

# Offshore Pedestal-mounted Cranes

API SPECIFICATION 2C  
SEVENTH EDITION, MARCH 2012  
ERRATA, MARCH 2013

EFFECTIVE DATE: OCTOBER 2012



AMERICAN PETROLEUM INSTITUTE

Currently in preview, click buy full version

# Offshore Pedestal-mounted Cranes

## Upstream Segment

API SPECIFICATION 2C  
SEVENTH EDITION, MARCH 2012  
ERRATA, MARCH 2013

EFFECTIVE DATE: OCTOBER 2012



AMERICAN PETROLEUM INSTITUTE

## 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 Specification 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.

Copyright reserved. No part of this work may be reproduced, translated, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from the publisher. Contact the Publisher, API Publishing Services, 1220 L Street, NW, Washington, DC 20005.

## Foreword

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, 1220 L Street, NW, Washington, DC 20005. 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, 1220 L Street, NW, Washington, DC 20005.

Suggested revisions are invited and should be submitted to the Standards Department, API, 1220 L Street, NW, Washington, DC 20005, [standards@api.org](mailto:standards@api.org).

Currently in preview, click buy full version

## Contents

|  | Page |
|--|------|
| 1 Scope .....  | 1    |
| 2 Normative References.....  | 1    |
| 3 Terms, Definitions and Abbreviations.....                                | 4    |
| 3.1 Terms and Definitions.....   | 4    |
| 3.2 Abbreviations.....   | 17   |
| 3.3 Units .....  | 18   |
| 4 Documentation.....   | 21   |
| 4.1 Manufacturer-supplied Documentation upon Purchase.....                 | 21   |
| 4.2 Purchaser-supplied Information prior to Purchase.....                  | 22   |
| 4.3 Record Retention.....  | 22   |
| 5 Loads .....  | 22   |
| 5.1 Safe Working Limits .....  | 22   |
| 5.2 Critical Components .....  | 23   |
| 5.3 Forces and Loadings .....  | 23   |
| 5.4 In-service Loads .....   | 23   |
| 5.5 Out-of-service Loads.....  | 32   |
| 5.6 Wind, Ice, and Seismic Loads .....                                     | 33   |
| 6 Structure.....   | 34   |
| 6.1 General .....  | 34   |
| 6.2 Pedestal, Kingpost, and Crane Supporting Foundation.....               | 35   |
| 6.3 Exceptions to use of AISC .....  | 35   |
| 6.4 Structural Fatigue .....   | 35   |
| 7 Mechanical .....   | 36   |
| 7.1 Machinery and Wire Rope Duty Cycle.....                                | 36   |
| 7.2 Critical Rigging Components.....                                       | 39   |
| 7.3 Boom Hoist, Load Hoist, Telescoping, and Folding Boom Mechanisms ..... | 46   |
| 7.4 Swing Mechanism .....  | 52   |
| 7.5 Power Plant .....  | 56   |
| 8 Ratings .....  | 57   |
| 8.1 General .....  | 57   |
| 8.2 Load Rating and Information Charts.....                                | 59   |
| 9 Gross Overload Conditions .....  | 61   |
| 9.1 General .....  | 61   |
| 9.2 Failure Mode Calculations .....  | 62   |
| 9.3 Calculation Methods .....  | 62   |
| 9.4 Failure Mode Charts .....  | 62   |
| 9.5 Gross Overload Protection System (GOPS).....                           | 62   |
| 10 Human Factors—Health, Safety, and Environment.....                      | 63   |
| 10.1 Controls .....  | 63   |
| 10.2 Cabs and Enclosures .....   | 65   |
| 10.3 Miscellaneous Requirements and Equipment .....                        | 68   |
| 11 Manufacturing Requirements.....   | 72   |
| 11.1 Material Requirements of Critical Components.....                     | 72   |
| 11.2 Welding of Critically Stressed Components .....                       | 76   |

## Contents

|   | Page |
|---|------|
| 11.3 Nondestructive Examination of Critical Components . . . . .                            | 77   |
| 12 Design Validation by Testing . . . . .   | 77   |
| 12.1 Design Validation . . . . .  | 77   |
| 12.2 Certification . . . . .  | 79   |
| 12.3 Operational Tests . . . . .  | 79   |
| 13 Marking . . . . .  | 80   |
| Annex A (informative) Example List of Critical Components . . . . .                         | 81   |
| Annex B (informative) Commentary . . . . .  | 83   |
| Annex C (informative) API Monogram Program . . . . .  | 100  |
| Annex D (normative) Cylinder Calculation Methods . . . . .                                  | 104  |
| Annex E (informative) Example Calculations . . . . .  | 107  |
| Annex F (informative) Additional Purchaser Supplied Information . . . . .                   | 122  |
| Bibliography . . . . .  | 124  |
| <b>Figures</b>  |      |
| 1 Crane Illustrations . . . . .   | 2    |
| 2 Offboard Loadings . . . . .   | 25   |
| 3 Onboard Loadings . . . . .  | 26   |
| 4 Out-of-service Loadings . . . . .   | 27   |
| 5 Some Methods of Securing Dead End of Rope when using Conventional Wedge Sockets . . . . . | 42   |
| 6 Sheave Dimensions . . . . .   | 43   |
| 7 Hoist Drum . . . . .  | 48   |
| 8 Plots of Rated Loads for Various Operating Conditions . . . . .                           | 61   |
| 9 Basic Four-lever Crane Control Diagram . . . . .  | 65   |
| 10 Basic Two-Lever Crane Control Diagram (Option 1) . . . . .                               | 66   |
| 11 Basic Two-Lever Crane Control Diagram (Option 2) . . . . .                               | 67   |
| B.1 Variable Pedestal Factor . . . . .  | 88   |
| C.1 API Monogram Nameplate . . . . .  | 103  |
| D.1 Cylinder Configuration . . . . .  | 106  |
| E.1 Swing Bearing Ultimate Strengths . . . . .  | 120  |
| <b>Tables</b>   |      |
| 1 Description of Symbols . . . . .  | 18   |
| 2 Summary of Design Parameter . . . . .   | 24   |
| 3 Vertical Velocity for Dynamic Coefficient Calculations . . . . .                          | 27   |
| 4 Crane Vertical Acceleration . . . . .   | 28   |
| 5 Crane Base Inclinations and Accelerations . . . . .                                       | 28   |
| 6 Recommended Shape Coefficients . . . . .  | 33   |
| 7 Classification of Offshore Crane Applications . . . . .                                   | 37   |
| 8 Auxiliary Hoist – 5 Year TBO . . . . .  | 37   |
| 9 Main Hoist – 5 Year TBO . . . . .   | 37   |
| 10 Boom Hoist – 5 Year TBO . . . . .  | 37   |
| 11 Slew Mechanism – 5 Year TBO . . . . .  | 38   |
| 12 Prime Mover and Pump Drive – 5 Year TBO . . . . .  | 38   |

