Planning, Designing, and Constructing Floating Production Systems

API RECOMMENDED PRACTICE 2FPS
SECOND EDITION, OCTOBER 2011

REAFFIRMED, SEPTEMBER 2020

Special Notes

API publications necessarily address problems of a general nature. With respect to particular circumstances, local, state, and federal laws and regulations should be reviewed.

Neither API nor any of API's employees, subcontractors, consultants, committees, or other assignees make any warranty or representation, either express or implied, with respect to the accuracy, completeness, or usefulness of the information contained herein, or assume any liability or responsibility for any use, or the results of such use, of any information or process disclosed in this publication. Neither API nor any of API's employees, subcontractors, consultants, or other assignees represent that use of this publication would not infringe upon privately owned rights.

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to assure the accuracy and reliability of the data contained in them; however, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any authorities having jurisdiction with which this publication may conflict.

API publications are published to facilitate the broad availability of proven, sound engineering and operating practices. These publications are not intended to obviate the need for applying sound engineering judgment regarding when and where these publications should be utilized. The formulation and publication of API publications is not intended in any way to inhibit anyone from using any other practices.

Any manufacturer marking equipment or materials in conformance with the marking requirements of an API standard is solely responsible for complying with all the applicable requirements of that standard. API does not represent, warrant, or guarantee that such products do in fact conform to the applicable API standard.

Users of this Recommended Practice should not rely exclusively on the information contained in this document. Sound business, scientific, engineering, and safety judgment should be used in employing the information contained herein.

Foreword

API 2FPS is one of a series of API and other standards for offshore structures in the Gulf of Mexico. This suite of standards, hereby referenced as the API Floating Structures Standards (AFSS), are a suite of applicable "Working Stress Design" standards for structures to be deployed in U.S. waters. The suite consists of the following standards.

— API 2A-WSD, Planning, Designing and Constructing Fixed Offshore Platforms-Working Stress Design

— API Spec 2C, Specification for Offshore Cranes

— API RP 2D, Recommended Practice for Operation and Maintenance of Offshore Cranes

— API Bull 2INT-MET, Interim Guidance on Hurricane Conditions in the Gulf of Mexico

— API RP 2MOP, Marine Operations

— API RP 2RD, Recommended Practice for Design of Risers for Floating Production Systems (FPSs) and Tension-Leg Platforms (TLPs)

— API 2SIM, Structural Integrity Management of Fixed Offshore Structures

— API RP 2SK, Design and Analysis of Stationkeeping Systems for Floating Structures

— API RP 2T, Recommended Practice for Planning, Design and Constructing Tension Leg Platforms

— API Bull 2U, Stability Design of Cylindrical Shells

— API Bull 2V, Design of Flat Plate Structures

— API RP 14J, Recommended Practice for Design and Hazards Analysis for Offshore Production Facilities

— API RP 75L, Guidance Document for the Development of a Safety and Environmental Management System for Onshore Oil and Natural Gas Production Operation and Associated Activities

— AISC 360-05, Specification for Structural Steel Buildings

— AWS D1.1, Structural Welding Code - Steel

The AFSS is deemed acceptable in regions that experience tropical cyclonic activity. Utilization of the AFSS in other regions can be acceptable if agreed by the owner and by the regulator, where one exists.

Nothing contained in any API publication is to be construed as granting any right, by implication or otherwise, for the manufacture, sale, or use of any method, apparatus, or product covered by letters patent. Neither should anything contained in the publication be construed as insuring anyone against liability for infringement of letters patent.

Shall: As used in a standard, “shall” denotes a minimum requirement in order to conform to the specification.

Should: As used in a standard, “should” denotes a recommendation or that which is advised but not required in order to conform to the specification.

This document was produced under API standardization procedures that ensure appropriate notification and participation in the developmental process and is designated as an API standard. Questions concerning the interpretation of the content of this publication or comments and questions concerning the procedures under which this publication was developed should be directed in writing to the Director of Standards, American Petroleum Institute, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001. Requests for permission to reproduce or translate all or any part of the material published herein should also be addressed to the director.

Generally, API standards are reviewed and revised, reaffirmed, or withdrawn at least every five years. A one-time extension of up to two years may be added to this review cycle. Status of the publication can be ascertained from the API Standards Department, telephone (202) 682-8000. A catalog of API publications and materials is published annually by API, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001.

Suggested revisions are invited and should be submitted to the Standards Department, API, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001, standards@api.org.

Contents

Page

Introduction

The series of Standards applicable to types of offshore structure, constitutes a common basis covering those aspects that address design requirements and assessments of all offshore structures used by the petroleum, petrochemical 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 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 series of Standards applicable to types of offshore structure is intended to provide wide latitude in the choice of structural configurations, materials and techniques without hindering innovation. Sound engineering judgment is therefore necessary in the use of these International Standards.

API 2FPS was developed in response to the offshore industry's demand for a coherent and consistent definition of methodologies to design, analyse and assess floating offshore structures of the class described in Clause 1. In particular, this standard addresses monohulls, semi-submersibles and spars.

Some background to, and guidance on, the use of this standard is provided in informative Annex A. The clause numbering in Annex A is the same as in the normative text to facilitate cross-referencing.

Planning, Designing, and Constructing Floating Production Systems

1 Scope

This document provides requirements and guidance for the structural design and/or assessment of floating offshore platforms used by the petroleum and natural gas industries to support the following functions:

— production;

— storage and/or offloading;

— drilling and production;

— production, storage and offloading;

— drilling, production, storage and offloading.

NOTE 1 Floating offshore platforms are often referred to using a variety of abbreviations, e.g. FPS, FSU, FPSO, etc. (see Clauses 3 and 4), in accordance with their intended mission.

NOTE 2 In this standard, the term “floating structure”, sometimes shortened to “structure”, is used as a generic term to indicate the structural systems of any member of the classes of platforms defined above.

NOTE 3 In some cases, floating platforms are designated as “early production platforms”. This term relates merely to an asset development strategy. For the purposes of this International Standard, the term “production” includes “early production”.

Its requirements do not apply to the structural systems of mobile offshore units (MOUs). These include, among others:

— floating structures intended primarily to perform drilling and/or well intervention operations (often referred to as MODUs), even when used for extended well test operations;

— floating structures used for offshore construction operations (e.g. crane barges or pipelay barges), for temporary or permanent offshore living quarters (floatels), or for transport of equipment or products (e.g. transportation barges, cargo barges), for which structures reference is made to relevant recognized classification society (RCS) rules.

Its requirements are applicable to all possible life-cycle stages of the structures defined above, such as

— design, construction and installation of new structures, including requirements for inspection, integrity management and future removal,

— structural integrity management covering inspection and assessment of structures in-service, and

— conversion of structures for different use (e.g. a tanker converted to a production platform) or reuse at different locations.

The following types of floating structure are explicitly considered within the context of this standard:

a) monohulls (ship-shaped structures and barges);

b) semi-submersibles;

c) spars.