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AHEAD OF THE FLOW®



Valve Selection & Specification
Guide for Building Services

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De-alloying corrosion, known as “Dezincification,” was effectively eradicated from valve products in the 1950’s. Today, however, this problem has returned with the increased use of high-zinc alloys (commonly referred to as ‘Yello Brass’) in forged and cast valves typically produced outside the United States.

Dezincification selectively removes zinc from the alloy, leaving behind a porous, copper-rich structure that has little mechanical strength. The physical attributes of an in-service valve with Dezincification includes a white powdery substance or mineral stains on its exterior surface.

What’s the cure? On all bronze valves the metal components in the waterway must not contain more than 15% zinc in their chemical make-up. As a standard NIBCO bronze pressure-rated valves are made to be “Dezincification Resistant,” which is a seal of quality and longevity.

The information presented in this catalog is correct at time of printing.
 NIBCO INC. reserves the right to change design and/or material specifications without notice.

VALVE SELECTION GUIDE — BUILDING SERVICES

Selection

Valves serve the purpose of controlling the fluids in building services piping. Valves are produced in a variety of design types and materials. Proper selection is important to ensure the most safe, efficient, cost-effective and long-lasting systems.

Function

Valves are designed to perform four principal functions:

1. Starting and stopping the flow (isolation)
2. Regulating (throttling) the flow
3. Preventing reversal of the flow (backflow)
4. Regulating or relieving the pressure of the flow

Service Considerations

1. Pressure
2. Temperature
3. Type of fluid
 - a) Liquid
 - b) Gas; i.e., steam or air
 - c) Dirty or abrasive (erosive)
 - d) Corrosive
4. Flow
 - a) On-off, throttling
 - b) Need to prevent flow reversal
 - c) Concern for pressure drop
 - d) Velocity
 - e) Shock
5. Operating conditions
 - a) Condensation
 - b) Frequency of operation
 - c) Speed of operation
 - d) Accessibility
 - e) Overall size/space available
 - f) Manual on automated control
 - g) Need for bubble-tight shut-off
 - h) Insulation

Valve Design Choices

1. Multi-Turn
 - a) Gate
 - b) Globe/Angle-Globe
2. Quarter-Turn
 - a) Ball
 - b) Butterfly
3. Check
 - a) Swing
 - b) Lift
 - c) Spring-actuated
4. End connections

Materials

1. Bronze (up to 550°F at 150 psi/up to 600 psi at 150°F) ¼"-3"
2. Cast Iron (up to 450°F at 250 psi/up to 500 psi at 100°F) 2"-24"
3. Ductile Iron (up to 650°F at 125 psi/up to 600 psi at 100°F) 2"-12"
4. Stainless Steel (up to 650°F at 125 psi/up to 2000 psi at 100°F) ¼"-12"
5. PVC Plastic (up to 140°F at 50 psi/up to 150 psi at 100°F) ¼"-4"

Approvals

1. Manufacturers Standardization Society (MSS)
2. Fire protection (UL® and FM)
3. State and local codes.



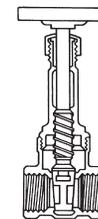
Design Detail

1. Multi-Turn

a) Gate Valves

Positive Features

- 1) Good choice for on-off service
- 2) Full flow - low pressure drop
- 3) Bidirectional
- 4) Best choice for steam service



Gate Valve

Disadvantages

- 1) Not for throttling; use fully opened or fully closed.
- 2) Metal-to-metal seating means not best choice for frequent operation. Bubble-tight seating should not be expected with metal-to-metal design.
- 3) Difficult to actuate.

Wedge and Seat Designs

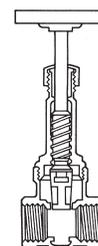
- 1) Solid wedge best choice for all building services. Modern foundry and machining controls enable the solid wedge to give good performance in a broad range of services.
- 2) Metal solid wedge seating against metal seat integral to the body is the most common in building service piping. Rubber-coated solid wedge (resilient wedge) has become popular in fire protection and municipal cold water service. The resilient wedge design offers bubble-tight seating, but is limited to 160°F water service.



Solid Wedge Seat

Stem Designs

- 1) Rising stem-inside screw is the most common and preferred design for bronze multi-turn valves. In the fully open "back seated" position*, the stem threads are protected from the media. Because the stem rises as the valve is opened, clearance must be provided and stem orientation should protect it from external damage. The stem position indicates to the observer if the valve is opened or closed.



Rising Stem-Inside Screw

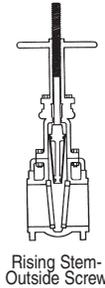
*Repacking while valve is pressurized is not recommended.

- 2) Non-rising-inside screw stems are used in bronze and iron gate valves. While they are more compact than rising stem valves, the stem threads are always exposed to flowing media, allowing for possible erosion/corrosion. Open/close indication is not provided with this design.



Non-Rising-Inside Screw Stem

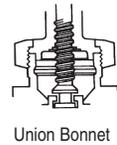
- 3) Rising stem-outside screw and yoke is preferred in iron, multi-turn valves. Threads are external to the valve, protecting them from flowing media and enabling lubrication. Care should be taken for clearance, as the stem rises, so that threads are not damaged. The stem position provides indication that the valve is opened or closed.



Rising Stem-Outside Screw

Body-Bonnet Connection

- 1) Union bonnet is recommended as the best choice for building services piping for bronze multi-turn valves, although not all styles offer this design. The union bonnet offers strength and ease of assembly-disassembly.



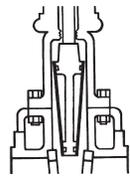
Union Bonnet

- 2) Threaded-in bonnet is common in lighter-duty services and smaller sizes of bronze multi-turn valves.



Threaded-in Bonnet

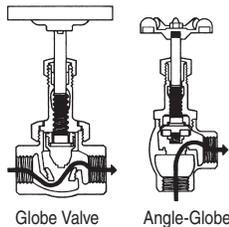
- 3) Bolted body-bonnet connection is the principal design used in iron multi-turn valves. This gasketed joint is strong and easy to assemble/disassemble.



Bolted Body-Bonnet

b) Globe/Angle-Globe Valves
Positive Features

- 1) Recommended for throttling applications
- 2) Positive bubble-tight shut-off when equipped with resilient seating
- 3) Good for frequent operation



Globe Valve

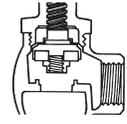
Angle-Globe

Disadvantages

- 1) Significant pressure drop due to flow path
- 2) More costly than alternate valves

Disc and Seat Designs

- 1) Resilient (soft) seat discs are preferred over metal-to-metal except where temperatures, very close throttling or abrasive flow make metal alloy seating a better choice. TFE is the best resilient disc material for most services, although rubber's softness give good performance in cold water.

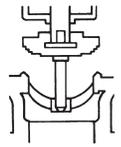


Resilient Soft Seat Disc

- 2) Plug-type disc/seat, often with harder metal and alloys, is best for very close throttling and steam service, when media temperature is beyond the range of TFE (500°F) or when abrasive flow is involved. Iron globe valves most commonly employ semi-plug bronze disc/seat design.

