

Reconditioning of Metallic Gate, Globe, and Check Valves

API RECOMMENDED PRACTICE 621
FIFTH EDITION, OCTOBER 2022



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. 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.

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.

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 and Definitions	2
4 Owner Access and Responsibilities	3
4.1 General	3
4.2 Valve Information	3
4.3 Preparation for Shipment to Reconditioner	3
5 Inspection, Identification, and Disassembly of Valves	4
5.1 General	4
5.2 Identification Number	4
5.3 Traveler Documents	4
5.4 Disassembly and Cleaning of Valves	4
6 Repair of Valve Parts	5
6.1 General	5
6.2 Inspection of Valve Parts	6
6.3 Handwheel Nut	6
6.4 Handwheel	6
6.5 Yoke	7
6.6 Stem Nut and Stem Nut Housing	7
6.7 Stem Nut Retainer	7
6.8 Packing Gland Flange	7
6.9 Packing Gland (Packing Follower)	8
6.10 Backseat Bushing	8
6.11 Body and Bonnet	8
6.12 Body Guides	16
6.13 Body Seat Ring(s)	17
6.14 Obturator (Wedge, Globe, Disc, and Plate)	17
6.15 Stem	19
6.17 Packing Gland Eye Bolts	20
6.18 Packing	21
6.19 Body-to-Bonnet Joint Gasket	21
6.20 Grease Injectors	21
7 Post-repair Assembly	21
7.1 General	21
7.2 Actuated Valves	22
8 Pressure Test	22
9 Preparation for Shipment to Owner	22
10 Tagging and Reconditioning Facility Identification	23
Annex A (normative) Weld Overlay of Stems	24
Annex B (normative) Stem Packing	26

Contents

	Page
Annex C (normative) Tests	32
Annex D (normative) Low Emissions Verification	33
Annex E (informative) Service Specific Requirements	34
Annex F (informative) Quarter Turn Valve Specific Requirements	39

Figures

1	Gate Valve Typical Thickness Measurement Locations	10
2	Globe Valve Typical Thickness Measurement Locations	11
3	Check Valve Typical Thickness Measurement Locations	12
4	Wear Travel	18
B.1	Typical Linear Valve Stuffing Box Clearances	27
B.2	Lantern Ring Arrangement	28
B.3	Graphite Packing Ring Arrangement	29
B.4	PTFE V-ring Packing Arrangement	30
B.5	Braided Packing Arrangement	31

Tables

1	Allowable Pitting and Localized Corrosion	14
2	Minimum Thickness of Shell Wall (API Standard 600, API Standard 623, and API Standard 594)	15
3	Surface Finish Required per Gasket Type	16
4	Face-to-Face Dimensions	16
5	Minimum Wear Travel and Maximum Stem Projection (from API Standard 600)	18
6	Permitted Stem Undertolerance (Gate and Globe)	20
7	Nominal Radial Width of Packing (from API Standard 600 and API Standard 623)	21

Reconditioning of Metallic Gate, Globe, and Check Valves

1 Scope

1.1 This Recommended Practice (RP) provides guidelines for reconditioning of API Standard 594, API Standard 599, API Standard 600, API Standard 603, API Standard 608, API Standard 609, and API Standard 623 valves. Guidelines contained in this RP apply to flanged and butt weld cast or forged valves. Parts of this standard may also be applied to other valves not specifically addressed with agreement between the Owner and the valve Reconditioner.

1.2 This RP does not cover reconditioning or remanufacturing of used or surplus valves intended for resale. It does not cover the modification of new valves (e.g. converting or changing the trim). For modification of new valves, see MSS SP-141, *Multi-Turn and Check Valve Modifications*. Electric and pneumatic actuator repair and reconditioning are not included in the scope of this document. The only intent of this RP is to provide guidelines for refurbishing an end user's (Owner) valves for continued service in the Owner's facility. Valves reconditioned to this RP may not meet API Standard requirements for new valves. The correct application of a valve reconditioned to this RP remains the responsibility of the Owner.

