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USACE / NAVFAC / AFCEA / NASA UFGS-23 22 25 (August 2009)  
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Preparing Activity: NASA Superseding  
UFGS-23 22 25 (February 2009)

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2010

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08/09

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### SECTION 23 22 25

#### STEAM VALVES 08/09

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NOTE: This guide specification covers the requirements for valves for steam and condensate systems.

Standard valves for steam, water, etc., operating at 178 degrees C and 900 kilopascal 353 degrees F and 125-pounds per square inch gage working steam pressure are covered in Section 23 05 15 COMMON PIPING FOR HVAC.

Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

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## PART 1 GENERAL

### 1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WELDING SOCIETY (AWS)

AWS A5.13 (2000) Specification for Surfacing  
Electrodes for Shielded Metal Arc Welding

ASME INTERNATIONAL (ASME)

ASME B1.20.1 (1983; R 2006) Pipe Threads, General  
Purpose (Inch)

ASME B16.1 (2005) Gray Iron Threaded Fittings;  
Classes 25, 125 and 250

ASME B16.34 (2009) Valves - Flanged, Threaded and  
Welding End

ASTM INTERNATIONAL (ASTM)

ASTM A 105/A 105M (2009) Standard Specification for Carbon  
Steel Forgings for Piping Applications

ASTM A 106/A 106M (2008) Standard Specification for Seamless  
Carbon Steel Pipe for High-Temperature  
Service

ASTM A 126 (2004; R 2009) Standard Specification for  
Gray Iron Castings for Valves, Flanges,  
and Pipe Fittings

ASTM A 182/A 182M (2009a) Standard Specification for Forged  
or Rolled Alloy-Steel Pipe Flanges, Forged  
Fittings, and Valves and Parts for  
High-Temperature Service

ASTM A 216/A 216M (2008) Standard Specification for Steel  
Castings, Carbon, Suitable for Fusion  
Welding, for High-Temperature Service

ASTM A 436 (1984; R 2006) Standard Specification for  
Austenitic Gray Iron Castings

ASTM B 61 (2008) Standard Specification for Steam or

Valve Bronze Castings

ASTM B 62 (2009) Standard Specification for  
Composition Bronze or Ounce Metal Castings

ISA - INTERNATIONAL SOCIETY OF AUTOMATION (ISA)

ISA RP60.9 (1981) Piping Guide for Control Centers

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS  
INDUSTRY (MSS)

MSS SP-70 (2006) Gray Iron Gate Valves, Flanged and  
Threaded Ends

MSS SP-80 (2008) Bronze Gate, Globe, Angle and Check  
Valves

MSS SP-86 (2009) Guidelines for Metric Data in  
Standards for Valves, Flanges, Fittings  
and Actuators

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS A-A-50457 (2001a) Valves Radiator, Heating Packless  
Bonnett, Class 125 PSIG

1.2 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions  
in Section 01 33 00 SUBMITTAL PROCEDURES and edit  
the following list to reflect only the submittals  
required for the project. Submittals should be kept  
to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the  
submittal requires Government approval. Some  
submittals are already marked with a "G". Only  
delete an existing "G" if the submittal item is not  
complex and can be reviewed through the Contractor's  
Quality Control system. Only add a "G" if the  
submittal is sufficiently important or complex in  
context of the project.

For submittals requiring Government approval on Army  
projects, a code of up to three characters within  
the submittal tags may be used following the "G"  
designation to indicate the approving authority.  
Codes for Army projects using the Resident  
Management System (RMS) are: "AE" for  
Architect-Engineer; "DO" for District Office  
(Engineering Division or other organization in the  
District Office); "AO" for Area Office; "RO" for  
Resident Office; and "PO" for Project Office. Codes  
following the "G" typically are not used for Navy,  
Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force

and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

Submit [Fabrication Drawings](#) for the following in accordance with paragraph entitled, "General Requirements," of this section.

[Valves](#)  
[Accessories](#)

Installation drawings for valves must be in accordance with the paragraph entitled, "Installation," of this section.

