



MET ET 051

PIPING MATERIAL PURCHASE SPECIFICATION VALVES

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I. ¡Error! Marcador no definido.**SCOPE**

- 1.1 This specification is intended to supplement the ITEM DESCRIPTION shown on the Bills of Material. If the ITEM DESCRIPTION differs from, or is in conflict with, any requirement of this specification, the ITEM DESCRIPTION shall govern.
- 1.2 WHEN THE TERM "AUTHORIZED" OR "AUTHORIZATION" IS USED IN THIS SPECIFICATION, IT IS INTENDED THAT THIS MEANS AUTHORIZED OR AUTHORIZATION BY BUYER.
- 1.3 Items specified or referenced by manufacturer and figure number are not intended to exclude equal items offered by other manufacturers. Products of reputable manufacturers and of comparable type, quality and characteristics may be submitted to Buyer for acceptance.
- 1.4 Primarily, this specification covers conventional GATE, GLOBE, BALL, BUTTERFLY and CHECK valves. Other types of valves shall conform to this specification insofar as applicable.

II. ¡Error! Marcador no definido.**STANDARDS, CODES AND REFERENCES**

The following codes, standards and specifications apply to this specification. When an edition date is not indicated for a code or standard, the latest edition and addendum in force at the time of purchase shall apply.

2.1 American Society of Mechanical Engineers (ASME)

ASME B31.3	Chemical Plant and Petroleum Refinery Piping
ASME B1.1	Unified Inch Screw Threads (UN and UNR Thread Form)
ASME B1.20.1	Pipe Threads (Except Dryseal)
ASME B16.10	Face-To-Face and End-To-End Dimensions of Valves
ASME B16.1	Cast Iron Pipe Flanges and Flanged Fittings
ASME B16.5	Pipe Flanges and Flanged Fittings
ASME B16.11	Forged Steel Fittings, Socket Welding and Threaded
ASME B16.20	Ring-Joint Gaskets and Grooves for Steel Pipe Flanges
ASME B16.25	Buttwelding Ends
ASME B16.34	Valves Flanged, Threaded and Welding Ends
ASME B36.10M	Welded and Seamless Wrought Steel Pipe
ASME B36.19M	Stainless Steel Pipe
ASME B46.1	Surface Texture (Surface Roughness, Waviness and Lay)

II. STANDARDS, CODES AND REFERENCES (cont.)

2.2 American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code

Section VIII Division 1, Pressure Vessels including Appendices VII and VIII

Section IX Welding and Brazing Qualifications

2.3 American Petroleum Institute (API)

API 594 Wafer Check Valves

API 598 Valve Inspection and Test

API 599 Steel and Ductile Iron Plug Valves

API 600 Steel Gate Valves, Flanged and Buttwelding Ends

API 602 Compact Carbon Steel Gate Valves

API 607 Fire Test for soft-seated Ball Vales

API 609 Butterfly Valves Lug-type and Wafer-type

2.4 Manufacturers' Standardization Society (MSS)

MSS-SP-25 Standard Marking System for Valves, Fittings, and Flanges and Unions

MSS-SP-55 Quality Standard for Steel Castings for Valves, Flanges, Fittings and
Other
Piping Components - Visual Method

MSS-SP-61 Pressure Testing for Steel Valves

2.5 Ancap's Standards

MET ET 055 Valves in Hydrogen Service

MET ET 058 Acceptance Test Valves in Hydrogen Service

MET ET 059 Inspection, Testing and Certification of Valves in Special Service

MET ET 060 Material Acceptance Requirements for Valves in Special Service

MET ET 056 Marking for Piping Materials



III. ~~Error! Marcador no definido.~~ MATERIALS OF CONSTRUCTION

- 3.1 Materials shall be as specified in the ITEM DESCRIPTION.
- 3.2 Free machining steels are not permitted for pressure containing components.
 - 3.2.1 Free machining steels are those which contain any of the following elements in excess of the quantities shown:
 - a. 0.06 percent phosphorous
 - b. 0.06 percent sulfur
 - c. 0.05 percent lead
 - d. 0.05 percent selenium

- 3.3 Where pressure containing parts have been noted as forged, substitution of castings is not permitted without authorization from Buyer.

