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Oil and gas industries including lower carbon energy — Specific requirements for offshore structures —

Part 3: Topsides structure

Industries du pétrole et du gaz, y compris les énergies à faible teneur en carbone — Exigences spécifiques relatives aux structures en mer —

Partie 3: Structures Top Sides

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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

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This document was prepared by Technical Committee ISO/TC 67, *Oil and gas industries including lower carbon energy*, Subcommittee SC 7, *Offshore structures,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 12, *Oil and gas industries including lower carbon energy,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 19901-3:2014), which has been technically revised.

The main changes are as follows:

— alignment of terminology with that of ISO 19900;

— a rational re-arrangement of the clauses content and numbering;

— adoption with modifications of IOGP supplementary requirements (S-631-04);

— ‘national or regional codes’ and ‘national or regional building codes’ have been replaced by ‘national building standards’ throughout the whole document;

— ‘supporting structure’ has been replaced by ‘substructure’ and definition of ‘substructure’ has been added to Clause 3;

— ‘wave, wind and current’ has been replaced by ‘metocean’;

— ‘design assessment/situations’ has replaced ‘design situations’ according to ISO 19900;

— 5.2.1 has been updated distinguishing between ASD (Allowable strength design) associated to ANSI/AISC 360-22 and WSD (Working stress design) associated to AISC 335-89 and API RP 2A-WSD. Further guidance is provided for floating structures where the hull is typically designed using the WSD method. In 5.2.2 guidance on the application of K_c is given in case of WSD method.

— subclause 5.7 on critical structures has been added;

- Table 2 has been updated with the introduction of 'restricted access for inspection, maintenance and repair' partial damage factors and reduction in case of full accessibility (with reference to ISO 19904-1, NORSOK N-004,[32] Reference [30] and DNV-OS-C101[31]). Guidance in case of dissimilar materials has been added;
- subclause 6.8.2 on ductility has been introduced, adapted from NORSOK N-004:2022, 7.2;
- addition of Table A.1 with typical minimum values for local, primary and global design of operational actions (Q);
- subclause 7.3 has been re-ordered and updated;
- subclause 7.5 has been renamed 'Indirect actions and resulting forces' and updated according to the modifications and assumptions in 10.1 and 10.2;
- wind actions, 7.6.2 and A.7.6.2, introduction of national building standards for the evaluation of the representative wind actions; alignment with ISO 19900 and ISO 19901-1 and addition of more guidance;
- alignment of minimum lateral acceleration for seismic (7.7.2 and A.7.7.2) with ANSI/API RP 2TOP[82].
- all sources of topsides accelerations collected (7.9.9 and A.7.9.9) and aligned;
- technical review of the accidental events (7.9 and A.7.9), with introduction of risk-informed and reliability-based approaches for fire and explosion in addition to the default semi-probabilistic approach;
- K_c correspondence factor (8.1 and A.8.1) defined according to an equivalent reliability procedure for ANSI/AISC 360-22,[12] CSA-S16:19[14] and EN 1993-1-1[13];
- bolted connection (8.4.3 and A.8.4.3) have been modified according to IOGP supplementary specification S-631-04;
- 8.5 has been renamed as 'Castings and forgings', adding references to forgings;
- addition of 8.6 and A.8.6 on design for structural stability in alignment with ANSI/API RP 2TOP[82] and based on ANSI/AISC 360-22[12] and EN 1993-1-1[13] criteria;
- addition of Clause 9 dedicated to the description of the limit state verification approaches including risk-informed and reliability-based approaches for fire and explosion (9.2, 9.3, A.9.2 and A.9.3) in addition to the default semi-probabilistic approach;
- in 10.2.1, an alternative method (method b) for the analysis of the topsides structures has been introduced with further guidance in A.10.2.1. The associated 6.4, 7.5, 7.8 and 10.1 and A.6.4, A.7.5, A.7.8 and A.10.1 have been updated accordingly;
- helicopter landing facilities (10.5) updated according to CAP 437[21] for emergency landing and addition of design load combinations (Table 7) adapted from NORSOK N-004:2022, Table F.5.[32] Deletion of the previous Table A.5;
- crane support structure clauses, 10.6 and A.10.6 have been reviewed. Crane support structure is to be designed according to API Spec 2C or EN 13852-1 and additional provisions reported. The simplified fatigue method has been aligned with ANSI/API RP 2TOP[82];
- Table 9 adapted with modifications from NORSOK N-004:2022, Table F.1[32] and addition of some example figures for DC;
- former 12.1 to 12.3.5 have been deleted and moved to ISO 19902:2020, Clause 18.
- in 12.2 Welding requirements have been reviewed;
- in 12.5 provisions for dissimilar materials have been added, adapted from NORSOK N-004:2022, F.4.4;

Clause 14 in ISO 19901-3:2104 on “Topsides structure default inspection scope” has been removed, being now covered by ISO 19901-9; in Clause 14 and A.14, the subclauses 14.2.2 and A.14.2.2 on “Critical structures” have been added;

— in Annex B, updated example of K_c calculations by utilization ratio for ISO 19902 and ANSI/AISC 360-22[12].

— removal of former Annex C. K_c is now reported as normative value in Table 4 for ANSI/AISC 360-22[12], CSA-S16:19[14] and EN 1993-1-1[13].

A list of all parts in the ISO 19901 series can be found on the ISO website.

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.

The International Standards on offshore structures prepared by TC 67 (i.e. ISO 19900, the ISO 19901 series, ISO 19902, ISO 19903, ISO 19904-1, ISO 19905-1, ISO 19905-3 and ISO 19906) constitute a common basis covering those aspects that address design requirements and assessments of all offshore structures used by the petroleum and natural gas industries including lower carbon energy 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 rules, safety elements, workmanship, quality control procedures and national requirements, all of which are mutually dependent. The modification of one aspect of design 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 all offshore structural systems.

The International Standards on offshore structures prepared by TC 67 are intended to provide 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.

This document has been prepared for those structural components of offshore platforms which are above the wave zone and are not part of the substructure or of the hull.

Historically, the design of structural components in topsides has been performed to national building standards for onshore structures, modified in accordance with experience within the offshore industry, or to relevant parts of classification society rules. While this document permits use of national building standards, and indeed remains dependent on them for the formulation of component resistance equations, it provides modifications that result in a more consistent level of component safety between substructures and topsides structures.

In some aspects, the requirements for topsides structures are the same as, or similar to, those for fixed steel structures; in such cases, reference is made to ISO 19902, with modifications where necessary. Annex A provides background to, and guidance on, the use of this document.

Annex B provides an example of the use of national building standards for onshore structures in conjunction with this document.