#### SD-07 Certificates

Submit [Listing of Product Installation](#) in accordance with paragraph entitled, "General Requirements," of this section.

Submit certificates for the following items showing conformance to the referenced standards contained in this section:

[Gate Valves](#)  
[Globe and Angle Valves](#)  
[Check Valves](#)  
[Cone-Plug Balancing Valve](#)  
[Eccentric Plug Valves](#)  
[Dial Cocks](#)  
[Diaphragm Control and Instrument Valves](#)

### 1.3 GENERAL REQUIREMENTS

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NOTE: If Section 23 00 00 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEMS is not included in the project specification, applicable requirements therefrom should be inserted and the first paragraph deleted. If Section 40 17 30.00 40 WELDING GENERAL PIPING is not included in the project specification, applicable requirements therefrom should be inserted and the second paragraph deleted.

\*\*\*\*\*

[Section 23 00 00 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEMS applies to work specified in this section.]

[Section 40 17 30.00 40 WELDING GENERAL PIPING applies to work specified in this section.]

Submit [Fabrication Drawings](#) for each type of [Valves](#) and [Accessories](#) used, meeting referenced standards contained within this section.

Submit Listing of Product Installation for valve assemblies indicating at least five installed units, similar to those proposed for use, that have been in successful service for a minimum of five years.

## PART 2 PRODUCTS

### 2.1 COMPONENTS

#### 2.1.1 Dial Cocks

Dial cocks in sizes DN65 2-1/2-inch ips and smaller with pointer and etched position dial must be rated 1100 kilopascal 150-psi working steam pressure (wsp) and be of manufacturer's standard all-brass construction.

#### 2.1.2 Diaphragm Control And Instrument Valves (DCIV)

Diaphragm control and instrument valves in sizes DN8 and DN10 1/4 and 3/8 inch must have a forged-brass body with reinforced tetrafluoroethylene diaphragm, and an AISI 300 series corrosion-resistant steel spring with round phenolic handle. Fit handle with disks color-coded in accordance with ISA RP60.9.

### 2.2 FABRICATION

#### 2.2.1 Gate Valves

\*\*\*\*\*  
NOTE: These valves are recommended for steam and condensate service.  
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##### 2.2.1.1 Gate Valves 2500 kPa 350 psi

Rate valves 2100 kilopascal 300 pounds per square inch (psi) working steam pressure (wsp) and ensure conformance to ASME B16.34.

Body end connections must be flanged for all valves larger than DN50 2 inches, unless butt weld ends are specified. Use [Screwed] [Socket] weld for sizes DN50 2 inches and under to suit specified piping system end connection and maintenance requirements, or be welded. Flange faces must have concentric serrated finish.

Body to bonnet connection must be [union] [gasketed-bolted] type for valves DN50 2 inches and under and gasketed-bolted type for valves larger than DN50 2 inches. Bonnet must be outside screw and yoke (OS&Y) type, rising stem.

Body and bonnet assembly must be [cast steel] [forged carbon steel]. Cast steel must conform to ASTM A 216/A 216M, Grade WCB. Forged carbon steel must conform to ASTM A 105/A 105M.

\*\*\*\*\*  
NOTE: Select the following paragraph only after checking flow coefficients.  
\*\*\*\*\*

[Valves must have a full port.]

Trim must include [hard-surfaced solid] [one-piece flexible] wedge disc and

hard-surfaced seats. Stem must be rising and backseating type.

Trim materials and hard-surfaced substrates must [conform to **ASTM A 182/A 182M**, Grade F6] [must be manufacturer's standard metallurgical equivalents for the specified service].

Hard surfacing alloy must conform to **AWS A5.13**, [Class RNiCr-B] [Class RCoCr-B].

Wire-reinforce packing, fiber braid impregnated with [30 percent tetrafluoroethylene] [a corrosion-inhibiting lubricant specifically suitable for service with stem material provided].

Valve wheels must be [cast iron] [malleable iron] [wrought steel].