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 Recommended Practice 571, *Damage Mechanisms Affecting Fixed Equipment in the Refining Industry*

API Recommended Practice 591, *Process Valve Qualification Procedure*

API Recommended Practice 751, *Safe Operation of Hydrofluoric Acid Alkylation Units*

API Standard 594, *Check Valves: Flanged, Lug, Wafer, and Butt-welding*

API Standard 598, *Valve Inspection and Testing*

API Standard 599, *Metal Plug Valves—Flanged, Threaded, and Welding Ends*

API Standard 600, *Steel Gate Valves—Flanged and Butt-welding Ends, Bolted Bonnets*

API Standard 603, *Corrosion-resistant, Bolted Bonnet Gate Valves – Flanged and Butt-welding Ends*

API Standard 608, *Metal Ball Valves—Flanged, Threaded, and Welding Ends*

API Standard 609, *Butterfly Valves: Double-flanged, Lug and Wafer-type, and Butt-welding Ends*

API Standard 622, *Type Testing of Process Valve Packing for Fugitive Emissions*

API Standard 623, *Steel Globe Valves—Flanged and Butt-welding Ends, Bolted Bonnets*

ASME B1.5 ¹, *Acme Screw Thread*

ASME B1.8, *Stub Acme Screw Threads*

ASME B16.5, *Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard*

¹ ASME International, Two Park Avenue, New York, New York 10016, www.asme.org.

ASME B16.10, *Face-to-face and End-to-end Dimensions of Valves*

ASME B16.47, *Large Diameter Steel Flanges NPS 26 Through NPS 60 Metric/Inch Standard*

ASME Boiler and Pressure Vessel Code, Section V, *Nondestructive Examination*

ASME Boiler and Pressure Vessel Code, Section IX, *Welding, Brazing, and Fusing Qualifications*

ASME Post Construction Code, *PCC-1 Guidelines for Pressure Boundary Bolted Flange Joint Assembly*

ISO 9001², *Quality Management Systems—Requirements*

MSS SP-9³, *Spot Facing for Bronze, Iron, and Steel Flanges*

MSS SP-55, *Quality Standard for Steel Casting for Valves, Flanges, Fittings, and Other Piping Components—Visual Method for Evaluation of Surface Irregularities*

MSS SP-141, *Multi-Turn and Check Valve Modifications*

MSS SP-143, *Live-Loaded Valve Stem Packing Systems*

NACE MR0103, *Metallic Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments*

NACE SP0472, *Methods and Controls to Prevent In-Service Environmental Cracking of Carbon Steel Weldments in Corrosive Petroleum Refining Environments*

3 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

3.1

large valve

A valve that is typically NPS 26 or larger. The size may increase or decrease depending on pressure class, type of valve, or Owner specifications.

3.2

new valve

A valve that has been manufactured under a quality assurance program to a specific design and tolerances by an OEM, was never installed or used, and does not meet the definition of a surplus valve.

3.3

obturator (closure member)

Part of a valve, such as ball, disc/plate, disc gate or plug, that is positioned in the flow stream to restrict, control, or prevent flow.

3.4

reconditioned valves

A valve that is no longer new, has been restored to the requirements of this RP, and is the property of the Owner.

² International Organization for Standardization, 1, ch. de la Voie-Creuse, Case postale 56, CH-1211 Geneva 20, Switzerland, www.iso.org.

³ Manufacturers Standard Society of the Valve and Fittings Industry, 127 Park Street NE, Vienna, Virginia 22180, www.mss-hq.com.

3.5

safety data sheet (SDS)

Formerly known as material safety data sheet (MSDS), which is used to communicate the hazards of chemical products.

3.6

surplus valves

Valves that were purchased new for a specific project or application but were never installed or used. Also, the valve may not have been stored in conditions recommended by the OEM and thereby require reconditioning to return to useful operation.

