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USACE / NAVFAC / AFCEA / NASA UFGS-23 09 13.34 (August 2008)  
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Preparing Activity: NASA Superseding  
UFGS-23 09 13.34 40 (April 2008)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated October 2008

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SECTION 23 09 13.34

CONTROL VALVES, SELF-CONTAINED

08/08

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### SECTION 23 09 13.34

#### CONTROL VALVES, SELF-CONTAINED 08/08

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NOTE: This specification covers the requirements  
for self-contained control and relief valves.

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 SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE 1003 (2001; Errata, 2003) Performance  
Requirements for Water Pressure Reducing  
Valves

ASME INTERNATIONAL (ASME)

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

ASME BPVC SEC VI (2007; Addenda 2008) Boiler and Pressure  
Vessel Code; Section VI, Recommended Rules  
for the Care and Operation of Heating  
Boilers

ASTM INTERNATIONAL (ASTM)

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

ASTM A 463/A 463M (2006) Standard Specification for Steel  
Sheet, Aluminum-Coated

ASTM A 48/A 48M (2003) Standard Specification for Gray  
Iron Castings

ASTM B 61 (2008) Standard Specification for Steam or  
Valve Bronze Castings

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 4126-1 (2004) Safety Devices for Protection  
Against Excessive Pressure - Part 1:  
Safety Valves

ISO 5209 (1977) General Purpose Industrial Valves -  
Marking

ISO 7005-2 (1988) Metallic Flanges Part 2: Cast Iron  
Flanges

ISO/DIS 5752 (1993) Metal Valves for Use in Flanged  
Pipe Systems; Face to Face and Center to  
Face Dimensions

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

MSS SP-86

(2002) Guidelines for Metric Data in  
Standards for Valves, Flanges, Fittings  
and Actuators

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 the following for self-contained control and relief valves  
in accordance with paragraph entitled, "General Requirements," of  
this section.

Fabrication Drawings

Submit the following for self-contained control and relief valves

in accordance with paragraph entitled, "Installation," of this section.

#### Installation Drawings

#### 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 with the referenced standards contained in this section.

[Self-Contained Temperature Control Valves](#)  
[Self-Contained Temperature-Regulator Valves](#)  
[Rate-of-Flow Controller](#)  
[Nonmodulating Float Valve](#)  
[Water Pressure Regulating Valve](#)  
[Water Pressure Relief Valve](#)  
[Pilot-Operated Pressure-Relief Valve](#)  
[Relief Valves for Electric Water Heaters](#)

### 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 following paragraph deleted.  
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Section 23 00 00 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEMS applies to work specified in this section.

Submit [Fabrication Drawings](#) for self-contained control and relief valves, including part numbers and exploded views.

Submit [Listing of Product Installation](#) for self-contained control and relief valves, identifying a minimum of five installed units, similar to those proposed for use, that have been in successful service for a minimum period of five years.

## PART 2 PRODUCTS

### 2.1 [SELF-CONTAINED TEMPERATURE CONTROL VALVES](#)

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NOTE: Select or delete the heading and the following paragraphs as applicable to the project.

Type I pressure limits: 175 kilopascal 25 pounds per square inch (psi), gage, 99 degrees C 210 degrees F water.

Type II pressure limits: 550 kilopascal, 99 degrees C 80 psig, 210 degrees F water.

Select, revise, delete or supplement the following

to suit project conditions.

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Self-contained temperature-control valves must conform to MSS SP-86 and to the following requirements.

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**NOTE: Select one of both of next two paragraphs.**

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Control valves must be Type I, Class II (integral temperature-sensing units for very hot water).

Control valves must be Type II, Class 2, Style A (remote temperature-sensing units for very hot water with a single temperature-sensing control element).

Mount set-point adjustment on the cabinet of the convector; the control knob must be accessible on the cabinet surface.

Wall-mount set-point adjustment and thermostat for finned-tube radiation. Thermostat surfaces must be nickel-plated brass.

Capillary tubing must be installed and armored. Remote element must not be less than 450 millimeter 18 inches long and contained within a guard.

Valve disks must be renewable.

## 2.2 SELF-CONTAINED TEMPERATURE-REGULATOR VALVES

Valve must be direct-operated, self-contained type. The valve body must be [ASTM B 61, (bronze)] [ASTM A 126 (cast iron)] and rated not less than 862 kilopascal 125-pounds per square inch (psi) saturated working steam-pressure. Body end connections must be screwed. Trim must be corrosion-resistant AISI Type 300 Series steel. Replaceable seat and plug must be hardened or faced with a cobalt-chromium-tungsten alloy to produce a surface with resistance to impact, wire-drawing, and with a Brinell hardness of not less than 450. Fit packed steam valves with tetrafluoroethylene packing, spring-load, and self-adjust. Valve must be single-seated, suitable for dead-end service, and fail-safe. Mount remote Class I or Class III filled-bulb element in a nonferrous separable socket. Maintain valve set-point temperature, plus or minus 15 degrees C 5 degrees F, with the set point at or near midpoint of the adjustable element range.