\*\*\*\*\*

**NOTE: Drawings shall note all locations where an integral bypass valve is required. Integral bypass valves are used for valves larger than **DN150 6 inches** and for smaller sizes where unusual warmup operations will occur.**

\*\*\*\*\*

Provide integral bypass globe valves around valves larger than **DN150 6 inches**. Bypass valves must be factory installed and have [butt] [socket] welded end, conforming to the same requirements as the main valve, except that in all cases valve seat and plug disk must be hard surfaced and seat must be removable, replaceable type. Piping connections must be pressure tubing, conforming to Schedule 80 **ASTM A 106/A 106M**, Grade [B] [C], and without change of direction fittings, i.e., bent. Connection must be to valve bosses located to perform specified function. Ship valves with integral bypass bolted to crates in a manner that will preclude damage to bypass assembly.

\*\*\*\*\*

**NOTE: Drawings shall note all locations where integral drain valve is required. Integral drain valves are particularly useful in tall risers and shall be noted in all cases where required except where valve size is less than **DN50 2 inches**, in which case an independent drain shall be provided immediately above the valve. Note pitch of horizontal lines.**

\*\*\*\*\*

Integral drain valve assembly must be [factory] [field] installed. Weld connection to main valve body. Trim drain valve with manufacturer's standard hardened corrosion-resistant steel. Piping must be pressure tubing conforming to **ASTM A 106/A 106M**, Grade [B] [C]. Drain discharge must be [capped] [plugged]; threaded closure assembly made with tetrafluoroethylene tape.

#### 2.2.1.2 Gate Valves **1100 kPa 150 psi**

Rate valves **1100 kilopascal 150-psi** (wsp) and ensure conformance to **ASME B16.34**.

Body end connections must be flanged for all valves larger than **DN50 2 inches** unless butt weld ends are specified. Use [Screwed] [Socket] weld

for sizes DN50 2 inches and under to suit specified piping system end connection and maintenance requirements. Flange faces must have concentric serrated finish.

Body to bonnet connection must be [union] [gasketed-bolted] type for valves DN50 2 inches and under and gasketed-bolted type for valves larger than DN50 2 inches. Bonnet must be OS&Y type, rising stem.

Body and bonnet assembly must be [cast steel] [forged carbon steel]. Cast steel must conform to ASTM A 216/A 216M, Grade WCB. Forged carbon steel must conform to ASTM A 105/A 105M.

\*\*\*\*\*  
**NOTE: Select the following paragraph only after  
checking flow coefficients.**  
\*\*\*\*\*

[Valves must have a full port.]

Trim for valves larger than DN50 2 inches must include [hard surfaced solid] [one-piece flexible-wedge] disk and hard-surfaced seats. Trim for valves DN50 2 inches and under must include [hard-surfaced] [hardened-solid] [one-piece flexible wedge disk] and [hard-surfaced] [hardened seats]. Hardened components must have Brinell hardness of not less than 500. Stem must be rising and backseating type.

Trim materials and hard-surfaced substrates [must conform to ASTM A 182/A 182M, Grade F6] [must be manufacturer's standard metallurgical equivalents for the specified service].

Hard-surfacing alloy must conform to AWS A5.13, [Class RNiCr-B] [Class RCoCr-B].

Wire reinforce packing, fiber braid impregnated with [30 percent tetrafluoroethylene] [a corrosion-inhibiting lubricant specifically suitable for service with stem material provided].

Valve wheels must be [cast iron] [malleable iron] [wrought steel].

\*\*\*\*\*  
**NOTE: Drawings shall note all locations where an  
integral bypass valve is required. Integral bypass  
valves are used for valves larger than DN150 6 inches  
and for smaller valves where unusual warmup  
operations will occur.**  
\*\*\*\*\*

Provide integral bypass globe valves around valves larger than DN150 6 inches. Factory install bypass valves and [butt] [socket] weld end, conforming to the same requirements as the main valve except that in all cases, valve seat and disk must be hard-surfaced and seat must be removable, replaceable type. Piping connections must be pressure tubing, conforming to Schedule 80 ASTM A 106/A 106M, Grade [B] [C], and without change of direction fittings; i.e., bent. Connection must be to valve bosses located to perform specified function. Ship valves with integral bypass bolted to crates in a manner that will preclude damage to bypass assembly.

