Operation, Inspection, Maintenance, and Repair of Drilling and Well Servicing Structures

API RECOMMENDED PRACTICE 4G
FIFTH EDITION, FEBRUARY 2019

ADDENDUM 1, MAY 2020
ADDENDUM 2, SEPTEMBER 2020

REAFFIRMED, SEPTEMBER 2026



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. The use of API publications is voluntary. In some cases, third parties or authorities having jurisdiction may choose to incorporate API standards by reference and may mandate compliance.

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.

All rights 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, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001.

Copyright © 2019 American Petroleum Institute

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.

The verbal forms used to express the provisions in this specification are as follows:

— the term “shall” denotes a minimum requirement in order to conform to the standard;

— the term “should” denotes a recommendation or that which is advised but not required in order to conform to the standard;

— the term “may” is used to express permission or a provision that is optional;

— the term “can” is used to express possibility or capability.

Informative elements—As used in a standard, “informative” denotes elements that identify the document, introduce its content, and explain its background, development, and its relationship with other documents or provide additional information intended to assist the understanding or use of the document.

Normative elements—As used in a standard, “normative” denotes elements that describe the scope of the document and that set out provisions that are required to implement the standard.

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

1 Scope . . . 1
1.1 Objective . . . 1
1.2 Structures Covered . . . 1

2 Normative References . . . 1

3 Terms, Definitions, Acronyms, and Abbreviations . . . 1
3.1 Terms and Definitions . . . 1
3.2 Acronyms and Abbreviations . . . 3

4 General Principles . . . 3
4.1 Procedures . . . 3
4.2 Personnel Qualifications . . . 4
4.3 Training . . . 5

5 Use and Maintenance . . . 5
5.1 General . . . 5
5.2 Loading . . . 5
5.3 Bolted Structure . . . 6
5.4 Racking Platforms . . . 6
5.5 Changes in Rig Location . . . 6

6 Inspection . . . 7
6.1 General . . . 7
6.2 Inspection Categories . . . 8
6.3 Frequency of Inspection . . . 9
6.4 Acceptance Criteria . . . 10
6.5 Rejected Equipment . . . 10
6.6 Damage Classification . . . 10

7 Repair . . . 10
7.1 General . . . 10
7.2 Corrosion . . . 11
7.3 Fire and Heat Exposure . . . 11

8 Modification/Change in Rating . . . 12
8.1 Planning . . . 12
8.2 Design and Modification . . . 12
8.3 Padeyes . . . 12
8.4 Lifting Eyes . . . 12
8.5 Nameplates for a Modification/Change in Rating . . . 12

9 Documentation and Records . . . 13
9.1 Inspection and Repair Records . . . 13
9.2 Identification/Traceability . . . 14

10 Unidentified Equipment-load Rating Determination . . . 16
10.1 Procedure . . . 16
10.2 Qualification . . . 16

11 Foundation Requirements . . . 16
11.1 General . . . 16
11.2 Leveling and Shimming . . . 17

Contents

Page

12 Raising/Bridle Line Inspection and Replacement . . . 17

13 Guying for Portable Masts with Guylines . . . 18
13.1 General . . . 18
13.2 Standing Ropes . . . 19
13.3 Frequency of Inspection . . . 19
13.4 Guywire End Terminations and Hardware . . . 19
13.5 Pretension of Guywires . . . 20

14 Guywire Anchors for Portable Masts with Guylines . . . 20
14.1 General . . . 20
14.2 Capacity Verification . . . 21
14.3 Alternative Anchoring Practices . . . 21
14.4 Pull Testing and Site Preparation . . . 22
14.5 Responsibilities of Contractor, Operator, and Testing Company . . . 23

15 Foundations for Masts and Substructures . . . 24
15.1 Foundations and Supplemental Footing . . . 24
15.2 Wellhead Cellars . . . 24

16 Low-temperature Operations . . . 24

Annex A (normative) Drilling Mast Visual Inspection Form . . . 27

Annex B (normative) Well Servicing Masts Visual Inspection Form . . . 37

Annex C (normative) Drilling Derrick Visual Inspection Form . . . 43

Annex D (normative) Substructure Visual Inspection Form . . . 51

Bibliography . . . 57

Figures
1 Typical Mast Lifting Lugs . . . 12
2 Recommended Guying Pattern . . . 18
3 Guywire Sag (Catenary) . . . 20
4 Anchor Spacing and Capacity Criteria . . . 22
5 Portable Mast Location Preparation . . . 25

Tables
1 Inspection Types and Frequencies for Drilling Structures . . . 9
2 Inspection Types and Frequences for Well Servicing Structures . . . 9
3 Inspection Criteria . . . 11
4 Guying Recommendations . . . 20
5 Guywire Sag Values . . . 21
6 Anchor Capacity of Guywire Load . . . 22
7 Safe Bearing Capacity of Soils . . . 26

Operation, Inspection, Maintenance, and Repair of Drilling and Well Servicing Structures

1 Scope

1.1 Objective

This document provides guidelines and establishes recommended procedures for inspection, maintenance, and repair of items for drilling and well servicing structures, in order to maintain the serviceability of this equipment. The information in this document should be considered as supplemental to, and not as a substitute for, the manufacturer's instructions and the recommendations in API 54.

1.2 Structures Covered

Items of drilling and well servicing structures covered by this document include:

— masts/derricks and accessories;

— substructures and accessories.

NOTE 1 Crown block sheaves and bearings are covered under API 8B.

NOTE 2 Offshore derricks and their substructures and accessories are not under the scope of this document relative to 6.2.4, Category IV inspection requirements.

2 Normative References

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

API Specification 4F, *Drilling and Well Servicing Structures*

ASNT SNT-TC-1A, *Recommended Practice for Personnel Qualification and Certification in Non-Destructive Testing*

AWS D1.1, *Structural Welding Code*

ISO 9712, *Non-Destructive Testing—Qualification and Certification of NDT Personnel*

3 Terms, Definitions, Acronyms, and Abbreviations

For the purposes of this document, the following terms, definitions, acronyms, and abbreviated terms apply. In addition, terms and definitions given in API 4F apply. If identical terms are defined in API 4F and this document, the definitions in this document apply.

3.1 Terms and Definitions

3.1.1
certification
The act of endorsing as meeting set standards or requirements.