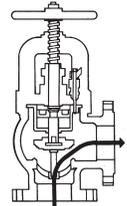


Plug-Type Disc/Seat



Semi-Plug Disc/Seat

- 3) Automatic steam stop-check valve is an angle-globe valve with an integral check valve. The valve is designed to be on the discharge of boilers where multiple boilers feed a common header. The check feature prevents steam from the header into the boiler if there is a loss of boiler pressure. The globe valve feature provides a positive shut-off for repairs.



Stop-Check Angle-Globe Valve

2. Quarter-Turn Valves

a) Ball Valves

Positive Features

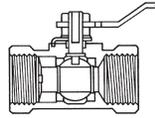
- 1) Bubble-tight shut-off from resilient (TFE) seats
- 2) Quick 90° open-close, not torque-dependent for seating
- 3) Straight-through, unobstructed flow, bidirectional
- 4) Minimal pressure drop if full-port selected
- 5) Can be throttled (Application dependent)
- 6) Easier to automate than multi-turn valves
- 7) More compact than multi-turn valves
- 8) Offers high cycle life

Disadvantages

- 1) Temperature range limited by seat material
- 2) Media is always trapped in the body cavity
- 3) Not a good choice for steam flow control due to "quick opening" feature.

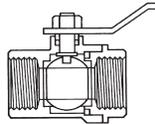
Body Styles

1) One-piece has no potential body leak path, but requires use of reduced port ball; thus, significant pressure drop. Not repairable.



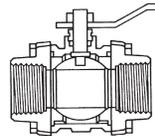
One-Piece Body

2) Two-piece end entry is most common in building services. Available full- or standard-port balls. Not recommended to be repaired.



Two-Piece Body

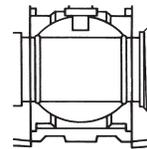
3) Three-piece is more costly, but is easier to disassemble and offers in-line reparability. Available in full- or standard-port balls.



Three-Piece Body

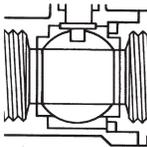
Port Size

1) Full-Port ball valves provide pressure drop equal to equivalent length of pipe, and even slightly better than gate valves.



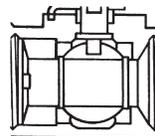
Full-Port

2) Standard (conventional) port balls are up to one pipe size smaller than nominal pipe size, but still have significantly better flow than globe valves.



Standard Port

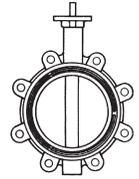
3) Reduced port ball valves have more than one pipe size flow restriction and are not recommended in building services piping, but rather for process piping in hazardous material transfer.



Reduced Port

b) Butterfly Valves - Resilient Seated
Positive Features

- 1) Bubble-tight shut-off from resilient seats
- 2) Quick 90° open-close, easier to automate than multi-turn valves
- 3) Very cost-effective compared to alternate valve choices
- 4) Broad range of throttling capabilities
- 5) Nearly full flow, less pressure drop than globe valves
- 6) Broad selection of trim materials to match different fluid conditions
- 7) More compact than multi-turn valves
- 8) Offers high cycle life



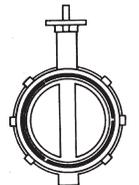
Butterfly Valve

Disadvantages

- 1) Not for use with steam and high temperature limits
- 2) Gear operators needed for larger than 6" size valves to aid in operation and protect against operating too quickly and causing destructive line shock.

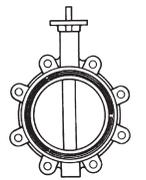
Body Styles

1) Wafer-style held in place between two pipe flanges. Easy to install but cannot be used as isolation valve.



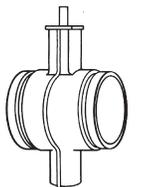
Wafer Style Body

2) Lug-style is a wafer body which has tapped lugs matching up to bolt circle of Class 125/150 flanges. Easily installed with cap screws from either side. Lug-style designs, from some manufacturers, permit removal of piping from one side and the valve while maintaining full pressure when needed. (Dead end service)



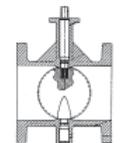
Lug Style Body

3) Grooved butterfly valves connect directly to the pipe using iron pipe size couplings. Grooved valves are easiest to install.



Grooved Style Body

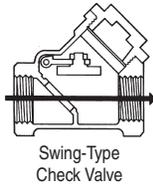
4) Flanged butterfly valves face to face dimension conforms to ANSI Standard B16.10. Class 125 and 150 ball, gate and plug valves.



Flanged Style Body

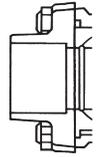
3. Check Valves (Backflow Prevention)

a) Swing-type check offer the least pressure drop and offer simple automatic closure; when fluid flow stops, gravity and flow reversal closes valve. Many bronze valves offer a Y-pattern body with an angle seat for improved performance. Resilient seating preferred for tighter shutoff.



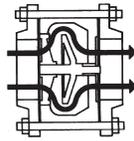
Swing-Type
Check Valve

b) Solder-end valves permit directly connecting bronze multi-turn and ball valves up to 3" to copper tubing. Care must be taken not to overheat and damage valves during the soldering process.



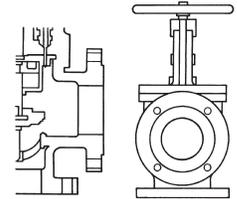
Solder-End
Connection

b) Lift checks come in in-line or globe-style body patterns. Both cause greater pressure drop than the swing type, with the horizontal pattern similar in restriction to globe valves. Some styles are spring-actuated for immediate closure when flow stops. The in-line spring-actuated lift check also is referred to as the "silent check" because the spring closes the valve before gravity and fluid reversal can slam the valve closed. Resilient seating recommended.



Lift Check Valve

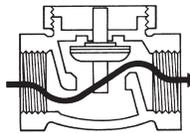
c) Flanged-end connections are the most used design for installation of iron multi-turn valves 2" and larger.



Flanged-End
Connection

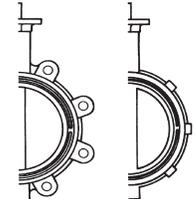
Flanged-End
Connection

c) Double-door checks have twin discs on a spring-loaded center shaft. These valves have better flow than lift checks and most often use a wafer body for low cost and easy installation. Resilient seating recommended.



Horizontal-Lift
Check Valve

d) Wafer and lug (wafer) body styles are used with butterfly valves and lift/double-door check valves for quick, easy installation between two flanges.

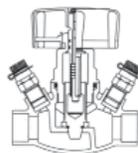


Lug-Body
Style

Wafer-Body
Style

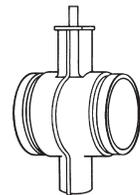
4. Circuit Balancing Valves

a) A Balancing Valve is used to regulate and measure the rate of flow of water. The valve can positively isolate the flow and be set at an intermediate position to maintain the design flow rate. Pressure tapping points on either side of the seat provide the means for flow measurement. Most Balancing Valves are globe style and incorporate a parabolic (plug) shaped disc.



Circuit Balancing
Valve

e) Grooved end ball, butterfly and check valves permit the quickest installation sizes 2" and larger.



Grooved-End
Connection

5. End Connection

a) Threaded-end multi-turn check valves and ball valves with ANSI female taper threads are most commonly used with pipe up to 2½" or 3"



Threaded-End
Connection

Pages 7 through 14 include sample valve specifications for a variety of building services installations.