## Contents

|  | Page |
|--|------|
| 13 Wire Rope TBR by Typical Offshore Crane Classification .....                        | 38   |
| 14 Auxiliary Wire Rope .....   | 39   |
| 15 Main Wire Rope .....  | 39   |
| 16 Boom Wire Rope .....  | 39   |
| 17 Sheave Groove Radius, Metallic Rim .....  | 44   |
| 18 Sheave Groove Radius, Cast Nylon Rim .....  | 45   |
| 19 Four-lever Crane Control Function .....   | 65   |
| 20 Two-Lever Crane Control Function (Option 1) .....                                   | 66   |
| 21 Two-Lever Crane Control Function (Option 2) .....                                   | 67   |
| 22 Indicators, Alarms, and Limits .....  | 69   |
| 23 Boom and Load Indicators .....  | 70   |
| 24 Level 1 Fracture Toughness .....  | 73   |
| 25 Casting Acceptance Criteria Based on ASTM Radiographic Standards .....              | 74   |
| 26 Level 2 Fracture Toughness .....  | 74   |
| 27 Bearing Ring Steel Cleanliness Limits .....   | 75   |
| 28 Workmanship Standard Examples .....   | 78   |
| B.1 General Method–Vessel Information .....  | 84   |
| B.2 General Method Sample Design Value Calculations TLP and Spa .....                  | 85   |
| B.3 Minimum Required Hook Speeds at Supply Boat Deck vs. Significant Wave Height ..... | 86   |
| B.4 Crane Structures .....   | 89   |
| B.5 Auxiliary Hoist – Five Year TBO .....  | 90   |
| B.6 Main Hoist – Five Year TBO .....   | 90   |
| B.7 Boom Hoist – Five Year TBO .....   | 90   |
| B.8 Slew Mechanism – Five Year TBO .....   | 90   |
| B.9 Prime Mover and Pump Drive – Five Year TBO .....                                   | 91   |
| B.10 Main Hoist Wire Rope .....  | 91   |
| B.11 Auxiliary Hoist Wire Rope .....   | 91   |
| B.12 Boom Hoist – Wire Rope .....  | 92   |
| B.13 Calculated Noise Exposures .....  | 94   |

Currently in preview, click buy full version

# Offshore Pedestal-mounted Cranes

## 1 Scope

This specification provides requirements for design, construction, and testing of new offshore pedestal-mounted cranes. For the purposes of this specification, offshore cranes are defined as pedestal-mounted elevating and rotating lift devices for transfer of materials or personnel to or from marine vessels, barges and structures.

Typical applications can include:

- a) offshore oil exploration and production applications; these cranes are typically mounted on a fixed (bottom-supported) structure, floating platform structure, or ship-hulled vessel used in drilling and production operations;
- b) shipboard applications; these cranes are mounted on surface-type vessels and are used to move cargo, containers, and other materials while the crane is within a harbor or sheltered area; and
- c) heavy-lift applications; cranes for heavy-lift applications are mounted on barges, self-elevating vessels or other vessels, and are used in construction and salvage operations within a harbor or sheltered area or in limited (mild) environmental conditions.

Figure 1 illustrates some (but not all) of the types of cranes covered under this specification. While there are many configurations of pedestal-mounted cranes covered in the scope of this specification, it is not intended to be used for the design, fabrication, and testing of davits or emergency escape devices. Additionally, this specification does not cover the use of cranes for subsea lifting and lowering operations or constant-tension systems.

## 2 Normative References

The following referenced documents are indispensable for the application of this specification. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any addenda) applies.

API Recommended Practice 2A-WSD, *Planning, Designing and Constructing Fixed Offshore Platforms—Working Stress Design*, 21st Edition

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

API Specification 2H, *Specification for Carbon Manganese Steel Plate for Offshore Platform Tubular Joints*

API Recommended Practice 2X, *Recommended Practice for Ultrasonic Examination of Offshore Structural Fabrication and Guidelines for Qualifications of Technicians*

API Specification 9A, *Specification for Wire Rope*

API Recommended Practice 14F, *Recommended Design and Installation for Unclassified and Class I, Division 1 and Division 2 Locations*

API Recommended Practice 500, *Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2*

API Recommended Practice 505, *Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1 and Zone 2*