INTERNATIONAL STANDARD

ISO 13819-2

First edition
1995-12-01

Petroleum and natural gas industries — Offshore structures —

Part 2: Fixed steel structures

Industries du pétrole et du gaz naturel — Structures en mer —
Partie 2: Structures fixes en acier

INTERNATIONAL ISO

Number of reference
ISO 13819-2:1995(E)

Contents

Page

Foreword iii

Introduction iv

1 Scope 1

2 Definitions 1

3 Informative references 1

4 Design recommendations 1

Annexes

A Design Recommendations (API RP2A-LRFD - First Edition, 1 July 1993) 3

B Regional Information 237

B.1 North-west Europe 238

B.2 Mediterranean 254

B.3 Brazil 261

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 13819-2 was prepared by Technical Committee ISO/TC 67, *Materials equipment and offshore structures for petroleum and natural gas industries*, Sub-committee SC 7, *Offshore structures*. Annex A was prepared as ANSI/API RP2A-LRFD-93 by the American Petroleum Institute.

ISO 13819 will consist of the following parts, under the general title *Petroleum and natural gas industries — Offshore structures*:

- *Part 1: General requirements*
- *Part 2: Fixed steel structures*
- *Part 3: Fixed concrete sturctures*
- *Part 4: Floating systems*
- *Part 5: Arctic structures*
- *Part 6: Site specific assessment of MODUS*

Annexes A and B of this part of ISO 13819 are for information only.

Introduction

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 modifications 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.

International Standard ISO 13819 constitutes a common basis covering those aspects that address design requirements and assessments of all structures used by the petroleum and natural gas industries worldwide. Through its application, the intention is to achieve reliability levels appropriate for manned and unmanned offshore structures, whatever the nature or combination of the materials used.

The standard is intended to provide a wide latitude in the choice of structural configurations, materials and techniques and to allow for incorporation of technological advances without hindering innovation. It is, therefore, essential that it is used in conjunction with sound engineering judgement.

The primary objectives of Part 2 of International Standard ISO 13819 are to provide a safe place of work for personnel and to protect the environment.

The detailed provisions given in this part of ISO 13819 implement the general principles in ISO 13819-1 and are specific to fixed steel structures. While some of the provisions of this part of ISO 13819 are applicable worldwide, others are applicable to specific geographic regions only. Where this is appropriate, ISO/TC 67/SC 7 is actively striving to harmonize the differing regional technical provisions. Once harmonized, these provisions will be incorporated in an updated version of this standard.

International Standard ISO 13819-2 includes the following informative annexes:

a) Annex A, which reproduces API RP2A-LRFD, First Edition, July 1, 1993, *Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms — Load and Resistance Factor design.*

   The API document in Annex A is reproduced in this standard by permission of the American Petroleum Institute, 1200 L Street, Northwest, Washington DC 2005 U.S.A.

   ISO, in endorsing this API document as an informative annex, recognizes that in certain respects the latter does not comply with all current ISO rules on the presentation and content of an International Standard.

   Information given in the POLICY is relevant to the API publication only.

   ISO/TC 67/SC 7 is however currently engaged in updating this API document in conjunction with the American Petroleum Institute. An updated version, in a form complying with ISO rules, will be issued when practicable.

b) Annex B, which identifies regionally applicable provisions that supplement those of ISO 13819-1 and/or annex A of this part of ISO 13819.

Petroleum and natural gas industries — Offshore structures —

Part 2:
Fixed steel structures

1 Scope

This part of ISO 13819 contains provisions for the design and assessment of fixed offshore structures constructed of steel, including jackets, towers, and free standing caissons. The provisions for member resistance also apply to elements of compliant towers and possibly other types of structures to the extent that these provisions are relevant.

This part of ISO 13819 is applicable to the design of complete structures including substructures, topside structures and foundations.

It specifies design principles that are also applicable to the successive stages in construction (namely fabrication, transportation and installation), to the use of the structure during its intended life, and to its abandonment. Generally, the principles are also applicable to the reassessment or modification of existing structures. Aspects relating to quality control are also addressed.