3.4 Stem Packing

Unless otherwise specified in the item description, gate and globe valve stem packing shall be in accordance with the following:

3.4.1 Bronze Valves: Manufacturer's standard.

3.4.2 Cast Iron Valves: Braided with sacrificial element.

3.4.3 Carbon Steel, Alloy, Austenitic Stainless Steel and Nickel Base Alloy Valves: Braided with sacrificial element suitable for hydrocarbon at 1000°F.

3.4.4 When specified "FLEXIBLE GRAPHITE" the packing shall comply with the following:

Non-nuclear service:

Commercial grade flexible graphite (with inconel metal reinforcement for braided packing part only). With corrosion inhibitor.

Chemical composition:

Carbon content	95% plus
Leachable chlorides	< 50 PPM
Leachable fluorides	< 50 PPM
Leachable halogens	< 200 PPM

Volumetric composition: The non-metallic part of the packing shall have a graphite and corrosion inhibitor volume of 94% plus.

Densities: Braided packing: 120-135 lbs/ft³.
Die-formed ribbon packing: 85-95 lbs/ft³.

- 3.4.5 The Seller shall be prepared to furnish, upon request, packing gland dimensions and the number and size of packing rings required for each type and size of valve shown on the Purchase Order.
- 3.4.6 The Seller shall submit samples of the packing prior to the award of the Purchase Order, if requested.
- 3.4.7 All packing in valves with ASTM A350 Gr. LF3 or ASTM A352 Gr. LC3 bodies shall be suitable for continuous exposure at temperature -65F. The selected materials shall retain adequate resilience after prolonged and cyclic loading.

III. MATERIALS OF CONSTRUCTION (cont.)

3.5 Bonnet Gaskets

Type of bonnet gasket shall be in accordance with the requirements of ANSI B16.34. Material shall conform to the following:

- 3.5.1 Metallic and nonmetallic bonnet gaskets shall have corrosion resistance equal, at least, to that of the body and bonnet materials.
- 3.5.2 Gaskets shall be suitable for the pressure design conditions of the valve within the following design temperatures:
 - a. Compressed sheet: -50°F through +500°F maximum (see 4.12).
 - b. Oval ring joint (solid metal): Same as body material.
 - c. Spiral-wound metal with filler: Same as body material (304SS Minimum)
 - d. Single or double jacketed metal with filler: Same as body material
 - e. Corrugated metal: Not permitted.
- 3.5.3 Compressed sheet gaskets shall be furnished with a nonstick parting agent on both sides.
- 3.5.4 Graphite or graphite-filled gasket material specified as "FLEXIBLE GRAPHITE" shall comply with the following requirements:

Non-nuclear service:

Commercial grade flexible graphite with corrosion inhibitor.

Chemical composition:

Carbon content	95% plus
Leachable chlorides	< 50 PPM
Leachable fluorides	< 50 PPM
Leachable halogens	< 200 PPM

Volumetric composition: The non-metallic part of the gasket shall have a graphite and corrosion inhibitor volume of 94% plus.