1.0 HOT AND COLD DOMESTIC WATER SERVICE SPECIFICATIONS

LINE CONTROL VALVES 2½" AND SMALLER

BALL VALVES: Valves shall be rated 150 psi SWP and 600 psi non-shock WOG and will have 2-pc. cast bronze bodies, TFE seats, full port, separate packnut with adjustable stem packing, anti-blow-out stems and chrome-plated brass/bronze ball. Valve ends shall have full depth ANSI threads or extended solder connections and be manufactured to comply with MSS SP-110.

ACCEPTABLE VALVES FULL PORT:

NIBCO T585-70 (threaded); S585-70 (solder)

NOTE: Where piping is insulated, ball valves shall be equipped with 2" extended handles of non-thermal conductive material. Also provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Memory stops, which are fully adjustable after insulation is applied, shall be included.

ACCEPTABLE VALVES FULL PORT:

NIBCO T585-70-NS (threaded); S585-70-NS (solder)

GATE VALVES:

Rising Stem: Valves shall be Class 125 and 200 psi CWP, rising stem, union bonnet, solid wedge and manufactured in accordance with MSS SP-80. Body, bonnet and wedge are to be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 or low-zinc alloy B-99, non-asbestos packing and malleable or ductile iron handwheel. Where higher operating pressures approach 150 psi, Class 150 union bonnet valves of like construction will be used. Valve ends may be threaded or solder-type.

ACCEPTABLE VALVES:

Class 125 NIBCO T124 (threaded);
Class 150 NIBCO T134 (threaded); S134 (solder)

Non-Rising Stem: Valves shall be Class 125 and 200 psi CWP, non-rising stem, screw-in bonnet, solid wedge and manufactured in accordance with MSS SP-80. Body, bonnet, external stuffing box and wedge are to be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 or low-zinc alloy B-99, non-asbestos packing and malleable or ductile iron handwheel. Where higher operating pressures approach 150 psi, Class 150 union bonnet valves of like construction will be used. Valve ends may be threaded or solder-type.

ACCEPTABLE VALVES:

Class 125 NIBCO T113 (threaded); S113 (solder)
Class 150 NIBCO T136 (threaded); S136 (solder)

GLOBE/ANGLE VALVES: Valves shall be Class 125 and manufactured in accordance with MSS SP-80; body and bonnet are to be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 or low-zinc alloy B-99, non-asbestos packing, TFE seat disc and malleable or ductile iron handwheel. Where higher operating pressures approach 150 psi, Class 150 union bonnet valves of like construction will be used. Valve ends may be threaded or solder-type.

ACCEPTABLE VALVES:

Class 125 NIBCO globe/angle T211-Y/T311-Y (threaded);
S211-Y/S311-Y (solder)
Class 150 NIBCO globe/angle T235-Y/T335-Y (threaded);
S235-Y (solder)

CHECK VALVES: 2½" and smaller shall be Y-pattern swing-type manufactured in accordance with MSS SP-80, Class 125, bronze ASTM B-62 body with TFE seat disc. Where higher operating pressures approach 150 psi, Class 150 valves of like construction shall be used. Valve ends may be threaded or solder-type.

ACCEPTABLE VALVES:

Class 125 NIBCO T413-Y (threaded); S413-Y (solder)
Class 150 NIBCO T433-Y (threaded); S433-Y (solder)

CIRCUIT BALANCING VALVES: Circuit Balancing Valves ½" to 2" for domestic hot water service shall be NIBCO Globe Style, Series 1709/1710. Valve shall have integral metering/test ports for flow balancing and flow measurement. Test ports shall have internal check valve and be equipped with caps. Valves shall be manufactured from dezincification resistant brass or bronze rated 240 psi at 250 F. All balancing valves shall have position indication readout and built in memory stop for repeatable regulation and control.

ACCEPTABLE VALVES:

NIBCO T1709/T1710 (threaded); S1709/S1710 (solder)

LINE CONTROL VALVES 2½" AND LARGER

BUTTERFLY VALVES: Valves shall be lug or I.P.S. grooved body style manufactured in accordance with MSS SP-67 rated at least 200 psi non-shock cold water working pressure. Body to have 2" extended neck for insulating and to be cast iron or ductile iron. Valve to have aluminum bronze alloy disc with EPDM rubber seat and seals; or EPDM rubber encapsulated disc with polymer-coated body. Stem shall be 400 series stainless steel and shall not have exposed stem to disc fasteners. Sizes 2½"-6" shall be lever operated with 10-position throttling plate; sizes 8" and larger shall have gear operators. Lug-style and grooved style shall be capable for use as isolation valves and recommended by manufacturer or dead-end service at full pressure without the need for downstream flanges.

ACCEPTABLE VALVES:

Lug body, aluminum bronze disc
NIBCO LD2000-3 (lever operator);
LD 2000-5 (gear operator);
LD1000-5 (gear operator) 14" and larger
Grooved body, rubber-coated disc
NIBCO GD4765-3 (lever operator);
GD4765-5 (gear operator)

GATE, GLOBE/ANGLE VALVES: Valves to be Class 125 manufactured in accordance with MSS SP-70 (gate) or MSS SP-85 (globe/angle), flanged, bolted bonnet, OS&Y, iron body, bronze trimmed, with body and bonnet conforming to ASTM A-126 class B cast iron. Packing and gaskets to be non-asbestos.

ACCEPTABLE VALVES:

Gate NIBCO F617-0;
Globe NIBCO F718-B;
Angle NIBCO F818-B

CHECK VALVES: For horizontal lines, 2½" and larger shall be swing-type manufactured in accordance with MSS SP-71, Class 125, flanged, ASTM A-126 Class B, cast iron body with bronze trim, non-asbestos gasket. For vertical lines or pump discharge, valves shall be wafer or lug style, in-line, spring-actuated lift check manufactured in accordance with MSS SP-126. Body shall be cast iron, ASTM A-126 Class B with stainless steel spring, bronze disc plates, rubber seat.

ACCEPTABLE VALVES:

Swing-type NIBCO F918-B
Spring-actuated wafer-type NIBCO W920-W, KW900-W,
W910-W, or flanged F910
Swing-type with outside lever and spring or weight
NIBCO F918-BL&S or F918-BLW

2.1 CONDENSER AND CHILLED WATER SPECIFICATIONS

LINE CONTROL VALVES 2½" AND SMALLER

BALL VALVES: Valves shall be rated 150 psi SWP and 600 psi non-shock WOG and will have 2-pc. cast bronze bodies, TFE seats, standard port, separate packnut with adjustable stem packing, anti-blowout stems and chrome-plated brass/bronze ball. Where pressure drop is a concern, full-port ball valves of like construction are to be used. Valve ends shall have full depth ANSI threads or extended solder connections and be manufactured to comply with MSS SP-110

ACCEPTABLE VALVES STANDARD PORT:

NIBCO T580-70 (threaded); S580-70 (solder)

ACCEPTABLE VALVES FULL PORT:

NIBCO T585-70 (threaded); S585-70 (solder)

NOTE: Where piping is insulated, ball valves shall be equipped with 2" extended handles of non-thermal conductive material. Also, provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Memory stops, which are fully adjustable after insulation is applied, shall be included.