3.7

traveler document

A paper or an electronic record that identifies the current condition, necessary repairs, completed repairs, and inspection and testing for any or all component parts of a valve.

4 Owner Access and Responsibilities

4.1 General

4.1.1 Owner shall have access to all reconditioning work, documentation, inspections, and test results at all times.

4.1.2 Access by the Owner shall be conducted in a manner that is not disruptive to the reconditioning work.

4.1.3 It is an expectation of this RP that a contractual agreement shall be established between the Owner and the valve Reconditioner. The reconditioning facility may be OEM owned/operated or directly associated and approved by the OEM. At the Owner's option, an independent facility may be used. It is the Owner's responsibility to confirm that the valve Reconditioner selected for valve reconditioning has a documented and established working Quality Assurance Program. The Quality Assurance Program should include the essential elements described in the ISO 9001 standard.

4.2 Valve Information

4.2.1 It is the Owner's responsibility to communicate to the Reconditioner any known problem with the valve. Any tag placed on the valve by the Owner should be of a type and material that resists damage, fading, and inadvertent removal.

4.2.2 A safety data sheet shall be provided for each service media that may have been contained in the valves sent for reconditioning, materials used to clean the valve, or a combination thereof.

4.2.3 Large valves that operate with the stems in the horizontal position should be noted in the purchase order.

4.3 Preparation for Shipment to Reconditioner

Valves to be shipped to the Reconditioner shall:

- 1) be in the open or partial open position;
- 2) have all residual product drained or flushed out of the body;
- 3) be decontaminated sufficiently so that it can be disassembled and handled safely;
- 4) have end flange gaskets removed;
- 5) contain packaging requirements approved by the Owner and the Reconditioner.



5 Inspection, Identification, and Disassembly of Valves

5.1 General

5.1.1 As soon as practical, valves shall be marked to identify the Owner (see [5.2.1](#)).

5.1.2 Valves shall be visually inspected and classified as valves capable of being reconditioned, or scrap.

5.1.3 For valves that cannot be economically repaired, consideration shall be given to salvaging as many usable parts as possible for use only in valves of the same manufacturer, type, and material.

5.1.4 Scrapped valves and scrapped valve parts shall be disposed of in accordance with Owner instructions.

5.2 Identification Number

5.2.1 Each valve shall be assigned a unique identification number that is traceable back to its Owner's shipping documentation or other pertinent information such as special instructions or records of previous reconditioning. If the Owner provides an equipment identification number for the valve, it shall be recorded in the traveler documents.

5.2.2 Salvaged usable parts (excluding handwheels) shall be identified as such to the Owner, and the identification shall include the name of the valve manufacturer, the model/figure number, size, type, pressure class, and material of the valve if available.

5.3 Traveler Documents

5.3.1 If requested by the Owner, the traveler document shall be approved by the Owner, otherwise the traveler document or electronic record shall follow the Reconditioner's standard practice. A traveler document or electronic record shall be developed and maintained for each valve and shall reference the valve identification number.

5.3.2 Traveler information shall be accumulated through the reconditioning process and include as a minimum:

- a) the valve identification number
- b) the status of repair, parts replaced, and work still to be performed;
- c) dimensional changes as a result of the reconditioning process;
- d) weld repair traceability [welder qualifications, welding procedure specifications (WPSs), procedure qualification records (PQRs), weld material certification, weld map with welder's ID stamp];
- e) applicable inspection and testing reports;
- f) additional information as specified by the Owner.

5.3.3 Unless otherwise specified, traveler information shall be archived by the Reconditioner for a minimum of 10 years.

5.4 Disassembly and Cleaning of Valves

5.4.1 Valves to be reconditioned shall be completely disassembled.

5.4.2 Old packing, gaskets, and bonnet bolting shall be removed and disposed of in accordance with Reconditioner's standard practice and applicable regulations. If nonstandard materials (such as packing, gaskets, and bolting) are identified by the Reconditioner, they shall be verified with the Owner.