- 3.5.5 Where filled metal gaskets are either furnished or specified, the filler shall have a neoprene binder.
- 3.5.6 Metal windings of austenitic stainless steel spiral-wound gaskets shall have maximum hardness no greater than 160 BHN.
- 3.5.7 Rings, for valves with ring-joint bonnet, shall have maximum hardness not greater than the maximum hardness specified in ANSI B16.20 and the following:

III. MATERIALS OF CONSTRUCTION (cont.)

- Austenitic stainless steel ("L" Grades) 130 BHN
- Monel 125 BHN

3.5.8 The Seller shall submit samples of gaskets prior to the award of the purchase order, if requested

3.6 Trim

3.6.1 Trim material for carbon steel and ferritic alloy valves shall be per API-600, Paragraph 3.9, and Table 3. Trim materials in the item purchase descriptions shall be interpreted as follows:

Trim API-600 Paragraph 3.9, Table 3, Trim Number	Trim Description
1	F6
2	304 stainless steel
4	F6 with hard F6 seats and disc
5	F6 with stellite seats and disc
6	F6 with nickel alloy seats
7	F6 with hard F6 seats
8	F6 with stellite seats
9	Monel
10	316 stainless steel

3.6.2 Where F6 trim is specified, this is meant to include the stem, body seat surface, gate seat surface and the bushing for back seat and stem hole guide.

3.6.3 Where F6 (13 Chrome) trim is specified, solid stellite seats, solid stellite seats and disc or stellite overlayed on F6 may be substituted.

3.6.4 Stellite shall be of No. 6 or equal composition. Seller shall define the process of stelling used and the minimum thickness of stelling after all machining is completed. The information shall be submitted as part of the Vendor's quotation.

3.6.5 Where valve body is an austenitic stainless steel, trim including stem and gland bolting shall be of the same nominal chemistry as the body except where stellite 6 trim is specified for the body and gate seat.

3.6.6 Where 304 Stainless Steel, F310, Monel, Hastelloy-B, 316 Stainless Steel, Monel with Stellite Seats, 316 Stainless Steel with Stellite Seats, Alloy 20, or Alloy 20 with Stellite Seats trim has been specified, there shall be a minimum differential hardness of 50 BHN between the seating surfaces.

3.6.7 TWO INCH AND SMALLER GATE VALVES FOR CARBON STEEL, ~~300~~ STAINLESS STEEL OR ANY CHROME ALLOY BODY MATERIALS SHALL BE FURNISHED WITH STELLITED SEATS.

III. MATERIALS OF CONSTRUCTION (cont.)

3.7 Bonnet Bolting

Unless otherwise specified in the item description, bonnet bolting for carbon steel, ferritic steel, alloy steel, austenitic stainless steel, and nickel-base alloy valves shall be ASTM A193, Grade B7 (studs) and ASTM A194, Grade 2H (nuts). Bolt protrusion through the nut shall be one-and-a-half threads maximum.

3.8 Where pressure retaining parts have been specified as forged or cast, substitution of welded construction is not permitted.

3.9 Valves specified as "NO COPPER PERMITTED" shall not have copper (except as trace element allowed by the material specification or 0.5 percent, whichever is lower) or copper-bearing alloy materials used in their construction. This includes internal and external parts such as trim, backseat, yoke bushings and gland followers.
EXCEPTIONS: Alloy 20, Monel, 17-4PH and 17-7PH when specified.

3.10 Monel body material for screwed, socket-weld end and butt welding end valves shall be of a weldable composition.

3.11 Straight grades (grades other than "L" grades) of Types 304, 316, 321 and 347 stainless steel shall have a minimum carbon content of 0.04 percent unless otherwise authorized.

3.12 All valves furnished to ASTM A352 Grade LCB or ASTM A350, Grade LF2 shall be tested for impact resistance at a test temperature of -50°F in accordance with the applicable standard. Valves furnished to ASTM A352 Grade LC3 or ASTM A350 Grade LF3 shall be tested for impact resistance at a test temperature of -150°F in accordance with the applicable standard.

3.13 Austenitic stainless steel valves shall be furnished in the solution annealed condition, unless otherwise authorized by Seller.

