

[INCH-POUND]
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SUPERSEDING
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COMMERCIAL ITEM DESCRIPTION

VALVES, TEMPERATURE-REGULATING (THERMOSTATICALLY CONTROLLED)

The General Services Administration has authorized the use of this commercial item description, for all federal agencies.

1. **SCOPE.** This commercial item description covers temperature-regulating valves designed to maintain fairly constant temperatures in heaters and storage tanks by regulation of the inlet fluid flow of the heating or cooling medium. The valves specified herein are intended to control temperatures by varying the fluid flow of a heat-transfer medium which is used to either heat or cool a separate fluid flow. Usually, the valve application involves utilization of steam flow to heat water in instantaneous heaters and storage tanks. In addition to these functions, the type II valve is capable of regulating the heated equipment supply pressure.

2. **CLASSIFICATION.** The temperature-regulating valves shall be of the following types, styles, and classes, as specified (see 7.3):

Type I - Temperature regulator.

Style A - Direct acting (closes with a temperature increase).

Style B - Reverse acting (opens with a temperature increase).

Style C - 3-way.

Class 1 - Self-operated.

Class 2 - Pilot-operated.

Class 3 - Electric-operated.

Type II - Combination pressure and temperature regulator.

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data which may improve this document should be sent to: Commanding Officer (Code 156), Naval Construction Battalion Center, Port Hueneme, CA 93043-4301.

AMSC N/A

FSC 4820

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3. SALIENT CHARACTERISTICS

3.1 Description. Within the range indicated in Table I, the valves shall automatically regulate fluid temperature by varying the flow of the heating or cooling medium. The valve assembly shall include a remote thermostatic bulb having flexible capillary tubing, a bellows, diaphragm, or other mechanical actuating device, a pilot valve, as required, and provisions that protect against overheating. The valve operating pressure, temperature, fluid service, and end connections shall be as specified (see 7.3). Valves of size 2-1/2-inch (65mm) and larger shall be flanged. The type II unit shall be furnished with a pressure-regulating override to limit and regulate the maximum outlet pressure of the temperature-regulating valve. The type I, class 3, valve electrical characteristics shall be as specified in 3.5.5.

3.2 Standard commercial product. The valves shall, as a minimum, be in accordance with the requirements of this commercial item description and shall be the manufacturer's standard commercial product. Additional or better features which are not specifically prohibited by this specification but which are a part of the manufacturer's standard commercial product, shall be included in the valves being furnished. A standard commercial product is a product which has been sold or is being currently offered for sale on the commercial market through advertisements or manufacturer's catalogs, or brochures, and represents the latest production model.

3.3 Design. The unit shall be designed to conform to the requirements of ANSI B31.1. Screw threads and pipe threads shall be in conformance with ANSI B1.1, B1.20.1, or B1.20.3, as applicable. Fluid-containing, thermostatic elements shall be hermetically sealed to preclude any mixing with the controlled medium. Unless otherwise specified (see 7.3), temperature calibration shall be accomplished at the midpoint of the temperature range specified.

3.4 Performance. Valves shall be capable of maintaining the controlled fluid temperature within the accuracy requirements specified in Table I for the temperature range and limiting pressures indicated. Valve capacities shall be in accordance with Table II. Overheat protection shall be provided to prevent damage to valve internal parts and to the thermal sensing apparatus. The type II valve shall control outlet pressure in addition to temperature. Pressure adjustment shall be in definite proportion to temperature change. Maximum delivery pressure shall be maintained for the specified operating pressure within ± 1 pound per square inch gauge (psig) 6.895 kilopascals gauge (kPag). Valve response time shall be kept to a minimum, consistent with the standard practice for the intended service.

3.5 Construction. When assembled and installed in the required piping circuit, the temperature-regulating valve shall operate as specified in 3.4 without evidence of binding, seizing, or permanent deformation caused by system temperature and pressure variations. Valve hysteresis shall be controlled in a positive manner. Direction of flow shall be clearly marked on the valve body. When specified (see 7.3), a strainer shall be furnished to preclude the damaging effects of scale, dirt, and welding chips in the line. Thermal sensing and actuating components shall be so arranged as not to be in direct contact with the fluid through the main valve. The valve assembly shall include the following components:

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TABLE I. Valve characteristics.

	Type I			Type II
	Class 1	Class 2	Class 3	
Temperature range degrees °F*	40 (4.4°C)	100 (37.8°C)	50 (10°C)	100 (37.8°C)
Accuracy °F	±4 (-15.5, -20.0°C)	±2 (-16.7, -18.9°C)	±4 (-15.5, -20.0°C)	±2 (-16.7, -18.9°C)
Inlet pressure psig max.**	125 (862 kPag)	250 (1724 kPag)	200 (1379 kPag)	600 (4137 kPag)
Pressure differential psig min.	5 (34 kPag)	5 (34 kPag)	5 (34 kPag)	15 (103 kPag)

*Maximum sensed temperature shall not exceed 250°F (121°C) for type I valves or 450°F (232.2°C) for type II valves.