## 2.3 RATE-OF-FLOW CONTROLLER

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**NOTE: Select for service to maintain constant  
flow-rate, regardless of changing line pressure.  
Provide flow and size data.**

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Rate-of-flow controller must be a hydraulically operated, pilot-controlled diaphragm-type globe valve. Pilot control must be actuated by differential pressure produced across an orifice installed at the inlet. Adjust rate of flow by varying spring loading on the pilot. Valve body must be cast iron conforming to ASTM A 48/A 48M, with 862 kilopascal 125-pound ASME B16.1, MSS SP-86 and ISO 7005-2 flanges. Valve trim must be manufacturer's standard bronze or AISI 18-8 corrosion-resistant steel. Orifice plate must

be AISI Type 303 corrosion-resistant steel. Diaphragm and seal material must be Buna-N. Maximum-service-pressure rating must not be less than 1207 kilopascal at 82 degrees C 175 psi at 180 degrees F.

#### 2.4 NONMODULATING FLOAT VALVE

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NOTE: Use with cooling towers.  
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Nonmodulating float valve must be pilot-controlled, diaphragm-actuated, spring-loaded, single-seated, hydraulically operated type. Mount pilot valve on the main valve or remotely mount within the cooling tower basin. Main valve body must be cast iron conforming to ASTM A 48/A 48M with screwed ends for sizes smaller than DN50 2-inch iron pipe size (ips) and flanges conforming to ASME B16.1, MSS SP-86 and ISO 7005-2, for sizes DN50 2-inch ips and larger. Pilot valve body must be brass or bronze. Main and pilot valve trim, including linkage and float, must be the manufacturer's standard bronze-copper or AISI Type 300 series corrosion-resistant steel. Diaphragm materials and seals must be Buna-N. Maximum-service-pressure rating must not be less than 1207 kilopascal at 82 degrees C 175 psi at 180 degrees F. Valve operation must be nonslam.

#### 2.5 WATER PRESSURE-REGULATING VALVE

Pressure-regulating valve must conform to MSS SP-86 and ISO/DIS 5752 (ASSE 1003) ASSE 1003, direct acting.

Pressure-regulating valve must not stick or allow pressure to build up on the low side. Set valve to maintain a terminal pressure of approximately 35 kilopascal 5 psi in excess of the static head on the system and operate within a 9 Newtons 2-pound maximum variation regardless of initial pressure fluctuation, and without objectionable noise under any condition of operation.

#### 2.6 WATER PRESSURE-RELIEF VALVE

Construct, label, and install pressure-relief valve in accordance with ASME BPVC SEC VI ISO 5209 and ISO 4126-1. Relieving capacity must be as specified by the referenced publication. Valves must be of nonferrous construction, complete with test lever.

#### 2.7 PILOT-OPERATED PRESSURE-RELIEF VALVE

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NOTE: Select for pump-discharge pressure control or  
for surge protection downstream of check.  
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Pilot-operated pressure-relief valve must be hydraulically operated, pilot-controlled modulating, with adjustable set point over the indicated range. Valve body must be cast iron conforming to ASTM A 48/A 48M, with 862 kilopascal 125-psi ASME B16.1, MSS SP-86 and ISO 7005-2 flanges. Valve trim must be manufacturer's standard brass, bronze, or corrosion-resistant steel. Pilot control must have AISI Type 303 or 304 corrosion-resistant steel trim. Diaphragm and seal material must be Buna-N. Maximum service-pressure rating must not be less than 1207 kilopascal at 82 degrees C 175 psi at 180 degrees F.

## 2.8 RELIEF VALVES FOR ELECTRIC WATER HEATERS

Temperature- and pressure-relief valves must conform to ASTM A 463/A 463M. Install Type I (combination pressure- and temperature-relief) valves when the heat input is less than 30 kilowatts 100,000 Btu per hour and when the storage is less than 450 liter 120 gallons. If either or both of the specified conditions will be reached or exceeded, Type II (temperature relief, water rated) or Type III (temperature relief, steam rated) valves must be installed. Install vacuum-relief valves on each cold-water branch connection to electric water heaters at an elevation above the top of the heater. Design vacuum relief to prevent water heater damage from a reverse flow vacuum.

## PART 3 EXECUTION

### 3.1 INSTALLATION

Submit Installation Drawings for self-contained control and relief valves, and install valves and specify in accordance with the manufacturer's recommendations, and Section 23 05 15 COMMON PIPING FOR HVAC.

-- End of Section --