3.14 The maximum heat treatment temperature for austenitic stainless steel valves shall be 2050°F.

3.15 Except as noted above, substitution of materials is not permitted without authorization from Seller.

3.16 Where ASTM A182 Grade F5A has been specified, only Grade F5 shall be acceptable.

3.17 Whenever 304 stainless steel is specified, 304H stainless steel shall be accepted with Buyer's approval.

3.18 Valves specified in ITEM DESCRIPTION as "Service Condition: CATALYST SERVICE" must be able to operate in presence of catalyst and alumina dust at 500°C.

3.19 When specified "Smooth 63 µin (1,6µm) Ra Max – HARDNESS > HB 130" for flanges finish, hardness requirement apply ONLY to groove zone. Body and bonnet shall comply with hardness requirements of the corresponding material specification.

3.20 The minimum heat treatment temperature for ASTM A351 Grade CF8C and ASTM A182 grade F321H is 2000° F.

3.21 All nonmetallic seats and seals in valves with ASTM A350 Gr. LF3 or ASTM A352 Gr. LC3 bodies, shall be suitable for continuous exposure at temperature –65F. The selected materials

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shall retain adequate resilience after prolonged and cyclic loading. All bolting for these valves shall also be suitable for an operating temperature of –65F.

IV. ¡Error! Marcador no definido.DESIGN

4.1 Valves shall be in accordance with the following standards, except as noted herein:

4.1.1 Gate Valves

- a. Carbon and ferritic alloy steel flanged and buttwelding end gate valves:
 - 1. API-600
- b. Austenitic stainless steel and nickel-base alloy flanged and buttwelding end gate valves:
 - 1. API-600 except minimum wall thickness shall meet the requirements of ASME/ANSI B16.34.
- c. Cast iron flanged gate valves:
 - 1. ASME/ANSI B16.1
- d. Carbon, ferritic alloy, stainless steel and nickel-base alloy threaded and socketweld end gate valves:
 - 1. API-602
 - 2. Minimum wall thickness per ANSI B16.34 plus any additional wall thickness required per the ITEM DESCRIPTION.

4.1.2 Globe Valves

- a. Carbon and ferritic alloy steel flanged and buttwelding end globe valves:
 - 1. Minimum wall thickness per ANSI B16.34 plus any additional wall thickness required per the ITEM DESCRIPTION.
- b. Austenitic stainless steel and nickel-base alloy flanged and buttwelding end globe valves:
 - 1. Minimum wall thickness per ANSI B16.34.
- c. Carbon, ferritic alloy stainless steel and nickel-base alloy threaded and socketweld end globe valves:
 - 1. API-602
 - 2. Minimum wall thickness per ANSI B16.34 plus any additional wall thickness required per the ITEM DESCRIPTION.

4.1.3 Check Valves

- a. Carbon and ferritic alloy steel check valves:
 - 1. Minimum wall thickness per ANSI B16.34 plus any additional wall thickness required per the ITEM DESCRIPTION.
- b. Austenitic stainless steel and nickel-base alloy check valves:
 - 1. Minimum wall thickness per ANSI B16.34.
- c. Wafer type check valves per API-594

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4.1.4 Plug Valves

- a. Carbon, ferritic alloy, stainless steel and nickel-base alloy plug valves:
 - 1. API-599

4.1.5 Butterfly Valves

- a. Carbon, ferritic alloy, stainless steel and nickel-base alloy valves:
 - 1. API-609

On wrench operated butterfly valves, the wrench must be capable of being positively locked in the fully open and the fully closed positions.

- 4.1.6 Valves specified as "HYDROGEN SERVICE" in the ITEM DESCRIPTION shall also comply with MET ET 055 "Requirements and Test for Valves in Hydrogen Service".



- 4.2 Certain types of valves, such as butterfly, ball, diaphragm, fabricated valves, etc., do not conform entirely to ANSI B16.34 pressure-temperature ratings or to the above listed standards. In such cases, valves that differ in pressure rating or temperature limits from those of the manufacturer and model number specified in the ITEM DESCRIPTION may be offered for Buyer's Acceptance.