**Based on saturated steam pressure.

TABLE II. Valve capacities - minimum.

Nominal pipe size, inches	Steam service (lbs/hr)		Liquid service		Air or gas service	
	35 psig inlet (241 kPag)	20 psig outlet (138 kPag)	5 psig pressure drop (34 kPag)GPM		5 psig inlet (34 kPag)	0-3 psig outlet (0-21 kPag)
1/4 (8 mm)	32	(12 Kg/hr)	1.3	(.08 l/s)	4	(1.89 l/s)
3/8 (10 mm)	60	(22 Kg/hr)	2.1	(.13 l/s)	8	(3.77 l/s)
1/2 (15 mm)	95	(35 Kg/hr)	4.0	(.25 l/s)	12	(5.66 l/s)
3/4 (20 mm)	210	(78 Kg/hr)	7.3	(.46 l/s)	21	(9.91 l/s)
1 (25 mm)	300	(112 Kg/hr)	11.0	(.69 l/s)	30	(14.16 l/s)
1-1/4 (32 mm)	500	(186 Kg/hr)	17.0	(1.07 l/s)	45	(21.23 l/s)
1-1/2 (40 mm)	750	(280 Kg/hr)	26.0	(1.64 l/s)	72	(33.98 l/s)
2 (50 mm)	1,200	(448 Kg/hr)	43.0	(2.71 l/s)	115	(54.27 l/s)
2-1/2 (65 mm)	2,100	(783 Kg/hr)	78.0	(4.92 l/s)	240	(113.26 l/s)
3 (80 mm)	3,200	(1194 Kg/hr)	125.0	(7.89 l/s)	396	(186.87 l/s)
4 (100 mm)	6,500	(2424 Kg/hr)	200.0	(12.62 l/s)	711	(335.52 l/s)
5 (125 mm)	9,500	(3543 Kg/hr)	350.0	(22.08 l/s)	1,164	(549.29 l/s)
6 (150 mm)	14,000	(5222 Kg/hr)	585.0	(36.91 l/s)	1,732	(817.33 l/s)

NOTE: The valve is set in the position it would assume at a temperature of 10°F (12.2°C) above or below the temperature at which the valve is set to close, as applicable. The above capacities refer to the heating or cooling medium flowing through the main valve.

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3.5.1 Main valve. The main valve shall be a single or double-seated, mechanically actuated, gate or globe valve. The valve shall be suitably balanced, and when intended for heating applications, shall be designed for dead-end shutoff. When required for cooling applications, a continuous flow bypass shall be furnished with the main valve. The valve body shall be bronze, brass, cast or ductile iron, or cast or forged steel, as specified (see 7.3). For pressures above 250 psig (1724kPag), the valve body shall be cast or forged steel. Unless otherwise specified (see 7.3), the trim shall be of standard industry practice in accordance with the operating medium.

3.5.2 Pilot valve. The pilot valve shall be either integral with or connected to the main valve by piping in accordance with the requirements specified herein. The pilot valve shall function with the thermostatic bulb to provide instant response to a sensed temperature change.

3.5.3 Type II valve pressure pilot. The type II valve pressure pilot shall be designed to control discharge pressure from the main valve. After sensing a pressure increase, the pilot shall act mechanically to control the main valve in accordance with the accuracy requirements of 3.4.

3.5.4 Thermostatic control. The thermostatic bulb and the capillary tube which connects the bulb to the temperature (pressure-actuated) bellows or diaphragm, shall be a hermetically sealed assembly. The bulb shall be plain, equipped with a union connection or a separable socket, as specified (see 7.3). Tubing shall be capable of withstanding, without rupture, repeated slow bending at a radius of 4 inches (100 mm) through a 90-degree (°) angle. Unless otherwise specified (see 7.3), tubing shall be provided in 8-foot (2438 mm) lengths.

3.5.5 Electric control. A normally closed solenoid control shall be supplied with the type I, class 3, valve. The solenoid shall be opened (energized) in response to a sensed temperature change and shall cause the main valve to admit or cut off fluid flow as required for the intended application. The control enclosure shall be a general purpose class, type I, in accordance with NEMA ICS 6. The coil shall be selected for high temperature, class H, continuous duty. Unless otherwise specified (see 7.3), the electrical supply shall be 120 volts (V), 60 hertz (Hz), alternating current.

3.6 Packing and maintenance tools. When specified (see 7.3), packing and maintenance tools shall be furnished.

4. REGULATORY REQUIREMENTS.

4.1 Materials. The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR). Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this commercial item description are to be new. They are to be fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as

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opposed to virgin raw materials. Unless otherwise specified, none of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this commercial item description.