\*\*\*\*\*



NOTE: Drawings shall note all locations where integral drain valve is required. Integral drain valves are particularly useful in tall risers and shall be noted in all cases where required except where valve size is less than DN50 2 inches, in which case an independent drain shall be provided immediately above the valve. Note pitch of horizontal lines.

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[Factory] [Field install] integral drain valve assembly. Factory drill main valve boss. Weld connection to main valve body. Trim drain valve with manufacturer's standard hardened corrosion-resistant steel. Piping must be pressure tubing conforming to ASTM A 106/A 106M, Grade [B] [C]. [Cap] [Plug] drain discharge, and make threaded closure assembly with tetrafluoroethylene tape. Provide all necessary handling and shipping care.

#### 2.2.1.3 Gate Valves 900 kPa 125 psi

Rate valves 900 kilopascal 125-psi (wsp) and ensure conformance to MSS SP-80 and MSS SP-86 wedge disc, rising stem, inside screw, 900 kilopascal 125-pound for sizes DN50 2 inches and under and to MSS SP-70 for sizes over DN50 2 inches.

Body end connections must be flanged for all valves larger than DN50 2 inches and screwed in sizes DN50 2 inches and under to suit specified piping system end connection and maintenance requirements.

Valves, in sizes DN50 2 inches and under, must be union-bonnet type. Cast iron must conform to ASTM A 126, Class B.

Stem must be rising and backseating type.

Packing must be fiber braid impregnated with 30 percent tetrafluoroethylene.

Valve wheels must be [cast iron] [malleable iron] [wrought steel].

\*\*\*\*\*

NOTE: The following materials selection may be desirable as a means of eliminating dissimilar metal couples in a corrosive condensate. Forged steel valve cost premium on per-unit basis is approximately 100 percent.

Coordinate the following selection with appropriate selections for 1100 150 service valves.

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For condensate service, screwed-end gate valves must be 1100 kilopascal 150-psi, wsp-rated, forged steel, conforming to ASME B16.34, except that trim must be manufacturer's standard corrosion-resistant steel.

\*\*\*\*\*

NOTE: Drawings shall note all locations where an integral bypass valve is required. Integral bypass valves are used for valves larger than DN150 6 inches and where warmup operations will occur.

\*\*\*\*\*

Provide integral bypass globe valves around valves larger than DN150 6 inches. Factory install main valve body taps. Bypass valves must be globe type, [factory] [field] installed, and have a socket welded end conforming to ASME B16.34, except that in all cases, valve seat and plug disk must be hard-surfaced and seats must be removable replaceable type. Piping connections must be pressure tubing, conforming to Schedule 80 ASTM A 106/A 106M, Grade [B] [C], and without change of direction fittings; i.e., bent, and include a socket welded end 20700 kilopascal 3,000-psi-rated, forged steel union with corrosion-resistant steel insert. Connection must be to valve bosses located to perform specified function. Ship valves with integral bypass bolted to crates in a manner that will preclude damage to bypass assembly.

\*\*\*\*\*

NOTE: Drawings shall note all locations where integral drain valve is required. Integral drain valves are particularly useful in tall risers and shall be noted in all cases where required except where valve size is less than DN50 2 inches, in which case an independent drain shall be provided immediately above the valve. Note pitch of horizontal lines.

\*\*\*\*\*

Provide integral drain valves. Factory finish main valve boss penetration, and [factory] [field] install. Drain valve must be gate type. Piping must be pressure tubing conforming to ASTM A 106/A 106M, Grade [B] [C]. [Cap] [Plug] drain discharge, and thread closure assembly with tetrafluoroethylene tape.

## 2.2.2 Globe And Angle Valves

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NOTE: These valves are recommended for steam and condensate service.

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### 2.2.2.1 Globe And Angle Valves 2500 kPa 350 psi

Rate valves 2100 kilopascal 300-psi (wsp) and ensure conformance to ASME B16.34.