- 4.3 Valves shall have face-to-face (or end-to-end) dimensions in accordance with ASME B16.10

- 4.4 Unless otherwise specified in the ITEM DESCRIPTION, end connections of flanged valves shall be in accordance with the following:

- 4.4.1 Cast Iron Valves: ANSI B16.1.

- 4.4.2 Carbon Steel, Ferritic Alloy, Austenitic Stainless Steel and Nickel-Base Alloy Valves: ANSI B16.5.

- 4.4.3 FLANGED END VALVES WITH WELD ON FLANGES ARE NOT PERMITTED WITHOUT AUTHORIZATION FROM BUYER. IF WELD ON FLANGES ARE AUTHORIZED FROM BUYER, RADIOGRAPHIC EXAMINATION FOR ALL WELD ON FLANGES IS MANDATORY.

- 4.5 End connections of butt welding end valves shall be in accordance with the following:

- 4.5.1 Weld bevel and end preparation shall be in accordance with ASME B16.25.

- 4.5.2 Flame cut weld bevels are not permitted.

- 4.5.3 When necessary to furnish valves with butt welding ends internally tapered to the specified schedule (weight or thickness), the Seller shall submit end-to-end (or center-to-end for angle valves) dimensions with quotation if tapering results in nonstandard dimensions.

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- 4.5.4 Bore of butt welding valves specified as Schedule 10, 20, 30, 40, 60, 80, 100, 120, 140 or 160 (without the suffix "S") and XX-strong shall be in accordance with ASME B36.10M.
- 4.5.5 Bore of butt welding valves specified as Schedule 5S, 10S 40S and 80S shall be in accordance with ASME B36.19M.
- 4.5.6 Butt welding end valves manufactured by machining flanges of a flanged valve are not acceptable without Buyer's authorization.
- 4.6 End connections of threaded end valves shall have taper pipe threads in accordance with ASME B1.20.1.
- 4.7 End connections of socket weld end valves shall be in accordance with ANSI B16.11.
- 4.8 Ball valves having the ball extending past the flange face are not permitted without authorization from Buyer.
- 4.9 Unless otherwise specified, bonnet joint design of flanged valves with ring-joint faced end flanges shall be in accordance with the following:
 - 4.9.1 Plug, Ball and Split-Type Body Valves shall have the manufacturer's standard bonnet design.
 - 4.9.2 All Valves manufactured to API-602 shall have bonnet gasket joint designed to that standard.
 - 4.9.3 300# Gate, Globe and Check Valves shall have a confined bonnet gasket design.
 - 4.9.4 600#-2500# Gate, Globe and Check Valves shall have a ring-joint bonnet gasket design.
 - 4.9.5 Pressure-Seal Bonnet Valves, limited to 900# and higher ANSI ratings, shall have the manufacturer's standard bonnet design and shall be reviewed by Buyer.
- 4.10 Where seal-welded bonnet valves are specified in the ITEM DESCRIPTION, welded bonnet valves are acceptable alternates.
- 4.11 Valves with socket welding ends, having 6 inch long nipples welded into the valve sockets, shall receive a postweld heat treatment (PWHT) after all welding is completed. Postweld heat treatment shall be in accordance with ASME B31.3, Table 331.1.1. The exemptions provided in Table 331.1.1 based on nominal wall thickness are not permitted. Maximum hardness of the body, weld metal, nipple and heat affected zone (HAZ) shall not exceed the values in ASME B31.3, Table 331.1.1.
- 4.12 Compressed sheet bonnet gaskets shall have a minimum tensile strength across the grain of 2800 psi. The manufacturer shall perform the tensile test on the sheet stock before the gaskets are cut. Tests shall be reviewed and/or witnessed by the Buyer.
- 4.13 The finish for gasket contact faces of flanged ends shall be in accordance with ANSI B16.5.