ACCEPTABLE VALVES STANDARD PORT:

NIBCO T580-70-NS (threaded); S580-70-NS (solder)

ACCEPTABLE VALVES FULL PORT:

NIBCO T585-70-NS (threaded); S585-70-NS (solder)

GATE VALVES: Valves shall be Class 125 rising stem, union bonnet, solid wedge and manufactured in accordance with MSS SP-80. Body, bonnet and wedge are to be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 or low-zinc alloy B-99, non-asbestos packing and malleable or ductile iron handwheel. Where higher operating pressures approach 150 psi, Class 150 union bonnet valves of like construction will be used. Valve ends may be threaded or solder type.

ACCEPTABLE VALVES:

Class 125 NIBCO T124 (threaded)

Class 150 NIBCO T134 (threaded); S134 (solder)

GLOBE/ANGLE VALVES: Valves shall be Class 125 and manufactured in accordance with MSS SP-80, body and bonnet are to be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 or low-zinc alloy B-99, non-asbestos packing, TFE seat disc and malleable or ductile iron handwheel. Where higher operating pressures approach 150 psi, Class 150 union bonnet valves of like construction will be used. Valve ends may be threaded or solder type.

ACCEPTABLE VALVES:

Class 125 NIBCO globe/angle T211-Y/T311-Y (threaded);

S211-Y/S311-Y (solder)

Class 150 NIBCO globe/angle T235-Y/T335-Y (threaded);

S235-Y (solder)

CHECK VALVES: 2½" and smaller shall be Y-pattern swing-type manufactured in accordance with MSS SP-80, Class 125, bronze ASTM B-62 body with TFE seat disc. Where higher operating pressures approach 150 psi, Class 150 valves of like construction shall be used. Valve ends may be threaded or solder type.

ACCEPTABLE VALVES:

Class 125 NIBCO T413-Y (threaded); S413-Y (solder)

Class 150 NIBCO T433-Y (threaded); S433-Y (solder)

CIRCUIT BALANCING VALVES: Circuit Balancing Valves ½" to 2" for domestic hot water service shall be NIBCO Globe Style, Series 1709/1710. Valve shall have integral metering/test ports for flow balancing and flow measurement. Test ports shall have internal check valve and be equipped with caps. Valves shall be manufactured from dezincification resistant brass or bronze rated 240 psi at 250 F. All balancing valves shall have position indication readout and built in memory stop for repeatable regulation and control.

ACCEPTABLE VALVES:

NIBCO T1709/T1710 (threaded); S1709/S1710 (solder)

LINE CONTROL VALVES 2½" AND LARGER

BUTTERFLY VALVES: Valves shall be lug or I.P.S. grooved body style manufactured in accordance with MSS SP-67 rated at least 200 psi non-shock cold water working pressure. Body to have 2" extended neck for insulating and to be cast iron or ductile iron. Valve to have aluminum bronze alloy disc with EPDM rubber seat and seals; or EPDM rubber encapsulated disc with polymer-coated body. Stem shall be 400 series stainless steel and shall not have exposed stem to disc fasteners. sizes 2½"-6" shall be lever operated with 10-position throttling plate; sizes 8" and larger shall have gear operators. Lug-style and grooved style shall be capable for use as isolation valves and recommended by manufacturer for dead-end service at full pressure without the need for downstream flanges.

ACCEPTABLE VALVES:

Lug body, aluminum bronze disc

NIBCO LD2000-3 (lever operator);

LD 2000-5 (gear operator);

LD1000-5 (gear operator) 14" and larger

Grooved body, rubber-coated disc

NIBCO GD4765-3 (lever operator);

GD4765-5 (gear operator)

GATE, GLOBE/ANGLE VALVES: Valves to be Class 125 manufactured in accordance with MSS SP-70 (gate) or MSS SP-85 (globe/angle), flanged, bolted bonnet, OS&Y, iron body, bronze trimmed, with body and bonnet conforming to ASTM A-126 Class B cast iron. Packing and gaskets to be non-asbestos.

ACCEPTABLE VALVES:

Gate NIBCO F617-0;

Globe NIBCO F718-B;

Angle NIBCO F818-B

CHECK VALVES: For horizontal lines, 2½" and larger shall be swing-type manufactured in accordance with MSS SP-71, Class 125, flanged, ASTM A-126 Class B, cast iron body with bronze trim, non-asbestos gasket. For vertical lines or pump discharge, valves shall be wafer or lug style, in-line, spring-actuated lift check manufactured in accordance with MSS SP-126. Body shall be cast iron, ASTM A-126 Class B with stainless steel spring, bronze disc plates, rubber seat.

ACCEPTABLE VALVES:

Swing-type NIBCO F918-B

Spring-actuated wafer-type NIBCO W920-W,

KW900-W, or W910-W

Swing-type with outside lever and spring or weight,

NIBCO F918-BL&S or F918-BLW

CIRCUIT BALANCING VALVES: 2" to 12" valves shall be constructed of iron with ANSI Class 125/150 flanged or grooved ends. All valves shall be globe style for precise regulation and control and rated 175 psi for Iron and 240 psi for Bronze at 250°F. Each valve shall have two metering/test ports with internal check valve and protective caps. All valves must be equipped with visual position readout and memory stop for repeatable regulation and control.

ACCEPTABLE VALVES:

NIBCO F737A (flanged); G737A (grooved)

2.2 HOT WATER HEATING SERVICE SPECIFICATIONS

LINE CONTROL VALVES 2½" AND SMALLER

BALL VALVES: Valves shall be rated 150 psi SWP, 600 psi non-shock WOG and will have 2-pc. cast bronze bodies TFE seats, standard port, separate packnut with adjustable stem packing, anti-blowout stems and stainless steel ball with vent. Where pressure drop is a concern, full port ball valves of like construction are to be used. Valve ends shall have full depth ANSI threads or extended solder connections and be manufactured to comply with MSS SP-110.

ACCEPTABLE VALVES STANDARD PORT:

NIBCO T580-70-66 (threaded); S580-70-66 (solder)

ACCEPTABLE VALVES FULL PORT:

NIBCO T585-70-66 (threaded); S585-70-66 (solder)

NOTE: Where piping is insulated, ball valves shall be equipped with 2" extended handles of non-thermal conductive material. Also, provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Memory stops, which are fully adjustable after insulation is applied, shall be included.

ACCEPTABLE VALVES STANDARD PORT:

NIBCO T580-70-66-NS (threaded); S580-70-66-NS (solder)

ACCEPTABLE VALVES FULL PORT:

NIBCO T585-70-66-NS (threaded); S585-70-66-NS (solder)

GATE VALVES: Valves shall be Class 150 rising stem, union bonnet, solid wedge and manufactured in accordance with MSS SP-80. Body, bonnet and wedge are to be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 or low-zinc alloy B-99, non-asbestos packing and malleable or ductile iron handwheel. Valve ends may be threaded or solder type.

ACCEPTABLE VALVES:

NIBCO T134 (threaded); S134 (solder)

GLOBE/ANGLE VALVES: Valves shall be Class 150 union bonnet and manufactured in accordance with MSS SP-80. Body and bonnet are to be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 or low-zinc alloy B-99, non-asbestos packing, TFE seat disc and malleable or ductile iron handwheel. Valve ends may be threaded or solder type.

ACCEPTABLE VALVES:

NIBCO globe/angle T235-Y/T335-Y (threaded); S235-Y (solder)

CHECK VALVES: 2½" and smaller shall be Y-pattern swing-type manufactured in accordance with MSS SP-80, Class 150, bronze ASTM B-62 body with TFE seat disc. Valve ends may be threaded or solder-type.