5.4.3 Tags from previous reconditioning shall be removed and the tag, or data from the tag, shall be placed in the reconditioned valve record document. OEM tags shall not be removed and shall be protected during the reconditioning process.

5.4.4 During the disassembly process, the valve's newly assigned identification number shall be metal stamped onto the valve's closure element, stem/shaft, seat rings if removed, and any other major part. Stamped markings shall remain on the individual valve components after the reconditioning process is completed and the valve is returned to the Owner.

- a) Stamping shall be on non-functional surfaces and shall be made with low stress stamps.
- b) If stamping is not practical, parts shall be segregated and traceable to the identification number. However, all stems and closure elements for valves DN 50 (NPS 2) and larger shall be marked by stamping.

5.4.5 Unless a specific cleaning method is specified by the Owner, valve parts shall be thoroughly cleaned by any usual method, such as steam, chemical, sand/bead, or steel shot blasting. Finished surfaces that may be damaged during the cleaning process shall be protected.

5.4.6 The cleaning process shall remove all or nearly all paint, grease, rust, and product from both internal and external surfaces.

6 Repair of Valve Parts

6.1 General

6.1.1 Welding

6.1.1.1 Welding procedures and welders shall be qualified in accordance with Section IX of the ASME *Boiler and Pressure Vessel Code*.

6.1.1.2 When required by the Owner, welding procedures and PQRs shall be submitted to the Owner for approval prior to the start of welding.

6.1.1.3 Weld metal buildup and weld metal repairs, including any required postweld heat treatment, shall be performed in accordance with the approved procedures.

6.1.2 Nondestructive Examination (NDE)

6.1.2.1 Welds, other than tack welds, shall be examined by the liquid penetrant method or by the NDE method specified by the Owner.

6.1.2.2 NDE of parts and weld repairs shall be done in accordance with Owner-approved NDE procedures and acceptance criteria.

6.1.2.3 SNT-TC-1A Level II technicians certified for the procedures per ASME Section V shall evaluate NDE results.

6.1.3 Replacement Parts and Material

6.1.3.1 Sources of replacement parts shall be one or more of the following in preferential order:

- a) parts purchased from the OEM or other OEM-approved source;
- b) identical parts salvaged from scrapped valves from the same valve manufacturer and with matching identification (see [5.2.2](#)), when approved by the Owner;

- c) parts manufactured in the reconditioning facility, when approved by the Owner.

6.1.3.2 Material used to manufacture replacement parts in the reconditioning facility shall be as specified by the Owner or the following in preferential order.

- a) If the Owner does not specify material, the material used (including heat treatment if applicable) shall be the material used by the original valve manufacturer and shall comply with the requirements of the referenced standard.
- b) Changes in material group, such as 13CR to austenitic stainless steel, require approval of the Owner.
- c) Verification of the specific material used and its source shall be part of the required documentation.

6.1.3.3 As a minimum, the following components shall be replaced:

- a) soft seats;
- b) body/bonnet/cover bolting;
- c) packing;
- d) gaskets;
- e) grease fittings.

6.2 Inspection of Valve Parts

6.2.1 General

6.2.1.1 Valve parts shall be inspected to determine their acceptability for re-use and extent of required repair.

6.2.1.2 Criteria for acceptability and extent of repair shall be the component's ability to meet the Owner's expectation for continued service in the Owner's facility.

6.2.2 Threaded Parts

6.2.2.1 Threaded parts shall be visually inspected for gross defects, such as burrs, chatter, missing or incomplete threads, defective thread profile, torn or ruptured surfaces, and cracks.

6.2.2.2 Acceptable surface finish of threaded parts shall be determined by visual or tactile methods or the use of a thread gauge as required.