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- 4.14 For swing type check valves, the material of the disc hinge shall be the same as specified in the ITEM DESCRIPTION for trim.
- 4.15 Gate and globe valves shall have backseating design to permit repacking under pressure while the valve is in the open position.
- 4.16 Unless otherwise specified, for flanged and butt welding end gate valves (3 inch and larger) wedge shall be flexible type only.
- 4.17 Unless otherwise specified, all globe valves shall have swivel plug discs.
- 4.18 Valves shall not be furnished with resilient materials, i.e., O-rings, gaskets inserted behind the seat rings.
- 4.19 Seat rings shall be integral welded or screwed and tack welded except for API-602 and API-606 valves.
- 4.20 Lever operated valves shall be furnished with individual levers, wrenches or handles.
- 4.21 Valve handwheels shall be made of cast steel, malleable iron or ductile iron.
- 4.22 Unless otherwise specified in the ITEM DESCRIPTION, lubricated plug valves shall be suitable for the following temperatures:
 - 4.22.1 Standard taper plug type to 350°F.
 - 4.22.2 Inverted taper plug type to 500°F.
- 4.23 Valve body bleeds, when specified in the ITEM DESCRIPTION, shall be located in accordance with ANSI B16.34. Tappings shall have female taper pipe threads in accordance with ASME B1.20.1 and shall be fitted with solid forged plugs (per ANSI B16.11) of the same basic metallurgy as the valve. Socket welding openings shall be machined in accordance with ANSI B16.11 and shall be fitted with plastic plugs.
- 4.24 Tapped holes in valves, when required for bolting to external flanges, etc., shall be threaded in accordance with ANSI B1.1 Standard for Unified Screw Threads. Threads shall be the Coarse Thread Series with a Class 2B tolerance. Manufacturers shall furnish depth of threads with their quotation.
- 4.25 Where valves are specified to be gear operated in the ITEM DESCRIPTION, they shall be furnished with operator and handwheel, attached to the valve and oriented as specified.
 - 4.25.1 Gear operators shall be of an enclosed design, with stem protectors where applicable, and of the same type and style as specified in the ITEM DESCRIPTION.
- 4.26 Welding procedures shall be submitted with the quotation for cast and forged valves with seal or strength welded bonnets, welded on flanges or with other pressure containing welds. All welding procedures shall comply with the requirements of ASME B31.3 or ASTM A488. Seller shall conduct destructive examination of welds in presence of Buyer inspectors prior to the award of Purchase Order.

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- 4.27 Where casting repairs are necessary and allowed by use of welding, manufacturer shall submit welding procedures to Buyer for approval. All welding procedures shall comply with the requirements of ASTM A488.
- 4.28 When specified "CAR SEALED" in the ITEM DESCRIPTION, the valve shall be supplied with a device that will allow to have a CAR SEALED OPEN VALVE and a CAR SEALED CLOSE VALVE
- 4.29 For valves with bodies in ASTM A350 Gr. LF3 or ASTM A352 Gr. LC3 vendor shall ensure that all valves that permit pressure to be trapped in the body cavity in any closure position are provided with means to prevent excessive pressure build-up due to thermal expansion of liquids. These valves shall either (a) be of a self-relieving design, or (b) have a 3-5 mm hole drilled in the upstream side of the closure element to relieve cavity pressure; such valves shall have the flow direction clearly marked on the body.

V. ¡Error! Marcador no definido.TESTING, EXAMINATION AND REPAIR

5.1 Pressure Testing

- 5.1.1 All valves (except as noted herein) shall be tested in accordance with API Standard 598.
- 5.1.2 Steel valves not covered by a standard shall be tested in accordance with MSS-SP-61.
- 5.1.3 Other valves not covered by 5.1.1 or 5.1.2 above shall be tested in accordance with the procedure of MSS-SP-61, except that pressures shall be as follows:

Test Pressure

Shell	1.5 X P *
Seat	1.0 X P *

*P = The nonshock cold-water, oil or gas pressure (WOG) rating specified by the manufacturer and referred to in the ITEM DESCRIPTION.