Body end connections must be flanged for all valves larger than DN50 2 inches, unless butt weld ends are specified. [Screwed] [Socket] weld must be used for sizes DN50 2 inches and under to suit specified piping system end connection and maintenance requirements. Flange faces must have concentric serrated finish.

Body to bonnet connection must be [union] [gasketed-bolted] type for valves DN50 2 inches and under; gasketed-bolted type for valves larger than DN50; 2 inches; and for valves DN10 3/8 inch and under, assembly must be screwed type. Bonnet must be OS&Y type, except that valves DN10 3/8 inch and under must be inside screw type.

Body and bonnet assembly must be [cast steel] [forged carbon steel]. Cast steel must conform to ASTM A 216/A 216M, Grade WCB. Forged carbon steel must conform to ASTM A 105/A 105M.

Trim must include hard-surfaced plug disk and hard-surfaced seats. Stem

must be rising and backseating type.

Trim materials and hard surface substrates must [conform to [ASTM A 182/A 182M](#), Grade F6] [be manufacturer's standard metallurgical equivalents for the specified service].

Hard-surfacing alloy must conform to [AWS A5.13](#), [Class RNiCr-B] [Class RCoCr-B].

Wire reinforce packing, fiber braid impregnated with [30 percent tetrafluoroethylene] [a corrosion-inhibiting lubricant specifically suitable for service with stem material provided].

Valve wheels must be [cast iron] [malleable iron] [wrought steel].

\*\*\*\*\*

**NOTE: Drawings shall note all locations where integral drain valve is required. Integral drain valves are particularly useful in risers and shall be noted in all cases where required except where valve size is less than [DN50 2 inches](#), in which case an independent drain shall be provided immediately above the valve. Note pitch of horizontal lines.**

\*\*\*\*\*

Provide integral drain valves. Main valve boss penetration must be factory finished and drain assembly must be [factory] [field] installed. Weld connection to main valve body. Trim drain valve with manufacturer's standard hardened corrosion-resistant steel. Piping must be pressure tubing, conforming to [ASTM A 106/A 106M](#), Grade [B] [C]. Drain discharge must be [capped] [plugged], and threaded closure assembly must be made with tetrafluoroethylene tape.

#### 2.2.2.2 Globe And Angle Valves [1100 kPa](#) [150 psi](#)

Rate valves [1100 kilopascal](#) [150-psi](#) working steam pressure (wsp) and ensure conformance to [ASME B16.34](#).

Body end connections must be flanged for all valves larger than [DN50 2 inches](#), unless butt weld ends are indicated. Use [Screwed] [Socket] weld for sizes [DN50 2 inches](#) and under to suit specified piping system end connection and maintenance requirements. Flange faces must have concentric serrated finish.

Body to bonnet connection must be [union] [gasketed-bolted] type for valves [DN50 2 inches](#) and under; gasketed-bolted type for valves larger than [DN50 2 inches](#); and for valves [DN10 3/8 inch](#) and under, assembly must be screwed type. Bonnet must be OS&Y type, except that valves [DN10 3/8 inch](#) and under must be inside screw type.

Body and bonnet assembly must be [cast steel] [forged carbon steel]. Cast steel must conform to [ASTM A 216/A 216M](#), Grade WCB. Forged carbon steel must conform to [ASTM A 105/A 105M](#).

Trim for valves larger than [DN50 2 inches](#) and for all sizes of valves in bypass service must include hard-surfaced, solid plug disk and hard-surfaced seats. Plug material in valves [DN50 2 inches](#) and under must be [as specified for valves larger than [DN50 2 inches](#)] [in accordance with AISI 400 series corrosion-resistant steel hardened to not less than 500

Brinell]. Stem must be rising and backseating type.

Trim materials and hard surface substrates [must conform to **ASTM A 182/A 182M**, Grade F6] [must be manufacturer's standard metallurgical equivalents for the specified service].

Hard-surfacing alloy must conform to **AWS A5.13**, [Class RNiCr-B] [Class RCoCr-B].

Wire reinforce packing, fiber braid impregnated with [30 percent tetrafluoroethylene] [a corrosion-inhibiting lubricant specifically suitable for service with stem material provided].