2 Definitions

For the purposes of this International Standard, the following definition applies:

2.1 Fixed structure: Structure that is bottom founded and transfers all actions that act upon it to the sea floor.

3 Informative references

Standards referenced in Annex A that primarily address structural design of nontubular components may be replaced by equivalent ISO, CEN or national standards that can be shown to meet or exceed the requirements of the referenced standards.

4 Design recommendations

4.1 Technical provisions

Technical provisions and criteria are given in Annex A which also contains requirements and criteria specific to United States offshore regions, including partial factors.

The resistance factors that are provided in Annex A are consistent with the load factors in Annex A and should be applied to the nominal resistances for nontubular components. Equivalent International, CEN or National Standards may also be used provided consistent load and resistance factors are used.

When establishing partial factors for other geographic areas, differences in practices or in the nature of the environmental conditions should be considered to ensure that required reliability levels are achieved. The regional information given in Annex B should be consulted for guidance.

4.2 Supplementary information

In some cases, Annex A might need to be supplemented to allow for regional environmental conditions, governmental requirements and local design, construction and operating practices. Information on these aspects is contained in Annex B.

Each section of Annex B contains technical provisions and criteria for a specific geographic region, that should be used for that region in preference to the recommendations of Annex A.

NOTE 1: Depending on the legislative system of a country, some of these provisions might be mandatory within the jurisdiction of the country concerned.

NOTE 2: Further regionally-specific information will be added to Annex B as and when required.

4.3 Other regions

For regions where there is no specific information given in Annex B, the technical provisions and criteria of Annex A may be substituted by corresponding technical provisions and criteria providing these are appropriate and consistent. The user is, however, warned that certain regional provisions and criteria, for example environmental criteria and partial factors for loads, generally require development on a case-by-case basis. In such cases, reference may be made to appropriate national standards where these have been developed specifically for offshore conditions.

Annex A

(informative)

Design recommendations

The Informative Annex A of this part of ISO 13819 contains guidelines for the design of steel, fixed offshore platforms. Annex A is the American Petroleum Institute Recommended Practice for Planning, Designing and Constructing fixed Offshore Platforms - Load and Resistance Factor Design, (API RP2A-LRFD), First Edition, July 1, 1993. Annex A is supplemented by Annex B, which includes provisions for specific regional areas. The regional provisions for United States territorial waters are included in Annex A.

Annex A provisions are based on a reliability-based calibration of the American Petroleum Institute *Recommended Practice for Planning, Designing and Constructing fixed Offshore Platforms — Working Stress Design* (API RP2A - WSD), which has served widely as the de facto basis for design of offshore platforms over the last 15 years. This calibration process was carried out on a component-type by component-type basis. The load and resistance factors were developed for each component-type such that target reliabilities for Annex A are on the average consistent with those for the API RP2A-WSD.

Annex A is based on limit states design principles and the general format is consistent with ISO 13819-1.

Annex A relies on the use of the nominal resistances for nontubular components provided in the American Institute for Steel Construction entitled *Load and Resistance Factor Design Specification for Structural Steel Buildings*.

The partial factors in Annex A reflect the practices and the target reliability levels in the Gulf of Mexico and other locations where the API RP2A-WSD has served as a reference design standard.

(Blank page)

Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms — Load and Resistance Factor Design

API RECOMMENDED PRACTICE 2A-LRFD (RP 2A-LRFD)
FIRST EDITION, JULY 1, 1993

American National Standard
ANSI/API RP2A-LRFD-93
Approved: April 13, 1994

American Petroleum Institute
1220 L Street, Northwest
Washington, DC 20005

Issued by
AMERICAN PETROLEUM INSTITUTE
Production Department

FOR INFORMATION CONCERNING TECHNICAL CONTENTS OF THIS PUBLICATION CONTACT THE API PRODUCTION DEPARTMENT, 1201 MAIN STREET, SUITE 2535, DALLAS, TX 75202-3994 — (214) 748-3841. SEE BACK SIDE FOR INFORMATION CONCERNING HOW TO OBTAIN ADDITIONAL COPIES OF THIS PUBLICATION.

Users of this publication should become familiar with its scope and content. This publication is intended to supplement rather than replace individual engineering judgment.