- 5.1.4 The type or style of valve stem packing used during hydrotesting shall be the same as that finally supplied with the valve.
- 5.1.5 Valves specified as "HYDROGEN SERVICE" in the ITEM DESCRIPTION shall be tested in accordance with [MET ET 058](#) "Acceptance Test Valves in Hydrogen Service".



5.2 Nondestructive Examination

- 5.2.1 Casting quality of cast steel valves shall meet the requirements of MSS-SP-55.
- 5.2.2 Additional nondestructive testing shall be performed only when:

- Specified in the ITEM DESCRIPTION or in the Purchase Order.
- Part of the manufacturer's standard procedure.
- Part of the ASTM specification.

V. TESTING, EXAMINATION AND REPAIR (cont.)

5.3 Hardness Testing

- 5.3.1 Valves specified in the ITEM DESCRIPTION "WET H₂S PER NACE MR175" or "HYDROGEN SERVICE" shall comply NACE MR 0175 hardness requirements.
- 5.3.2 Valves with Monel trim shall have minimum hardness differential of 50 BHN between the seating surfaces. (See also Paragraph 3.6.6.)
- 5.3.3 Valves shall have supplementary tagging in accordance with 7.2.5.
- 5.3.4 For carbon steel valves to API-602 with welded bonnets, the hardness of the bonnet weld shall not exceed 225 BHN.
- 5.3.5 All other valves shall be hardness tested in accordance with ASME B31.3.

5.4 Inspection

- 5.4.1 Valves shall be subject to the requirements of API Standard 598, Section 2, "Inspection."
- 5.4.2 Valves specified as "HYDROGEN SERVICE" shall be inspected according [MET ET 059](#) "Inspection, Testing and Certification of Valves in Special Service" and [MET ET 060](#) "Material Acceptance Requirements for Valves in Special Service".
- 5.4.3 In the event that a defective casting is found, two additional castings of the same material shall be examined to the same criteria. If these examinations reveal defective castings, then all remaining castings of the same material from the foundry involved shall be examined.
- 5.4.4 Radiographic inspection, where required by this specification and/or any other in this project, shall be in accordance with ASME Section VIII, Appendix VII, except that casting less than 1 inch thick shall meet the acceptance criteria for castings 1 inch to 2 inch thick. Radiographic quality level shall be 2-2T.
- 5.4.5 Magnetic particle inspection, where required by this specification and/or any other specification in this project, shall be in accordance with ASME Section VIII, Appendix VII, except that Types IV and V indications shall be based on the results of radiographic examination.
- 5.4.6 Dye penetrant inspection, where required by this specification and/or any other specification in this project, shall be in accordance with ASME Section VIII, Appendix VIII, with acceptance standards for castings per Appendix VII except that machined surfaces shall meet acceptance standards of Appendix VIII.



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- 5.4.7 Impact testing of the valves shall be performed in the presence of Buyer inspectors and shall be in accordance with the applicable standard.
- 5.4.8 All valves, during the process of manufacture and/or at completion of manufacture shall be subject to inspection by Buyer inspectors.

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5.5 Casting Repairs

- 5.5.1 Major repairs are not permitted for any type of material without authorization from Buyer. The term "Major Repair" shall be as defined in ASTM A217.
- 5.5.2 Cast iron valves, none permitted.
- 5.5.3 Carbon steel valves per ASTM A216.
- 5.5.4 Ferritic alloy steel valves per ASTM A217.
- 5.5.5 Twelve chrome, austenitic stainless steel and nickel-base alloy valves per ASTM A351. Grade CF8M valves shall be solution heat treated after weld repairs.
- 5.5.6 Castings shall not be repaired by impregnation with metallic or nonmetallic materials.
- 5.5.7 Casting repairs for valves specified in the ITEM DESCRIPTION as "HYDROGEN SERVICE" shall be in accordance with [MET ET 060](#) "Material Acceptance Requirements for Valves in Special Service".



