Recommended Practice for Planning, Designing and Constructing Fixed OffshorePlatforms—Working Stress Design

API RECOMMENDED PRACTICE 2A-WSD (RP 2A-WSD)
TWENTY-FIRST EDITION, DECEMBER 20[illegible]
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AMERICAN PETROLEUM INSTITUTE

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Upstream Segment

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FOREWORD

This *Recommended Practice for Planning, Designing, and Constructing Fixed Offshore Platforms* contains engineering design principles and good practices that have evolved during the development of offshore oil resources. Good practice is based on good engineering; therefore, this recommended practice consists essentially of good engineering recommendations. In no case is any specific recommendation included which could not be accomplished by presently available techniques and equipment. Consideration is given in all cases to the safety of personnel, compliance with existing regulations, and antipollution of water bodies.

Metric conversions of customary English units are provided throughout the text of this publication in parentheses, e.g., 6 in. (152 mm). Most of the converted values have been rounded for most practical usefulness; however, precise conversions have been used where safety and technical considerations dictate. In case of dispute, the customary English values should govern.

Offshore technology is growing rapidly. In those areas where the committee felt that adequate data were available, specific and detailed recommendations are given. In other areas general statements are used to indicate that consideration should be given to those particular points. Designers are encouraged to utilize all research advances available to them. As offshore knowledge continues to grow, this recommended practice will be revised. It is hoped that the general statements contained herein will gradually be replaced by detailed recommendations.

Reference in this practice is made to the latest edition of the AISC *Specification for the Design, Fabrication and Erection of Structural Steel for Buildings* (see Section 2.5.1a). While the use of latest edition of this specification is generally endorsed, the use of the new AISC *Load & Resistance Factor Design (LRFD), First Edition* is specifically not recommended for design of offshore platforms. The load and resistance factors in this new code are based on calibration with building design practices and are therefore not applicable to offshore platforms. Research work is now in progress to incorporate the strength provisions of the new AISC LRFD code into offshore design practices.

In this practice, reference is made to ANSI/AWS D1.1-2002 *Structural Welding Code—Steel*. While use of this edition is endorsed, the primary intent is that the AWS code be followed for the welding and fabrication of Fixed Offshore Platforms. Chapters 8, 9, and 10 of the AWS Code give guidance that may be relevant to the design of Fixed Offshore Platforms. This Recommended Practice makes specific reference to Chapter 9 and 10 for certain design considerations. Where specific guidance is given in this API document, as in Sections 4 and 5, this guidance should take precedence.

This standard shall become effective on the date printed on the cover but may be used voluntarily from the date of distribution.

Attention Users: Portions of this publication have been changed from the previous edition. The locations of changes have been marked with a bar in the margin, as shown to the left of this paragraph. In some cases the changes are significant, while in other cases the changes reflect minor editorial adjustments. The bar notations in the margins are provided as an aid to users as to those parts of this publication that have been changed from the previous edition, but API makes no warranty as to the accuracy of such bar notations.

Note: This edition supersedes the 20th Edition dated July 1, 1993.

This Recommended Practice is under jurisdiction of the API Subcommittee on Offshore Structures and was authorized for publication at the 1969 standardization conference. The first edition was issued October 1969.

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CONTENTS

Page

Figures

Page

Tables

Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms—Working Stress Design

0 Definitions

fixed platform: A platform extending above and supported by the sea bed by means of piling, spread footings or other means with the intended purpose of remaining stationary over an extended period.

manned platform: A platform which is actually and continuously occupied by persons accommodated and living thereon.

unmanned platform: A platform upon which persons may be employed at any one time, but upon which no living accommodations or quarters are provided.

operator: The person, firm, corporation or other organization employed by the owners to conduct operations.

ACI: American Concrete Institute.

AIEE: American Institute of Electrical Engineers.

AISC: American Institute of Steel Construction.

API: American Petroleum Institute.

ASCE: American Society of Civil Engineers.

ASME: American Society of Mechanical Engineers.

ASTM: American Society for Testing and Materials.

AWS: American Welding Society.

IADC: International Association of Drilling Contractors.

NACE: National Association of Corrosion Engineers.

NFPA: National Fire Protection Association.

OTC: Offshore Technology Conference.

1 Planning

1.1 GENERAL

1.1.1 Planning

This publication serves as a guide for those who are concerned with the design and construction of new platforms and for the relocation of existing platforms used for the drilling, development, and storage of hydrocarbons in offshore areas. In addition, guidelines are provided for the assessment of existing platforms in the event that it becomes necessary to make a determination of the "fitness for purpose" of the structure.

Adequate planning should be done before actual design is started in order to obtain a workable and economical offshore structure to perform a given function. The initial planning should include the determination of all criteria upon which the design of the platform is based.

1.1.2 Design Criteria

Design criteria as used herein include all operational requirements and environmental data which could affect the detailed design of the platform.

1.1.3 Codes and Standards

This publication has also incorporated and made maximum use of existing codes and standards that have been found acceptable for engineering design and practices from the standpoint of public safety.

1.2 OPERATIONAL CONSIDERATIONS

1.2.1 Function

The function for which a platform is to be designed is usually categorized as drilling, producing, storage, materials handling, living quarters, or a combination of these. The platform configuration should be determined by a study of layouts of equipment to be located on the decks. Careful consideration should be given to the clearances and spacing of equipment before the final dimensions are decided upon.

1.2.2 Location

The location of the platform should be specific before the design is completed. Environmental conditions vary with geographic location; within a given geographic area, the foundation conditions will vary as will such parameters as design wave heights, periods, and tides.

1.2.3 Orientation

The orientation of the platform refers to its position in the plan referenced to a fixed direction such as true north. Orientation is usually governed by the direction of prevailing seas, winds, currents, and operational requirements.

1.2.4 Water Depth

Information on water depth and tides is needed to select appropriate oceanographic design parameters. The water depth should be determined as accurately as possible so that elevations can be established for boat landings, fenders, decks, and corrosion protection.