4.2 Metric products. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch-pound units, provided they fall within specified tolerances using conversion tables contained in the latest version of Federal Standard No. 376, and all other requirements of this commercial item description including form, fit and function are met. If a product is manufactured to metric dimensions and those dimensions exceed the tolerances specified in the inch-pound units, a request should be made to the contracting officer to determine if the product is acceptable. The contracting officer has the option of accepting or rejecting the product.

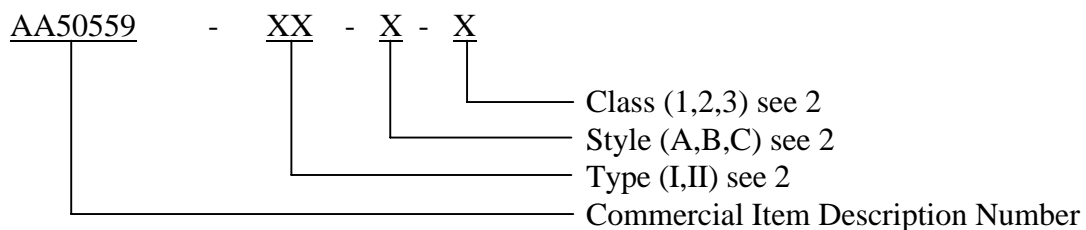
5. QUALITY ASSURANCE PROVISIONS.

5.1 Contractor certification. The contractor shall certify and maintain substantiating evidence that the product offered meets the salient characteristics of the commercial item description. The product must conform to the producer's own drawings, specifications, standards, and quality assurance practices. The product must be offered for sale in the commercial marketplace by a nationally recognized brand found in standard vendor catalogs. The government reserves the right to require proof of such conformance prior to first delivery, and thereafter as may be otherwise provided for under the provisions of the contract.

6. PACKAGING. Preservation, packing, and marking shall be as specified in the contract or order (see 7.3).

7. NOTES.

7.1 Part Identification Number (PIN). The following part identification numbering procedure is for government purposes and does not constitute a requirement for the contractor. The PIN used for units acquired to this description will be assigned as follows:



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7.2 Source of documents.

7.2.1 NEMA Standards are available from the National Electrical Manufacturers Association (NEMA), 2101 L Street, N.W., Washington D.C. 20037.

7.2.2 ANSI standards are available from American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.

7.2.3 The Federal Acquisition Regulation (FAR) may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC, 20402.

7.2.4 Copies of specifications and standards required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.

7.3 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type, style, and class of valve required (see 2).
- c. Valve operating pressure, temperature, fluid service, and end connections required (see 3.1).
- d. Temperature calibration, if other than as specified (see 3.3).
- e. When a strainer is required (see 3.5).
- f. Main valve body material required (see 3.5.1).
- g. Trim, if other than as specified (see 3.5.1).
- h. Thermostatic bulb connection required (see 3.5.4).
- i. Capillary tubing length, if other than as specified (see 3.5.4).
- j. Electrical characteristics of type I, class 3, valve, if other than as specified (see 3.5.5).
- k. Packing and maintenance tools, if required (see 3.6).
- l. Level of preservation, packing and marking required (see 6).

7.4 Options. The size of the temperature regulator should be selected for the intended application, rather than for the pipe size of the heater line, in which the valve is installed. In most applications, the valve will be smaller than the heater piping. For heating fluids with steam, the following approximation may be used to determine the valve size required:

- a. For water; $\text{lbs. steam / hr.}^* = \text{GPM}/2$ (temperature rise °F)
- b. For fuel oil; $\text{lbs. steam / hr.}^* = \text{GPM}/4$ (temperature rise °F)
- c. For air; $\text{lbs. steam / hr.}^* = \text{GPM}/925$ (temperature rise °F)
- d. For radiation; $\text{lbs. steam / hr.}^* = (\text{Sq. ft. EDR})/4$

*Minimum flow at 5 PSIG input pressure (saturated steam).
EDR is equivalent direct (steam) radiation.

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Final valve size selection should be made in accordance with manufacturer's recommendations for the particular steam flow.

7.5 Key word listing.

High Pressure
Pressure
Steam

7.6 National Stock Numbers (NSNs). The following is a list of NSNs assigned which correspond to this commercial item description. The list may not be indicative of all possible NSNs associated with the commercial item description.

4820-00-273-9937
4820-00-202-6546
4820-00-273-9936
4820-00-899-0806

MILITARY INTEREST:

Custodians
Navy - YD1

Review Activity
Navy - SH
DLA -CS

CIVIL AGENCY COORDINATING ACTIVITY:
GSA-FSS

Preparing Activity
Navy - YD1

(Project 4820-0656)