VI. ¡Error! Marcador no definido. ENGINEERING DATA REQUIREMENTS

6.1 Certified Drawings

Dimensional drawings, certified by the supplier, shall be furnished for valves when catalog dimensional data is not available, and for the following:

- 6.1.1 Valves larger than 24 inch nominal pipe size.
- 6.1.2 Gate and globe valves specified in the item description to be furnished with gear operators.
- 6.1.3 Valve class 1500 and higher.

6.2 Welding Procedures

The Seller shall furnish welding procedures and procedure qualifications for Buyer's acceptance, if valves are made with pressure retaining welds (including seal welds). The procedures and qualifications shall be in accordance with ASME Section IX. The qualifications shall include hardness testing in accordance with ASTM A370 (specifically 16.0 and 17.0) for materials with maximum hardness limitations shown in ASME B31.3, Table 331.1.1. Except as modified by this specification, the hardness testing shall be performed on the weld and the heat affected zone and after any required heat treatment.

6.3 Material Certification

The following applies to all valves with body and bonnet material specified to an ASME (SA) specification in the ITEM DESCRIPTION:

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- 6.3.1 The Seller shall furnish manufacturer's Certification of Compliance with the referenced ASME Specification for the body and bonnet. The certification shall also state compliance with the applicable ASME Specifications for the bonnet bolting. The documents shall be identified with Buyer's Purchase Order Number and Item Code Number and shall be signed by the manufacturer's authorized agent.
- 6.3.2 ASTM materials may be substituted for materials specified as ASME, provided the ASTM Specification is indicated (below the title of the ASME specification) to be identical with the ASME Specification for the Grade, Class or Type produced. The manufacturer shall state the dual compliance on the Certification of Compliance. ASTM Specification substitutions shall be submitted to Buyer for acceptance in writing.

VII. MARKING AND IDENTIFICATION

7.1 Manufacturer's Markings

- 7.1.1 Each valve shall be marked in strict accordance with MET ET 056 "Marking for piping materials".
- 7.1.2 Manufacturer's standard tagging is required in addition to contract tagging.



VIII. HANDLING AND SHIPPING

- 8.1 Prior to shipping, all valves shall be inspected for tagging to assure that all tags required are correct and securely attached to the valve.
- 8.2 Gate and globe valves shall be in the closed position for shipment. Plug and ball valves shall be in the open position for shipment.
- 8.3 Valves shall be shipped with the correct stem packing installed and with the gland-follower sufficiently tightened to prevent in-service leaking.
- 8.4 Threaded or socket-welding openings shall be closed with metal or plastic protectors to exclude dirt and other foreign matter from the interior of the valves.
- 8.5 Flanged facings and butt welding ends shall be protected with wood, plastic or metal covers to exclude dirt and other foreign matter from the interior of the valves and to protect the flange or butt weld end facings.
- 8.6 When flange facings are protected with metal covers, a nonmetallic gasket shall also be furnished between the flange and the cover.
- 8.7 Valves shall be prepared for shipment in such a manner to avoid damage or atmospheric corrosion to inside or outside surfaces, or parts, during storage or while in transit. Use API-600 as a minimum standard of acceptance.

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VIII. HANDLING AND SHIPPING (cont.)

- 8.8 Particular attention shall be given to protecting austenitic stainless steel valves from chloride attack such as might occur in salt contaminated atmospheres. In this case they should be enclosed or wrapped in a vapor-proof barrier material.
- 8.9 Valves specified in the ITEM DESCRIPTION as "HYDROGEN SERVICE" shall also comply with the following requirements:
 - 8.9.1 Valves supplied shall be internally clean and free from moisture and grease.
 - 8.9.2 Valves shall be properly packed to prevent ingress of dirt and moisture.