6.3 Handwheel Nut

6.3.1 Handwheel nut shall be visually inspected for wear or excessive corrosion of the threads or contact area.

6.3.2 If the handwheel nut is defective, it shall be repaired or replaced.

6.3.3 If the handwheel nut is locked into place with a setscrew or some other device, the locking mechanism shall be in place and fully functional.

6.4 Handwheel

6.4.1 Handwheel shall be visually inspected for worn, bent, or broken spokes and rim.

6.4.2 Handwheel shall be inspected to verify proper engagement to the stem yoke nut. If the valve does not have a yoke nut, the handwheel shall be inspected to verify proper engagement to the stem.

6.4.3 A defective handwheel shall be repaired by the appropriate repair method for the defect: bent spokes, hub, or rim may be straightened by pressing. Broken spokes or rim (if made of a weldable grade material) may be weld repaired.

6.4.4 If the defect(s) cannot be repaired, the handwheel shall be scrapped and replaced with one of similar size and material.

6.4.5 All parts of the handwheel and any repairs shall be free of burrs, metal splinters, and sharp metal edges.

6.5 Yoke

6.5.1 Yoke shall be visually inspected for defects and for proper alignment of the stem through the stem nut, packing chamber, backseat bushing, and wedge connection.

6.5.2 Defects shall be repaired by generally accepted repair procedures, such as welding or machining.

6.6 Stem Nut and Stem Nut Housing

6.6.1 Stem nut and stem nut housing shall be visually inspected for corrosion, galling, or wear of bearing surfaces.

6.6.2 Defects shall be repaired by welding (if of a weldable material), machining, or other appropriate methods. If the defects cannot be repaired, the nut/housing shall be replaced.

6.6.3 If a thrust bearing was used by the OEM in the design of the valve, the thrust bearing must be in place and free of excessive corrosion or wear. If necessary for smooth operation of the stem nut, the thrust bearing shall be replaced.

6.6.4 Internal threads of a tapped hole in the stem nut housing shall be visually inspected and defective threads shall be repaired or re-tapped.

6.6.5 If applicable, external threads on the stem nut shall be visually inspected for proper engagement to the handwheel nut.

6.6.6 Internal ACME threads of the stem nut shall be visually inspected for condition and proper engagement with the external threads of the stem in accordance with ASME B1.5 or ASME B1.8.

6.7 Stem Nut Retainer

6.7.1 If applicable, stem nut retainer shall be visually inspected for excessive corrosion and wear. Threads shall be inspected for general condition and proper engagement to the valve bonnet or yoke.

6.7.2 Defective stem nut retainer shall be repaired by welding, machining, or a combination thereof. If defects cannot be repaired, stem nut retainer shall be replaced.

6.7.3 After assembly and before shipping, the stem nut retainer shall be tack welded, or otherwise locked, to the yoke.

6.8 Packing Gland Flange

6.8.1 Packing gland flange shall be visually inspected for excessive corrosion, cracks, and straightness. If the packing gland flange to nut seating surface cannot be repaired, hardened washers may be installed if approved by Owner.

6.8.2 Defective packing gland flange shall be repaired or replaced.

6.9 Packing Gland (Packing Follower)

6.9.1 Packing gland shall be visually inspected for excessive corrosion or wear and checked dimensionally for proper fit to the stuffing box and to the stem in accordance with OEM dimensions and tolerances. When OEM dimensions and tolerances are not available, the clearances specified in [Figure B.1](#) may be used.

6.9.2 A damaged or broken packing gland shall be repaired or replaced.

6.9.3 No chamfer or radius > 0.1 mm (0.005 in.) is permitted on the gland ID and OD.

6.10 Backseat Bushing

6.10.1 A backseat bushing's ability to seal against the opposing angle of the stem shall be assessed by visually inspecting for corrosion, wear, and cracks. Sealing surface shall have a finish Ra of $0.8\text{ }\mu\text{m}$ (32 $\mu\text{in.}$) or smoother.