ACCEPTABLE VALVES:

Class 150 NIBCO T433-Y (threaded); S433-Y (solder)

CIRCUIT BALANCING VALVES: Circuit Balancing Valves ½" to 2" for domestic hot water service shall be NIBCO Globe Style, Series 1709/1710. Valve shall have integral metering/test ports for flow balancing and flow measurement. Test ports shall have internal check valve and be equipped with caps. Valves shall be manufactured from dezincification resistant brass or bronze rated 240 psi at 250 F. All balancing valves shall have position indication readout and built in memory stop for repeatable regulation and control.

ACCEPTABLE VALVES:

NIBCO T1709/T1710 (threaded); S1709/S1710 (solder)

LINE CONTROL VALVES 2½" AND LARGER

BUTTERFLY VALVES: Valves shall be lug or I.P.S. grooved body style manufactured in accordance with MSS SP-67 rated at least 200 psi non-shock cold water working pressure. Body to have 2" extended neck for insulating and to be cast iron or ductile iron. Valve to have aluminum bronze alloy disc with EPDM rubber seat and seals; or EPDM rubber encapsulated disc with polymer-coated body. Stem shall be 400 series stainless steel and shall not have exposed stem to disc fasteners. sizes 2½"-6" shall be lever operated with 10-position throttling plate; sizes 8" and larger shall have gear operators. Lug-style and grooved style shall be capable for use as isolation valves and recommended by manufacturer or dead-end service at full pressure without the need for downstream flanges.

ACCEPTABLE VALVES:

Lug body, aluminum bronze disc
NIBCO LD2000-3 (lever operator);
LD 2000-5 (gear operator)
Grooved body, rubber-coated disc
NIBCO GD4765-3 (lever operator);
GD4765-5 (gear operator)

GATE, GLOBE/ANGLE VALVES: Valves to be Class 125 manufactured in accordance with MSS SP-70 (gate) or MSS SP-85 (globe/angle), flanged, bolted bonnet, OS&Y, iron body, bronze trimmed, with body and bonnet conforming to ASTM A-126 class B cast iron. Packing and gaskets to be non-asbestos.

ACCEPTABLE VALVES:

Gate NIBCO F617-0;
Globe NIBCO F718-B;
Angle NIBCO F818-B

CHECK VALVES: For horizontal lines, 2½" and larger shall be swing-type manufactured in accordance with MSS SP-71, Class 125, flanged, ASTM A-126 Class B, cast iron body with bronze trim, non-asbestos gasket. For vertical lines or pump discharge, valves shall be wafer or lug style, in-line, spring-actuated lift check manufactured in accordance with MSS SP-126. Body shall be cast iron, ASTM A-126 Class B with stainless steel spring, bronze disc plates, rubber seat.

ACCEPTABLE VALVES:

Swing-type NIBCO F918-B
Spring-actuated wafer-type NIBCO W920-W,
KW900-W, or W910-W

CIRCUIT BALANCING VALVES: 2" to 12" valves shall be constructed of iron with ANSI Class 125/150 flanged or grooved ends. All valves shall be globe style for precise regulation and control and rated 175 psi for Iron and 240 psi for Bronze at 250°F. Each valve shall have two metering/test ports with internal check valve and protective caps. All valves must be equipped with visual position readout and memory stop for repeatable regulation and control.

ACCEPTABLE VALVES:

NIBCO F737A (flanged); G737A (grooved)

2.3 LOW PRESSURE STEAM SERVICE (15 psi) SPECIFICATIONS

LINE CONTROL VALVES 2½" AND SMALLER

BALL VALVES: Valves shall be rated 150 psi SWP and 600 psi non-shock WOG and will have 2-pc. cast bronze bodies, TFE seats, standard port, separate packnut with adjustable stem packing, anti-blowout stems and stainless steel ball with vent. Where pressure drop is a concern, full-port ball valves of like construction are to be used. Valve ends shall have full depth ANSI threads or extended solder connections and be manufactured to comply with MSS SP-110.

ACCEPTABLE VALVES STANDARD PORT:

NIBCO T580-70-66 (threaded)

ACCEPTABLE VALVES FULL PORT:

NIBCO T585-70-66 (threaded)

NOTE: Where piping is insulated, ball valves shall be equipped with 2" extended handles of non-thermal conductive material. Also, provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Memory stops, which are fully adjustable after insulation is applied, shall be included.

ACCEPTABLE VALVES STANDARD PORT:

NIBCO T580-70-66-NS (threaded)

ACCEPTABLE VALVES FULL PORT:

NIBCO T585-70-66-NS (threaded)

GATE VALVES: Valves shall be Class 125 rising stem, union bonnet, solid wedge and manufactured in accordance with MSS SP-80. Body, bonnet and wedge are to be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 or low-zinc alloy B-99, non-asbestos packing and malleable or ductile iron handwheel. Valve ends may be threaded or solder-type.

ACCEPTABLE VALVES:

Class 125 NIBCO T124 (threaded)

GLOBE/ANGLE VALVES: Valves shall be Class 125 and manufactured in accordance with MSS SP-80, body and bonnet are to be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 or low-zinc alloy B-99, non-asbestos packing, TFE seat disc and malleable or ductile iron handwheel.

ACCEPTABLE VALVES:

Class 125 NIBCO globe/angle T211-Y/T311-Y (threaded)

CHECK VALVES: 2½" and smaller shall be Y-pattern swing-type manufactured in accordance with MSS SP-80, Class 125, bronze ASTM B-62 body with TFE seat disc.

ACCEPTABLE VALVES:

Class 125 NIBCO T413-Y (threaded)

LINE CONTROL VALVES 2½" AND LARGER

GATE, GLOBE/ANGLE VALVES: Valves to be Class 125 manufactured in accordance with MSS SP-70 (gate) or MSS SP-85 (globe/angle), flanged, bolted bonnet, OS&Y, iron body, bronze trimmed, with body and bonnet conforming to ASTM A-126 Class B cast iron. Packing and gaskets to be non-asbestos.

ACCEPTABLE VALVES:

Gate NIBCO F617-0;

Globe NIBCO F718-B;

Angle NIBCO F818-B

CHECK VALVES: For horizontal lines, 2½" and larger shall be swing-type manufactured in accordance with MSS SP-71, Class 125, flanged, ASTM A-126 Class B, cast iron body with bronze trim, non-asbestos gasket.

ACCEPTABLE VALVES:

Swing-type NIBCO F918-B

2.4 MEDIUM-PRESSURE STEAM SERVICE (15-125 psi) SPECIFICATIONS

LINE CONTROL VALVES 2½" AND SMALLER

GATE VALVES: Valves shall be threaded Class 125 rising stem, union bonnet, solid wedge and manufactured in accordance with MSS SP-80. Body, bonnet and wedge are to be of bronze ASTM B-62 with bronze disc. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 or low-zinc alloy B-99, non-asbestos packing and malleable or ductile iron handwheel. Where steam working pressures approach 100 psi, Class 150 union bonnet valves of like construction will be used.