OFFICIAL PUBLICATION

REG. U.S. PATENT OFFICE

ERRATA
(OCTOBER, 1993)

Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms — Load and Resistance Factor Design

API RECOMMENDED PRACTICE 2A-LRFD (RP 2A-LRFD)
FIRST EDITION, JULY 1, 1993

American Petroleum Institute
1220 L Street, Northwest
Washington, DC 20005

Issued by
AMERICAN PETROLEUM INSTITUTE
Production Department

FOR INFORMATION CONCERNING TECHNICAL CONTENTS OF THIS PUBLICATION CONTACT THE API PRODUCTION DEPARTMENT, 1201 MAIN STREET, SUITE 2535, DALLAS, TX 75202-3994 — (214) 748-3841. SEE BACK SIDE FOR INFORMATION CONCERNING HOW TO OBTAIN ADDITIONAL COPIES OF THIS PUBLICATION.

Users of this publication should become familiar with its scope and content. This publication is intended to supplement rather than replace individual engineering judgment.

OFFICIAL PUBLICATION

REG. U.S. PATENT OFFICE

Page 2, Table of Contents. *Change A.3.7 to read:*

A.3.7 Deck Elevation

Page 33, Section C.3.4.2.3 Turbulence Intensity. *Change Equation C.3-8 to the following:*

$$I(z) \equiv \sigma(z)/V(1\text{ hr}, z) = \begin{matrix} 0.15(z/z_s)^{-0.125} \text{ for } z \leq z_s \\ 0.15(z/z_s)^{-0.275} \text{ for } z > z_s \end{matrix} \quad \ldots\ldots \text{(C.3-8)}$$

Page 52, Section D.3.2.1 Cylindrical Members. *Change Equation D.3.2-1 to the following:*

$$\frac{f_c}{\phi_c F_{cn}} + \frac{1}{\phi_b F_{bn}} \left\{ \left[\frac{C_{my} f_{by}}{\left(1 - \frac{f_c}{\phi_c F_{ey}}\right)} \right]^2 + \left[\frac{C_{mz} f_{bz}}{\left(1 - \frac{f_c}{\phi_c F_{ez}}\right)} \right]^2 \right\}^{0.5} \leqq 1.0 \quad \ldots\ldots \text{(D.3.2-1)}$$

Change Equation D.3.2-3 to the following:

$$f_c < \phi_c F_{xc} \quad \ldots\ldots \text{(D.3.2-3)}$$

Page 55, Section E.1 Connections of Tension and Compression Members. *Add the following note after the definition of* F_y *for Equation E.3-1:*

Note: The tensile strength limitation on F_y is intended to apply throughout Section E.

Page 83, Table I.1 Structural Steel Plates. *Change information shown under Group II, Class C, to the following:*

GROUP	CLASS	SPECIFICATION & GRADE	YIELD STRENGTH MPa	YIELD STRENGTH ksi	TENSILE STRENGTH MPa	TENSILE STRENGTH ksi
II	C	ASTM A572 Grade 42 (to 2″ thick)*	290	42	415 min.	60 min.
		ASTM A572 Grade 50 (to 2″ thick; ASTM S91 required over ½″)*	345	50	450 min.	65 min.

Page 84, Table I.2 Structural Steel Shapes. *Change information shown under Group II, Class C to the following:*

GROUP	CLASS	ASTM SPECIFICATION & GRADE	YIELD STRENGTH MPa	YIELD STRENGTH ksi	TENSILE STRENGTH MPa	TENSILE STRENGTH ksi
II	C	A572 Grade 42 (to 50 mm (2 in) thick)[1]	290	42	415 min.	60 min.
		A572 Grade 50 (to 50 mm (2 in) thick; S91 required over 13 mm (½ in) thick)[1]	345	50	450 min.	65 min.

Page 127, Commentary Comm.C.3.1 Strength Requirements, Fourth Paragraph, Third Sentence. *Change* L_2 *to* L_1.

Order No. 811-00211

Additional copies available from
AMERICAN PETROLEUM INSTITUTE
Publications and Distribution Section
1220 L Street, NW
Washington, DC 20005
(202) 682-8375

(Blank page)