6.10.2 A defective backseat bushing shall be repaired or replaced as required.

6.10.3 The backseat bushing shall be positively secured (e.g. not secured by friction).

6.11 Body and Bonnet

6.11.1 Bonnet Stuffing Box

6.11.1.1 The stuffing box shall be visually inspected for corrosion, wear, or scoring of the bore wall.

6.11.1.2 Bottom of stuffing box shall be perpendicular to the stuffing box wall with a maximum tolerance of 5° .

6.11.1.3 The stuffing box bore sealing area (the area of the stuffing box that contacts the top packing ring) may have some pitting provided that the pitting does not extend for more than one quarter of the height of any individual compressed packing ring. The stuffing box bore non-sealing area is not required to be inspected for surface finish. Any deleterious area that may cause damage to the packing during installation shall be dressed.

6.11.1.4 A defective stuffing box shall be repaired by machining or welding and re-machining. Unless otherwise specified by the Owner, sleeving of the stuffing box is prohibited.

6.11.1.5 The stuffing box surface finish shall be as specified by the packing manufacturer with a maximum surface finish Ra of $3.2\text{ }\mu\text{m}$ (125 $\mu\text{in.}$).

6.11.1.6 For linear valves, the stuffing box depth should be sufficient to house a minimum of 5 packing rings, unless otherwise recommended by the packing manufacturer. For quarter turn valves, the packing gland dimensions should match the valve manufacturer's recommendation.

6.11.2 Bellows Sealed Valves (BSV)

CAUTION — Bellows can be easily damaged and must be handled carefully.

6.11.2.1 Bellows should be visually inspected for damage (such as cracks, bulges, dents, or rupture). The overall free length, convolution spacing, and angular torsion of the bellows should be reviewed to meet the guidelines from the manufacturer, if available.

6.11.2.2 Bellows-seal attachment welds should be examined visually and via surface NDT (PT). Generally, damaged bellows should be replaced instead of repaired due to complexities of welding the thin bellows. Repair of the bellows welds is outside the scope of this document.

6.11.2.3 For testing of bellows assemblies, see [C.2](#).

6.11.3 Castings

6.11.3.1 Pressure containing castings shall be visually inspected for defects in accordance with MSS SP 55.

6.11.3.2 Some pitting or areas of localized corrosion are allowed provided the requirements of [Table 1](#) are met.

6.11.3.3 If requested by the Owner, castings may be inspected with NDE (radiography or other method) to determine extent of defects.

6.11.3.4 WC6, WC9, C5, C12, nickel alloys, and austenitic stainless casting metallurgy shall be verified by positive material identification (PMI) or as specified by the Owner.

6.11.3.5 Minimum wall thickness of bonnet castings shall be measured at a minimum of two locations, and minimum wall thickness of body castings shall be measured at a minimum of three locations. Typical thickness measurement locations are shown in [Figure 1](#), [Figure 2](#), and [Figure 3](#). Care should be taken so that measurements are not taken on the thickest area of the wall, such as at a boss. Wall thickness shall be measured at additional locations if visual inspection identifies specific areas that require additional wall thickness verification.

- a) Acceptable wall thickness shall conform to [Table 2](#) for heavy wall valves (API Standard 600, API Standard 623, and API Standard 594). For all other valves see the product standard, unless otherwise approved by the Owner.
- b) Location of measurements and thickness measured shall be recorded in the data file (traveler documents) of each valve.