ACCEPTABLE VALVES:
Class 125 NIBCO T124;
Class 150 NIBCO T134

GLOBE/ANGLE VALVES: Valves shall be threaded Class 125 and manufactured in accordance with MSS SP-80; body and bonnet are to be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 or low-zinc alloy B-99, non-asbestos packing, TFE seat disc and malleable or ductile iron handwheel. Where steam working pressures approach 100 psi, Class 150 union bonnet valves of like construction will be used. For close throttling use, valves shall have full plug stainless steel seat/disc.

ACCEPTABLE VALVES:
Class 125 NIBCO globe/angle T211-Y/T311-Y
Class 150 NIBCO globe/angle T235-Y/T335-Y
Class 200 NIBCO globe T-256-AP (full plug stainless steel seat/disc)
Class 300 NIBCO angle T-376-AP (full plug stainless steel seat/disc)

CHECK VALVES: 2½" and smaller shall be threaded Y-pattern swing-type manufactured in accordance with MSS SP-80, Class 125, bronze ASTM B-62 body with TFE seat disc. Where steam working pressures approach 100 psi, Class 150 valves of like construction shall be used.

ACCEPTABLE VALVES:
Class 125 NIBCO T413-Y;
Class 150 NIBCO T433-Y

LINE CONTROL VALVES 2½" AND LARGER

GATE, GLOBE/ANGLE VALVES: Valves to be Class 125 manufactured in accordance with MSS SP-70 (gate) or MSS SP-85 (globe/angle), flanged, bolted bonnet, OS&Y, iron body, bronze trimmed, with body and bonnet conforming to ASTM A-126 Class B cast iron. Packing and gaskets to be non-asbestos. Where steam working pressures exceed 100 psi, Class 250 valves of like construction shall be used.

ACCEPTABLE VALVES:
Class 125 Gate NIBCO F617-0;
Class 125 Globe NIBCO F718-B;
Class 125 Angle NIBCO F818-B;
Class 250 Gate NIBCO F667-0;
Class 250 Globe NIBCO F768-B

STOP CHECK VALVES: 2½" and larger Class 250 angle-globe style stop check valves may be used on boilers in lieu of globe or angle style control valves and check valves. Flanged body and bonnet are to be manufactured from ASTM A-126 Class B cast iron with bronze trim and non-asbestos gaskets. Sizing of stop check is to be in accordance with manufacturer's recommendations.

ACCEPTABLE VALVES:
NIBCO F869-B

CHECK VALVES: For horizontal lines, 2½" and larger shall be swing-type manufactured in accordance with MSS SP-71, Class 125, flanged, ASTM A-126 Class B, cast iron body with bronze trim, non-asbestos gasket.

ACCEPTABLE VALVES:
Class 125 NIBCO F918-B;
Class 250 NIBCO F968-B

LINE CONTROL VALVES 2½" AND SMALLER

GATE VALVES: Shall have approval rating 175 psi WWP or greater with body and bonnet made from cast bronze alloy ASTM B-62. Valve to be of OS&Y design with threaded ends. Valve to be Underwriters Laboratories® listed, Factory Mutual Approved and in compliance with MSS SP-80.

ACCEPTABLE VALVES:
NIBCO T104-0

BALL VALVES: Shall have approval rating 175 psi WWP or greater with TFE seats. Valve to have weatherproof gear operator rated for indoor/outdoor use with raised position indicator and two internal supervisory switches. Valves shall have threaded or I.P.S. grooved ends and will be Underwriters Laboratories listed, Factory Mutual Approved and in compliance with MSS SP-110

ACCEPTABLE VALVES:
NIBCO KT505-W8 (threaded)
NIBCO KG505-W8 (grooved)

LINE CONTROL VALVES 2½" AND LARGER

GATE VALVES: Shall have approval rating of 175 psi WWP or greater, iron body with bronze trim or with resilient rubber encapsulated wedge. Body and bonnet to be of cast iron alloy ASTM A-126 Class B with OS&Y type bonnet. If of resilient wedge design, interior of valve to be epoxy-coated. Valve stem to be pre-grooved for use with supervisory switch, if required. Ends to be flanged Class 125. Valves shall be Underwriters Laboratories listed, Factory Mutual Approved and in compliance with MSS SP-70.

ACCEPTABLE VALVES:
NIBCO F607-OTS/F607-RW (flanged)

INDICATOR POSTS WITH GATE VALVES: Sizes 4" and larger shall have approval rating of 175 psi WWP or greater with bronze trim or with resilient rubber encapsulated wedge. Body and bonnet are to be of cast iron alloy ASTM A-126 Class B with bonnet, incorporating indicator post mounting flange. If resilient wedge design, interior of valve to be epoxy-coated. Ends to be flanged Class 125 or mechanical joint. Upright indicator post to be adjustable for bury depth required. Valves and posts shall be Underwriters Laboratories listed and Factory Mutual Approved. Where applicable, valves shall be in compliance with MSS SP-70.

ACCEPTABLE VALVES AND POSTS:
Flanged Valve, NIBCO F609/F609-RW
Underground M.J. Valve, NIBCO M609/M609-RW
Upright Post, NIBCO NIP1-AJ
Wall Post, NIBCO NIP2-AJ

CHECK VALVES: Shall have approval rating of 175 psi WWP or greater with bronze trim and rubber to metal seating. Body to be of cast iron alloy ASTM A-126 Class B. Ends to be flanged or wafer for use with Class 125/150 flanges. Valves shall be Underwriters Laboratories listed, Factory Mutual Approved and, where applicable, in compliance with MSS SP-71.

ACCEPTABLE VALVES:
Flanged, NIBCO F908-W
Wafer, NIBCO KW900-W

LINE CONTROL VALVES 2½" AND LARGER

BUTTERFLY VALVES: Shall have approval rating of 175 psi WWP or greater. Valve to have weatherproof gear operator rated for indoor/outdoor use with handwheel and raised position indicator and two internal supervisory switches. Bodies to be from cast ductile iron ASTM A-395 or A-536 and stems to be 400 series stainless steel. Valves shall be wafer style for installation between Class 125/150 flanges or I.P.S. grooved. Valves shall be Underwriters Laboratories listed, Factory Mutual Approved and in compliance with MSS SP-67.

ACCEPTABLE VALVES:
Wafer/Lug, NIBCO WD3510-8
Grooved, NIBCO GD1765-8N, GD4765-8N, or GD6765-8N

HI-RISE SERVICE GATE VALVES: Shall have approval rating of 300 psi WWP or greater. OS&Y bonnet and body to be of cast iron alloy ASTM A-126 Class B. Valves to be flanged ends for use with Class 250/300 flanges. Valves shall be Underwriters Laboratories listed, Factory Mutual approved and in compliance with MSS SP-70.

ACCEPTABLE VALVES:
NIBCO F697-B

HI-RISE SERVICE CHECK VALVES: Shall have approval rating of 300 psi WWP or greater. Valves to be of the horizontal swing check design with bronze trim and body made from cast iron alloy ASTM A-126 Class B. Valves to be flanged ends for use with Class 250/300 flanges. Valves to be approved by the New York City Materials and Equipment Acceptance (M.E.A.) Division and in compliance with MSS SP-71.

ACCEPTABLE VALVES:
NIBCO F968-B

TRIM AND DRAIN VALVES 2" AND SMALLER

BALL VALVES: To have approval rating of 175 psi WWP or greater. Valve to have TFE seats, threaded ends, blowout-proof stem and lever handle. Valve shall be Underwriters Laboratories listed and Factory Mutual Approved for trim and drain service and in compliance with MSS SP-110.