Valve wheels must be [cast iron] [malleable iron] [wrought steel].

\*\*\*\*\*

**NOTE: Drawings shall note all locations where integral drain valve is required. Integral drain valves are particularly useful in tall risers and shall be noted in all cases where required except where valve size is less than **DN50, 2 inches**, in which case an independent drain shall be provided immediately above the valve. Note pitch of horizontal lines.**

\*\*\*\*\*

Integral, drain-valves assembly must be [factory] [field] installed. Factory drill main valve boss. Weld connection to main valve body. Trim drain valve with manufacturer's standard hardened corrosion-resistant steel. Piping must be pressure tubing conforming to **ASTM A 106/A 106M**, Grade [B] [C]. [Cap] [Plug] drain discharge. Threaded closure assembly must be made with tetrafluoroethylene tape.

#### 2.2.2.3 Globe And Angle Valves **900 kPa 125 psi**

Valves must be rated **900 kilopascal 125-psi** (wsp) and must conform to **MSS SP-80, MSS SP-86**, [globe] [angle], [**900**] [**1100**] kilopascal. [**125**] [**150**]-pound.

Body end connections must be flanged for all valves larger than **DN50 2 inches** and screwed for sizes **DN50 2 inches** and under.

Valves **DN50 2 inches** and under in size must be union bonnet type.

Cast iron must conform to **ASTM A 126**, Class B.

Stem must be rising and backseating type.

Composition seating surface disc construction may be substituted for metal plug disc connection.

\*\*\*\*\*

**NOTE: Select the following paragraph for large pressure regulating stations.**

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[Pressure regulating station bypass valves must be **1100 kilopascal 150 psi**.]

\*\*\*\*\*

**NOTE: Select the following paragraph for  
miscellaneous high-pressure drop throttling.**

\*\*\*\*\*

[Plug material for throttling valves DN50 2 inches and under must be AISI 400 series corrosion-resistant steel hardened to not less than 500 Brinell.]

Packing must be fiber braid impregnated with 30 percent tetrafluoroethylene.

Valve wheels must be [cast iron] [malleable iron] [wrought steel].

\*\*\*\*\*

**NOTE: Drawings shall note all locations where  
integral drain valve is required. Integral drain  
valves are particularly useful in tall risers and  
shall be noted in all cases where required, except  
where valve size is less than DN50 2 inches in which  
case an independent drain shall be provided  
immediately above the valve. Note pitch of  
horizontal lines.**

\*\*\*\*\*

Provide integral drain valves. Main valve boss penetration must be factory finished and drain assembly and be [factory] [field] installed. Drain valve must be gate type. Piping must be pressure tubing conforming to ASTM A 106/A 106M, Grade [B] [C]. Drain discharge must be [capped] [plugged], and threaded closure assembly and be made with tetrafluoroethylene tape. Provide all necessary handling and shipping care.

### 2.2.3 Check Valves

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**NOTE: These valves are recommended for steam and  
condensate service.**

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#### 2.2.3.1 Check Valves 2500 kPa 350 psi

Rate valves 2100 kilopascal 300-psi wsp and ensure conformance to applicable portions of ASME B16.34.

Valves must be horizontal swing-check type.

Body end connections must be flanged for all valves larger than DN50 2 inches unless butt weld ends are specified. [Screwed] [Socket] weld and be used for sizes DN50 2 inches and under to suit specified piping system end connection and maintenance requirements. Flange faces must have concentric serrated finish.

Body to cover connection must be [union] [gasketed-bolted] type.

Body and bonnet assembly must be [cast steel] [forged carbon steel]. Cast steel must conform to ASTM A 216/A 216M, Grade WCB. Forged carbon steel must conform to ASTM A 105/A 105M.

Trim materials, including hinge pin, must be manufacturer's standard corrosion-resistant alloys for the specified service.

#### 2.2.3.2 Check Valves 900 kPa 125 psi

Rate valves 900 kilopascal 125-psi wsp and standard horizontal swing type and ensure conformance to MSS SP-80, MSS SP-86, swing check, 900 kilopascal. 125-pound.