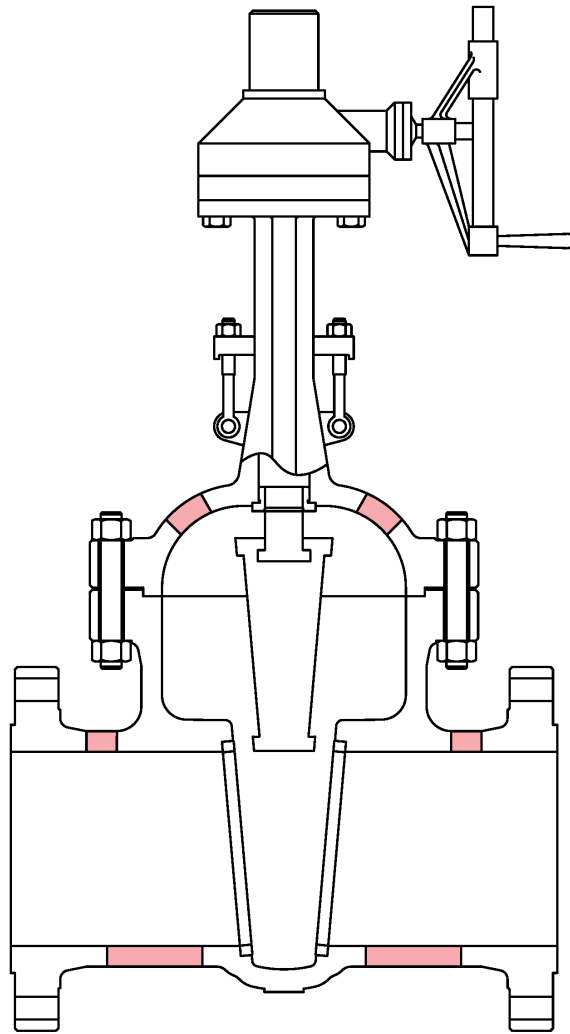


Figure 1—Gate Valve Typical Thickness Measurement Locations

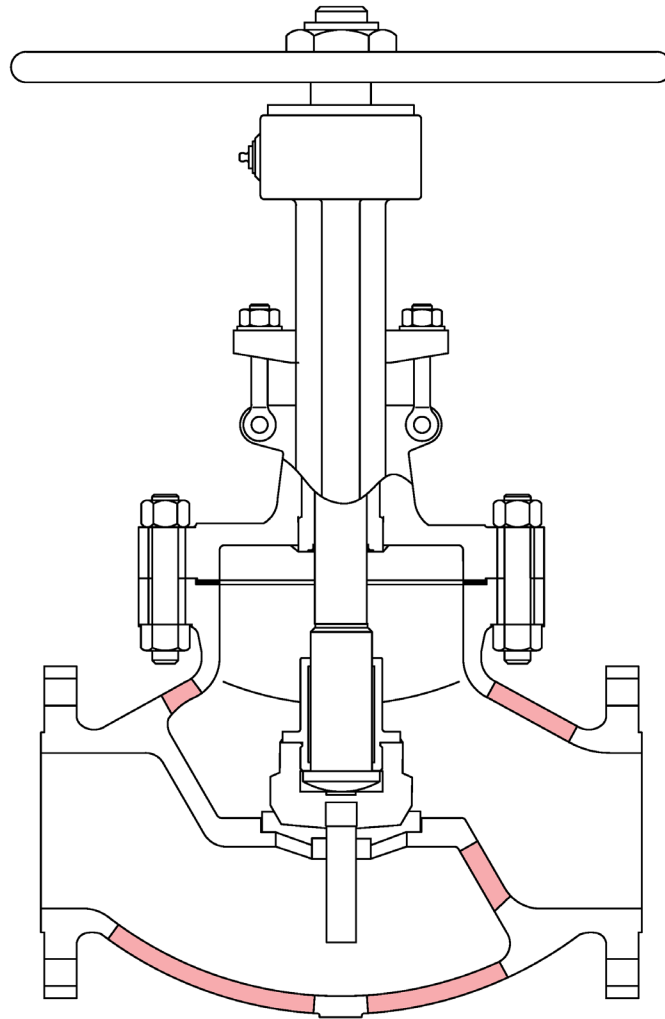


Figure 2—Globe Valve Typical Thickness Measurement Locations