ACCEPTABLE VALVES:
NIBCO KT585-70-UL (¼"-1")
NIBCO KT580-70-UL (1¼"-2")

GLOBE/ANGLE VALVES: To have approval rating of 175 psi WWP or greater. Valves to have rubber seat disc and threaded ends. Valves shall be Underwriters Laboratories listed for trim and drain service.

ACCEPTABLE VALVES:
Globe, NIBCO KT65-UL/KT211-WUL
Angle, NIBCO KT67-UL/T301-W

CHECK VALVES: To be rated 175 psi or greater. Valves to have rubber seat discs and threaded ends. Valve to be Y-pattern horizontal swing-type. Valve shall be in compliance with MSS SP-80.

ACCEPTABLE VALVES:
NIBCO KT403-W

LINE CONTROL VALVES 2½" AND SMALLER

BALL VALVES: Valves shall be rated 600 psi cold working pressure and will have 2-pc. cast bronze bodies, TFE seats, standard port, separate packnut with adjustable stem packing, anti-blowout stems and chrome-plated brass/bronze ball. Where pressure drop is a concern, full-port ball valves of like construction are to be used. Valve ends shall have full depth ANSI threads and be manufactured to comply with MSS SP-110. Where applicable for isolation, valves to be in compliance with OSHA Lockout/Tagout Standard 1910-147 and shall be designed to vent air to atmosphere upon closure. Valves shall be fitted with locking device so valves can be locked in open or closed position.

ACCEPTABLE VALVES STANDARD PORT:

NIBCO T580-70 (threaded)

ACCEPTABLE VALVES FULL PORT:

NIBCO T585-70 (threaded)

ACCEPTABLE OSHA VALVES:

NIBCO T580-70-SV

CHECK VALVES: (NOTE: If air compressor is reciprocating type, Check Valves shall be downstream of receiver tank.)

2½" and smaller shall be Y-pattern swing-type manufactured in accordance with MSS SP-80, Class 125, bronze ASTM B-62 body with TFE seat disc or spring-loaded lift-type with resilient seating. Valve ends to be threaded-type.

ACCEPTABLE VALVES AND POSTS:

Class 125 NIBCO T413-Y (threaded)

Spring-actuated lift-type NIBCO T480-Y (threaded)

LINE CONTROL VALVES 2½" AND LARGER

BUTTERFLY VALVES: Valves shall be lug or I.P.S. grooved body style manufactured in accordance with MSS SP-67 and be rated at least 200 psi non-shock cold working pressure. Body to have 2" extended neck for insulating and to be cast iron or ductile iron. Valve to have plated ductile iron or aluminum bronze alloy disc with Buna-N rubber seat and seals; or Buna-N rubber encapsulated disc with polymer-coated body. Stem shall be 400 series stainless steel and shall not have exposed stem to disc fasteners. Sizes 2½"-6" shall be lever-operated with 10-position throttling plate; sizes 8" and larger shall have gear operators. Lug-style shall be capable for use as isolation valves and recommended by manufacturer for dead-end service at full pressure without the need for downstream flanges. Lever-operated valves shall be designed to be locked in the open or closed position.

ACCEPTABLE VALVES:

Lug body, plated D.I. disc

NIBCO LD3110-3 (lever operator);

LD3110-5 (gear operator)

Lug body, aluminum bronze disc

NIBCO LD2100-3 (lever operator);

LD2100-5 (gear operator)

Grooved body, rubber-coated disc

NIBCO GD4775-3 (lever operator);

GD4775-5 (gear operator)

LINE CONTROL VALVES 2½" AND SMALLER

BALL VALVES: Valves shall be rated 600 psi non-shock cold working pressure and will have 2-pc. cast bronze bodies, TFE seats, standard port, separate packnut with adjustable stem packing, anti-blowout stems and chrome-plated brass/bronze ball. Where pressure drop is a concern, full-port ball valves of like construction are to be used. Valve ends shall have full depth ANSI threads or extended solder connections and manufactured to comply with MSS SP-110.

ACCEPTABLE VALVES STANDARD PORT:

NIBCO T580-70 (threaded); S580-70 (solder)

ACCEPTABLE VALVES FULL PORT:

NIBCO T585-70 (threaded); S585-70 (solder)

LINE CONTROL VALVES 2½" AND LARGER

BUTTERFLY VALVES: Valves shall be lug or I.P.S. grooved body style manufactured in accordance with MSS SP-67 and be rated at least 200 psi non-shock cold working pressure. Body to have 2" extended neck for insulating and to be cast iron or ductile iron. Valve to have plated ductile iron or aluminum bronze alloy disc with Buna-N rubber seat and seals; or Buna-N rubber encapsulated disc with polymer-coated body. Stem shall be 400 series stainless steel and shall not have exposed stem to disc fasteners. Sizes 2½"-6" shall be lever-operated with 10-position throttling plate; sizes 8" and larger shall have gear operators. Lug-style shall be capable for use as isolation valves and recommended by manufacturer for dead-end service at full pressure without the need for downstream flanges. Lever-operated valves shall be designed to be locked in the open or closed position.

ACCEPTABLE VALVES:

Lug body, plated D.I. disc

NIBCO LD3110-3 (lever operator);

LD3110-5 (gear operator)

Lug body, aluminum bronze disc

NIBCO LD2100-3 (lever operator);

LD2100-5 (gear operator)

Grooved body, rubber-coated disc

NIBCO GD4775-3 (lever operator);

GD4775-5 (gear operator)

QUARTER-TURN BRONZE BALL VALVES: Manufactured in compliance with MSS SP-110 and rated 600 psi non-shock cold working pressure are to be used. Body shall have solder ends and 3-pc. design permitting disassembly for brazing installation. Valve to have TFE seats, full-port, anti-blowout stems and chrome-plated brass/bronze ball. Valve shall be provided by manufacturer cleaned and bagged for oxygen service.

ACCEPTABLE VALVES:

NIBCO S595-YX (solder)

NOTE: Where piping is insulated, ball valves shall be equipped with 2" extended handles of non-thermal conductive material. Also, provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation.

ACCEPTABLE VALVES:

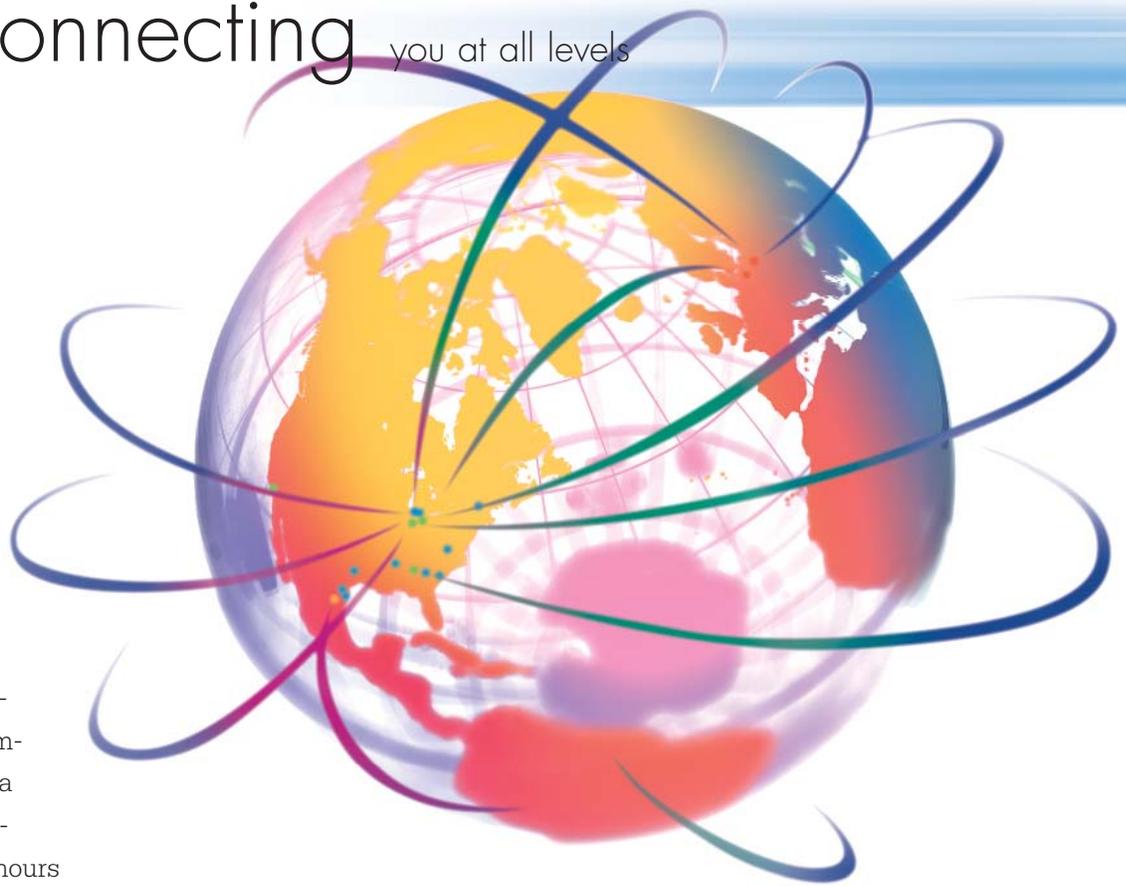
NIBCO S595-YX-NS (solder)

7.0 VALVE MANUFACTURERS' CONDENSED CROSS-REFERENCE LIST

VALVE TYPE	NIBCO	APOLLO	CRANE	GRINNELL	WATTS	KEYSTONE	MILWAUKEE	STOCKHAM
Bronze Ball - 2 pc./std. port	T/S580-70	70	—	3700/3700SJ	B6000	—	BA100/BA150	—
Bronze Ball - 2 pc./full port	T/S585-70	77	93-B	3750/3750SJ	B6080 (400 psi)	—	—	S206-BR1
Bronze Ball - 3 pc./full port	T/S595-Y	82	—	3810/3810SJ	B6800	—	—	—
Bronze Gate - Class 125	T124	—	428 UB	3080/3080SJ	—	—	1152	B105
Bronze Gate 150	T134	—	431 UB	3080/3080SJ	—	—	1151/1169	B120/B124
Bronze Globe - Class 125	T/S211-Y	—	5TF	3210/3210SJ	—	—	—	B13T/B14T
Bronze Globe - Class 150	T/S235-Y	—	7TF/1310	3240/3240SJ	—	—	590T/1590T	B22/B24
Bronze Globe - Class 200	T256-AP	—	212P	3270	—	—	592A	B62
Bronze Angle - Class 125	T/S311-Y	—	2/1311	3220	—	—	—	—
Bronze Angle - Class 150	T/S335-Y	—	17TF	—	—	—	595T	B222T
Bronze Angle - Class 300	T376-AP	—	384P	3280	—	—	—	B274
Bronze Check - Class 125	T/S413-Y	—	34½/1303	3310/3310SJ	—	—	509T/1509T	B320TY/B310TY
Bronze Check - Class 150	T/S433-Y	—	137	3330/3330SJ	—	—	510T/1510T	—
Bronze Check - Spring Act.	T/S480-Y	61	—	3600/3600SJ	—	—	—	—
Brass Ball - 2 pc./full port	FP600A	64	92XX-B	171	FBV-3	—	BA475	S206-UFBR
Lug Butterfly - Buna/DI	LD3110	—	23FRB	LD8191	—	122/129	ML122B	LD711DS3B
DI Lug Butterfly - EPDM/Bronze/DE	LD2000	—	—	LD8281	—	AR-2	—	—
Lug Butterfly - Buna/Bronze	LD2100	—	14TL	LC8181	—	122/129	ML123B	LD711BS3B
CI Lug Butterfly - EPDM/Bronze	N200235	—	44BXZ	LC1281	BF03-121	222	CL223-E	LG712BS3E
DI Grooved Butterfly - Buna	GD4775	—	—	GE7712	—	—	—	LG812
DI Grooved Butterfly - EPDM	GD4765	—	—	GE7722	—	—	GG145	LG812
Iron Gate - Class 125	F617-0	—	465½	6020A	—	—	F2885A	G623
Iron Globe - Class 125	F718-B	—	351	6200A	—	—	F2981A	G512
Iron Angle - Class 125	F818-B	—	353	—	—	—	—	G515
Iron Check - Class 125	F918-B	—	373	6300A	—	—	F2974A	G931
Iron Stop Check - Class 250	F869-B	—	30-E	6869A	—	—	—	F541
Iron Gate - Class 250	F667-0	—	7½E	6100A	—	—	F2894A	F667
Iron Globe - Class 250	F768-B	—	21-E	6250A	—	—	—	F532
Iron Angle - Class 250	F869-B	—	—	—	—	—	—	—
Iron Check - Class 250	F968-B	—	39-E	6350A	—	—	—	F947
Iron Check - Lift	F910-B	—	—	402B	—	—	1800	—
Iron Check - Dbl. Door	W920-W/KW900-W	—	—	300	—	—	—	WG970
Iron Check-Lever & Spring/Weight	F918-BL&S/L&W	—	—	—	—	—	—	—
Bronze Gate - UL/FM	T104-0	—	—	66	—	—	—	B133
Bronze Ball - UL/FM	KT/KG505-8W	—	—	—	—	—	—	—
Iron Gate - OS&Y UL/FM	F607-OTS/RW	—	467	A2078	—	—	—	G634/G610
Iron Gate/300 UL/FM	F697-0	—	—	A2078	—	—	—	F670
Iron Gate - NRS UL/FM	F/M609/RW	—	—	A2074	—	—	—	G600/G601
Indicator Post - UL/FM	NIP1-AJ/2-AJ	—	—	A20804	—	—	—	G950/G951
Iron Swing Check - UL/FM	F908-W	—	—	A2122-6	—	—	—	G940
Iron Wafer Check - UL/FM	KW900-W	—	—	A2102	—	—	—	WG990
DI Wafer Butterfly - UL/FM	WD3510-8	—	—	WC82823FP	—	—	—	LG52UF
DI Grooved Butterfly - UL/FM	GD4765-8N	—	—	7700FP	—	—	—	LG82UF

To be used only as a guide. Some variations in detail are possible.

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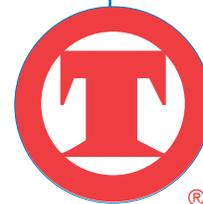


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