in 19905-1 on:
  - Chord shear areas.
  - Calculated foundation capacity - commentary on Annex E.4.
  - Go-By example to support new Annex E.4 on "Calculated foundation capacity" (awaited).
  - An update of the "go-by" to capture the changes in 3rd edition of 19905-1, that will be done as a DNV, Noble Denton training exercise.
- Except as noted, the main changes are in the draft of the 2nd Edition.
- Would like to publish with 3rd Ed of 19905-1, but will lag by a few months as the full "go-by" update is to be based on FDIS 19905-1.



Status of ISO 19905-3
Site specific assessment of mobile floating units

- First Edition of ISO 19905-3 was published in October 2017, thanks to the good work by John Stiff and Panel 53.
- A number of Technical comments from the ballot on the FDIS of the First Edition were carried forward to the Second Edition.
- In 2018 the UK HSE and others requested that text regarding airgap be strengthened.
- The second edition was eventually published in March 2021 – however the CEN ballot was not held in parallel. The
  EN ISO was published in June 2022 and the BS EN ISO was eventually published in October 2022.
- P53 meeting yesterday to assess usage and feedback. In use. UK HSE will be issuing an IS that references the standard. Need to publicise.


INTERNATIONAL STANDARD

ISO 19905-3

First edition
2017-09

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

Part 3:
Floating unit

Industries du pétrole et du gaz naturel — Évaluation spécifique au site d'unités mobiles en mer —

Partie 3: Unité flottante

Reference number
ISO 19905-3:2017(E)

Status of ISO 19905-4
Installation and removal of jack-ups [Going on and off location]

- Panel 54 has worked on guidance for site specific installation and removal operations to address:
  - The procedures and communication methods to keep the operational risks within tolerable limits.
  - The situations to be addressed and provide guidance as to how to assess these with the goal of allowing the operability of rigs to be assessed using an appropriate and consistent methodology, to check or extend the limits documented in the Marine Ops Manual.
- Participant list includes almost 90 names and 39 organisations.
  - Good spread; 9 Consultants, 9 Owners, 4 Designers, 5 MWS, 3 Operators, 4 Movers, 5 Others
  - Around 75% of the organizations are US-based; others include Australia, Denmark, Netherlands, Singapore, UAE, UK
- The 15th, and most recent, Panel 54 meeting was held in June 2022.

Status of ISO 19905-4
Installation and removal of jack-ups (cont.)

- Intend to publish the Normative and Informative Annex A first, together with:
  - Annex B – Checklists
  - Annex C – Example rig-move procedure
  - Annex D – Competence
  - Annex E – Responsible Parties.
- Intend to add further Annexes detailing calculation methodologies in a subsequent edition.
- Re-registered in ISO

Status of ISO 19905-4
Installation and removal of jack-ups (cont.)

- To date, representatives of all the major sectors of industry that use jack-ups have contributed at least 3300 hours of un-paid effort to the development of this document in Panel and Task Group meetings alone; further time and expense has been spent on preparation for meetings, travel, etc.
- Technical input has been (near-)complete since the Spring 2020 P54 meetings, with minor updates from subsequent meetings.
- However, we need editorial (ERP) meetings to bring the document to completion, and funding to support this.
- In September 2021 Jim Rocco at IADC circulated IADC jack-up owners with a request for funding split over 2 years. This resulted in a commitment to funding by Valaris, Velesto and Shelf Drilling. However, we need further support.
- It has been intimated that IOGP might now be prepared to make a contribution.
- What about members of J-Reg Offshore Renewable Energy JIP on windfarm jack-ups?

Until such time as some funding is available it is unlikely that we will be able to progress the editing

Looking Forward

- Maintain Technical Panel momentum.

  Address 19905-1 technical issues c/f to 4th Edition and J-Reg inputs.

- Progress 19905-2 2nd Edition for publication ASAP.

- Continue to progress 19905-4 for publication in 2023
  - but this will only happen if we can find funding for the editing

- We still need new blood in the WG & TP's, and a succession plan. Any volunteers??

And last, but not least ….

Many thanks to all who contributed to the publication of:

- ISO 19905-1:2012, :2016 and FDIS 19905-1:2023
- ISO/TR 19905-2:2012
- ISO 19905-3:2017 and ISO 19905-3:2021

And to those who have been active in the development of

- TR 19905-2 and
- 19905-4.


Maersk Inspirer – MSC CJ70


KFELS “B-Class”

The End
(… but, hopefully not of 19905 development)

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