

Gate, Globe, and Check Valves for Sizes DN 100 (NPS 4) and Smaller for the Petroleum and Natural Gas Industries

API STANDARD 602
TENTH EDITION, MAY 2015

API MONOGRAM PROGRAM EFFECTIVE DATE: NOVEMBER 19, 2015

ERRATA , SEPTEMBER 2016



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

Copyright © 2015 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.

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.

Contents

Page

1	Scope	1
2	Normative References	2
3	Terms and Definitions	3
4	Pressure/Temperature Ratings	3
4.1	Valve Ratings	3
4.2	Temperature Constraints	12
5	Design	12
5.1	Reference Design	12
5.2	Flow Passageway	12
5.3	Wall Thickness	12
5.4	Valve Body	14
5.5	Valve Bonnet or Cover	17
5.6	Closure Element	18
5.7	Stem	19
5.8	Stem Nut or Stem Bushing	21
5.9	Packing, Packing Chamber, and Gland	21
5.10	Packing Retention	22
5.11	Handwheel	22
6	Materials	22
6.1	Trim Materials	22
6.2	Materials Other Than Trim	25
6.3	Compliance	25
7	Marking	25
7.1	Legibility	25
7.2	Body Marking	25
7.3	Ring Joint Groove Marking	27
7.4	Identification Plate Marking	27
7.5	Weld Fabrication Marking	27
8	Testing and Inspection	28
8.1	Pressure Tests	28
8.2	Inspection	28
9	Preparation for Dispatch	28
10	Purchase Order Information	28
	Annex A (informative) Use of API Monogram by Licensees	29
	Annex B (normative) Requirements for Extended Body Valves	32
	Annex C (normative) Requirements for Valves with Bellows Stem Seals	37
	Annex D (normative) Type Testing of Bellows Stem Seals	41
	Annex E (informative) Identification of Valve Parts	44
	Annex F (normative) Information to be Specified by the Purchaser	52
	Annex G (informative) Valve Material Combinations	54

Contents

Page

Bibliography	57
--------------------	----

Figures

B.1 Threaded End Extension for Class 800	33
B.2 Welding End Extension for Class 800 and Class 1500	33
B.3 Socket Welding End Preparation for Class 800 and Class 1500	34
E.1 Outside Screw and Yoke Bolted Bonnet Gate Valve	44
E.2 Inside Screw Gate Valve	45
E.3 Bellows Stem Seal Gate Valve	46
E.4 Welded Bonnet Gate Valve	47
E.5 Outside Screw and Yoke Globe Valve	48
E.6 Union Bonnet Globe Valve	49
E.7 Piston Check Valve	50
E.8 Ball Check Valve	50
E.9 Swing Check Valve	51

Tables

1a ASME B16.34 Material Group 1, Forging and Casting Descriptions	4
1b ASME B16.34 Material Group 2, Forging and Casting Descriptions	4
1c ASME B16.34 Material Group 3, Forging and Casting Descriptions	4
2a Class 800 Pressure/Temperature Ratings (SI Units)	6
2b Class 800 Pressure/Temperature Ratings (USC Units)	7
2c Class 800 Pressure/Temperature Ratings (SI Units)	8
2d Class 800 Pressure/Temperature Ratings (USC Units)	9
2e Class 800 Pressure/Temperature Ratings (SI Units)	10
2f Class 800 Pressure/Temperature Ratings (USC Units)	11
3 Minimum Diameter of Equivalent Flow Passageway for Standard(1), (2) Bore Valves	13
4 Minimum Diameter of Equivalent Flow Passageway for Full-bore(1), (2) Valves	13
5 Minimum Wall Thickness for Valve Bodies, Bonnets, and Check Valve Covers	14
6 Minimum Wall Thickness for Bonnet Extensions and Bellows Enclosures	15
7 Butt-welding End Diameters	17
8 Wear Travel for Gate Valves	19
9 Minimum Stem Diameter for Standard Bore Valves	20
10 Minimum Stem Diameter for Full-bore Valves	20
11 Minimum Uncompressed Packing Height	22
12 Nominal Seating Surfaces, Stem, or Weld-Deposited Materials and Hardness	23
13 Alternative CNs	25
14 Materials for Valve Parts Other Than Trim Items	26
B.1 Threaded End Extension for Class 800	33
B.2 Welding End Extension for Class 800 and Class 1500	34
B.3 Socket Welding End Preparation for Class 800 and Class 1500	34
B.4 Post weld Heat Treatment	35
C.1 Bellows Material Chart	39
D.1 Bellows Test Cycles	42
G.1 Material Combinations for Group 1 Body, Bonnet, and Cover Materials	54
G.2 Material Combinations for Group 2 Body to Bonnet Materials	55
G.3 Material Combinations for Group 3 Body to Bonnet Materials	56

Gate, Globe, and Check Valves for Sizes DN 100 (NPS 4) and Smaller for the Petroleum and Natural Gas Industries

1 Scope

This standard specifies the requirements for a series of compact gate, globe and check valves for petroleum and natural gas industry applications.

It is applicable to valves of:

- nominal diameter sizes DN 8, DN 10, DN 15, DN 20, DN 25, DN 32, DN 40, DN 50, DN 65, DN 80, and DN 100;
- corresponding to nominal pipe sizes NPS $\frac{1}{4}$, NPS $\frac{3}{8}$, NPS $\frac{1}{2}$, NPS $\frac{3}{4}$, NPS 1, NPS $1\frac{1}{4}$, NPS $1\frac{1}{2}$, NPS 2, NPS $2\frac{1}{2}$, NPS 3, and NPS 4.

It is also applicable to pressure designations of Class 150, Class 300, Class 600, Class 800, and Class 1500.

Class 800 is not a listed class designation, but is an intermediate class number widely used for socket welding and threaded end compact valves.

It includes provisions for the following valve characteristics:

- outside screw with rising stems (OS & Y), in sizes $8 \leq DN \leq 100$ ($\frac{1}{4} \leq NPS \leq 4$) and pressure designations including Class 800;
- inside screw with rising stems (ISRS), in sizes $8 \leq DN \leq 65$ ($\frac{1}{4} \leq NPS \leq 2\frac{1}{2}$) and pressure designations of classes ≤ 800 ;
- socket welding or threaded ends, in sizes $8 \leq DN \leq 65$ ($\frac{1}{4} \leq NPS \leq 2\frac{1}{2}$) and pressure designations of Class 800 and Class 1500;
- flanged or butt-welding ends, in sizes $15 \leq DN \leq 100$ ($\frac{1}{2} \leq NPS \leq 4$) and pressure designations of Class 150 through Class 1500, excluding flanged end Class 800;
- bonnet joint construction—bolted, welded, and threaded with seal weld for classes ≤ 1500 and union nut for classes ≤ 800 ;
- extended body, in sizes $15 \leq DN \leq 50$ ($\frac{1}{2} \leq NPS \leq 2$) and pressure designations of Class 800 and Class 1500;
- bellows stem seal, in sizes $8 \leq DN \leq 50$ ($\frac{1}{4} \leq NPS \leq 2$) and pressure designations of \leq Class 1500;
- bellows stem seal testing requirements;
- standard and full-bore body seat openings;
- materials, as specified;
- testing and inspection.

This standard is applicable to valve end flanges in accordance with ASME B16.5, valve body ends having tapered pipe threads to ASME B1.20.1, valve body ends having socket weld ends to ASME B16.11 and butt-weld connections per the requirements described within this standard.

If product is supplied bearing the API Monogram and manufactured at a facility licensed by API, the requirements of Annex A shall apply.