Body end connections must be flanged for all valves larger than DN50 2 inches and screwed in sizes DN50 2 inches and under.

Body to cover connection in sizes larger than DN50 2 inches must be gasketed-bolted type, and valve body must be [cast iron, conforming to ASTM A 126, Class B] [Class 1 [ Class 1, at 178 degrees C; 1379 kilopascal 125-psig, wsp at 353 degrees F; 200-psig water, oil and gas (wog), nonshock] valves conforming to MSS SP-70]. Flanges must conform to ASME B16.1.

Swing-check pin must be corrosion-resistant [steel] [bronze] [brass]. Swing check angle of closure must be manufacturer's standard, unless a specific angle is indicated.

Valve disk must be [regrindable metal] [renewable composition] type.

#### 2.2.3.3 Manual Radiator Valves

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NOTE: The following paragraph applies to steam and  
hot water systems.  
\*\*\*\*\*

Valves to control heating using medium heating element must be packless type, metallic diaphragm seal, using MSS SP-86 (FS A-A-50457, Type II, Style D) conforming to FS A-A-50457, Type II, Style D metallic diaphragm seal.

#### 2.2.4 Cone-Plug Balancing Valve (CPBV)

Cone-plug balancing valves in sizes through DN32 1-1/4 inches must be thread end, conforming to ASME B1.20.1 and must be rated for service at not less than 1207 kilopascal at 121 degrees C 175 psi at 250 degrees F. Valve body and components must be [ASTM B 61 bronze] [manufacturer's equal-strength brass materials]. Valve plug must be swivel-type contoured cone and not rattle or make noise in service at any balancing position. Valve must have high temperature, service-rated packing, with bushing in bottom of gland and gland adjustment. Fit valves with a memory device which permits a valve set at a balance point to be opened or closed but not opened beyond the balance point. Valve must be nonrising stem type. Where used for combination shutoff and balancing service, furnish valve with insulating composition handle.

#### 2.2.5 Eccentric Plug Valves (EPV)

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NOTE: Review service temperature range of dual  
temperature systems prior to making selection and  
restrict to temperatures and materials to ensure  
long elastomer life.  
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[Eccentric plug valves in sizes DN50 2 inches and smaller must be

constructed of manufacturer's standard [brass] [bronze] materials conforming to [ASTM B 61] [ASTM B 62]. Rate valves for service at 1207 kilopascal 175-psi maximum nonshock pressure at 121 degrees C 250 degrees F. Valve body must have screwed ends. Eccentric plug surfaces in contact with flow and be coated with a 60 to 70 Shore A durometer hardness elastomer, resistant to treated water. Fit valves used for combination shutoff and balancing service with a memory device or mechanism which permits a valve set at a balance point to be operated to the closed position.]

[Reopening, limited to eccentric plug valves in sizes DN65 2-1/2 inches and larger, must be constructed of Type 2 nickel-alloy iron conforming to ASTM A 436. Rate valves for service at 1207 kilopascal 175-psi maximum nonshock pressure at 121 degrees C. 250 degrees F. Valve body must have screwed ends. Eccentric plug surfaces must be coated with a 60 to 70 Shore A durometer hardness elastomer, resistant to treated water. Fit valves used for combination shutoff and balancing service with a memory device. Memory device or mechanism must permit a valve set at a balance point to be operated to the closed position, but with reopening limited to the balance point. Fit valves up to DN150 6-inch ips with removable lever operator.]

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NOTE: Normally delete the following paragraphs.  
Limit to DN125 5-inch valves. Cross sectional area  
of valve bore, when open, shall equal pipe inlet  
area.

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[Valves, DN150 6-inch nps and larger, must be fitted with totally enclosed, flood-lubricated, worm-gear drive; operating torque must not exceed 68 newton meter 50 foot-pounds.]

## PART 3 EXECUTION

### 3.1 INSTALLATION

Install valves in accordance with the manufacturer's recommendations and in accordance with the applicable requirements of Section 23 05 15 COMMON PIPING FOR HVAC.

-- End of Section --