Well Control Systems for Well Servicing

API STANDARD 16WS
FIRST EDITION, MAY 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 ensure 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 used. 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.

Classified areas may vary depending on the location, conditions, equipment, and substances involved in any given situation. Users of this standard should consult with the appropriate authorities having jurisdiction.

Users of this standard 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.

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 20001-5571.

Copyright © 2026 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 document are as follows.

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

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

May: As used in a standard, “may” denotes a course of action permissible within the limits of a standard.

Can: As used in a standard, “can” denotes a statement of possibility or capability.

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

2 Normative References 1

3 Terms, Definitions, Abbreviations, and Symbols 2
3.1 Terms and Definitions 2
3.2 Abbreviations 8
3.3 Symbols 8

4 Cased Hole Well Containment Equipment 8
4.1 General 8
4.2 Well Servicing Operations 8
4.3 Operational Pressure Categories 10
4.4 Well Control Stack Configurations 11
4.5 BOP Stack Equipment 14
4.6 Pressure Containment Equipment 15
4.7 BOP Accumulator Systems 22
4.8 Auxiliary Equipment 27
4.9 BOP System Pressure Sealing Components 27
4.10 BOP Preventers for H_2S Service 29
4.11 Pressure Measurement Devices 29
4.12 Inspection and Maintenance—BOPE Systems 30

5 Testing—BOPE Systems 32
5.1 Purpose 32
5.2 General 32
5.3 Inspection Tests 32
5.4 Competency 32
5.5 Function Tests 33
5.6 Accumulator System Response Time 33
5.7 Pressure Tests 33
5.8 Hydraulic Chamber Tests 34
5.9 Test Fluids 34
5.10 Test Documentation 34
5.11 General Testing Requirements 34
5.12 BOPE Stack Equipment 35
5.13 Accumulator/Closing Unit Drawdown Test 35

Annex A (informative) Accumulator Precharge Calculations 37

Annex B (informative) Example Worksheets and Calculations 38

Annex C (normative) Testing 41

Bibliography 47

Contents

Page

Figures

1 Example Well Service Rig Land BOP 11
2 Example 5K RWP Choke Line and Choke Manifold 15
3 Example 5K to 10K RWP Choke Line and Choke Manifold 16
4 Example Less than 5K RWP Kill Line 16
5 Example Greater than 5K to 10K RWP Kill Line 16
6 Example 10K or Greater RWP Kill Line 17
7 Well Service Pump Circulation System Without Manifold 18
8 Well Service Pump Circulation System With Manifold 19
B.1 Example BOP Function Test Worksheet for Land and Surface Offshore 38
B.2 Example BOP Drawdown Test Worksheet for Land and Surface Offshore 39

Tables

1 Surface BOP Pressure Designations 10
2 Pressure Categories for Well Servicing (Cased Hole) Well Control Equipment 10
3 Well Servicing Well Control Stack Equipment Configuration 13
4 Well Servicing Choke-Kill Manifold Configuration 13
5 Pressure Rating for internal Threaded End or Outlet Connectors 20
B.1 Example Surface MEWSP Calculations Given Well and Equipment-Specific Data 40
C.1 Initial Function Testing (Surface BOP Stacks) 41
C.2 Subsequent Operational Function Testing (Surface BOP Stacks) 42
C.3 Scheduled Function Testing (Surface BOP Stacks) 43
C.4 Initial Pressure Testing (Surface BOP Stacks) 44
C.5 Subsequent Operational Pressure Testing (Surface BOP Stacks) 45
C.6 Operating Chamber Pressure Testing (Surface BOP Stacks) 46

Introduction

Well control equipment systems are designed with components that provide wellbore pressure control in support of well operations. To the extent that this document recommends specific equipment arrangements, it is recognized that other arrangements can be equally effective in addressing well requirements and achieving safety and operational efficiency.

Well Control Systems for Well Servicing

1 Scope

This document contains procedures for the installation and testing of blowout prevention equipment systems on land for well service rigs working in a cased well. Work performed in open hole with a well service rig should be performed in accordance with API Standard 53. Its purpose is to provide the means to contain well fluids to the wellbore, add fluids to the wellbore, and allow controlled fluid volumes to be removed from the wellbore.

The following components are included in the scope of this document for operations under varying rig and well conditions:

— blowout preventers (BOPs);

— injection and circulating lines;

— injection and circulating manifolds;

— accumulator systems;

— auxiliary equipment.

This document does not include the following:

— diverters, shut-in devices, or rotating head systems (rotating control devices, whose primary purpose is to safely divert or direct flow rather than to contain fluids to the wellbore);

NOTE See API 64 and API 16RCD, respectively.

— procedures and techniques for well control;

— coil tubing well control equipment (see API 16ST).

2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any addenda) applies.

API Specification 6A, *Specification for Wellhead and Tree Equipment*

API Specification 7K, *Drilling and Well Servicing Equipment*

API Specification 16A, *Specification for Drill-through Equipment*

API Specification 16C, *Choke and Kill Equipment*

API Specification 16D, *Specification for Control Systems for Drilling Well Control Equipment and Control Systems for Diverter Equipment*

ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*

ASME B31.3, *Process Piping*

ASME *Boiler and Pressure Vessel Code (BPVC),* Section IX: *Welding and Brazing Qualifications*