

MIL-V-23450C

19 June 1974

SUPERSEDING

MIL-V-23450B

10 June 1971

## MILITARY SPECIFICATION

### VALVES, EXPANSION, THERMOSTATIC, REFRIGERANT 12 AND REFRIGERANT 22

This specification is approved for use by all Departments and Agencies of the Department of Defense.

#### 1. SCOPE

- \* 1.1 Scope. This specification covers two types and two styles of thermostatic expansion valves for use with refrigerant 12 and refrigerant 22.
- \* 1.2 Classification. The thermostatic expansion valves shall be of the (1) following types and styles and (2) sizes and capacities as specified on MS 17982 (see 6.2).

Type I - Internal equalizer

Refrigerant 12 - with pressure limiting feature  
Refrigerant 22 - without pressure limiting feature

Type II - External equalizer

Refrigerant 12  
Refrigerant 22

Style 1 - Straight through pattern  
Style 2 - Angle pattern

#### 2. APPLICABLE DOCUMENTS

- \* 2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

#### SPECIFICATION

##### MILITARY

MIL-V-3 - Valves, Fittings and Flanges (Except for Systems Indicated Herein); Packaging of.

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STANDARDS

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MS 17982 - Valves, Expansion, Thermostatic, Refrigerant 12 and Refrigerant 22.

(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.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply:

American National Standards Institute (ANSI)

Safety Code for Mechanical Refrigeration ANSI B9.1

(Application for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018.)

Air Conditioning and Refrigerating Institute (ARI)

Standard 750 - Thermostatic Refrigerant Expansion Valves

(Application for copies should be addressed to the Air Conditioning and Refrigerating Institute, 1815 N. Fort Myer Drive, Arlington, VA 22209.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Standard product. The thermostatic expansion valves delivered under this specification shall be the manufacturer's standard commercial product, except for any changes necessary to comply with this specification.

3.2 Standards. The thermostatic expansion valve shall conform to ANSI B9.1 and ARI 750.

3.2.1 Certification. Prior to approval of the first shipment, the supplier shall submit satisfactory evidence to the contracting officer or his authorized representative that the thermostatic expansion valves he proposes to supply under this specification meet the requirements of ANSI B9.1 and ARI 750. Acceptable evidence of meeting these requirements shall be a certification from the manufacturer that the thermostatic expansion valve offered conform to ANSI B9.1 and ARI 750.

3.3 Materials. Materials not definitely specified shall be of the quality normally used by the manufacturer in his standard commercial thermostatic refrigerant expansion valves, provided the completed items comply with all provisions of this specification.

\* 3.4 Design. The thermostatic expansion valves shall be designed as specified herein and in accordance with MS 17982 for use with refrigerant 12 or refrigerant 22 as applicable. The type I valves for use with refrigerant 12 shall be of the internal equalizer type with pressure limiting feature. Type I valves for use with refrigerant 22 shall be of the internal equalizer type without pressure limiting feature. Type II valves for use with refrigerant 12 and refrigerant 22 (as applicable) shall be of the external equalizer type. The type I and II valves shall be designed to automatically control the flow of refrigerant from the high pressure side of the system to the low pressure side of the system through a pressure controlled orifice in accordance with the load demands of the system at the evaporator. The basic response of the valves shall be with respect to the superheat change of the gas in the suction line. The valves shall provide means for external adjustment of the superheat setting.

3.4.1 Capacity. The minimum capacities, British Thermal Units per hour, (Btuh) of the type I and II valves shall be as specified in MS 17982 when tested in accordance with 4.3.2.

### 3.5 Performance.

\* 3.5.1 Superheat setting. The superheat setting shall be as specified in MS 17982 under "Operating Characteristics". Type I and II valves shall be tested for superheat setting in accordance with 4.3.3.

3.5.2 Superheat change. The superheat change induced by the seat leakage test of 4.3.5 shall not exceed the value specified in MS 17982.

\* 3.5.3 Pressure limit valves. The type I refrigerant 12 valves, MS 17982-1 and MS 17982-2, shall be set as shown under "Operating Characteristics" of MS 17982. The valves shall throttle or stop the flow of refrigerant when the suction pressure at the evaporator reaches the maximum pressure setting, and shall operate normally when the suction pressure falls below the maximum pressure setting. The pressure setting of the valves shall be tested as specified in 4.3.4.

\* 3.5.4 Seat leakage. The valve seat for type I and II valves shall meet the requirements of the test specified in 4.3.5.

3.6 Construction. The maximum envelope dimensions of the valve, the type and size of inlet, outlet and external equalizer connections shall be as shown on MS 17982. The valve inlet and outlet configuration shall be straight through (style 1) or right angle (style 2) as shown on MS 17982. Valves MS 17982-1 and MS 17982-2 shall have a removable strainer provided at the inlet side of the valve. The valve body shall have an arrow or other significant marking legibly and permanently stamped or embossed showing the direction of refrigerant flow. Method of fabrication (welding, brazing, soldering, and sealing) shall be at the option of the individual manufacturer in accordance with commercial practice.

3.7 Marking for identification. Valves shall be marked in accordance with industry's standard practice. In addition, valves shall be marked to include the applicable part number as shown on MS 17982.

3.8 Finish. The valves shall have the manufacturer's standard commercial finish.

3.9 Workmanship. The finished thermostatic expansion valve shall not be fractured, split, punctured, dented, or malformed. Soldering, when applicable, shall be complete, clean, and adherent and shall not have any pinholes. Welding and brazing where applicable, shall be complete, uniform, and properly fused, having no burn holes, slag, inclusion, scale or flux deposits, and shall not be cracked, fractured, or undercut. The valve shall not have any sharp burrs, slivers, or splinters.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Inspection. Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated hereinafter.

4.2.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected and tested in accordance with all the requirements of referenced specifications and standards, unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document.

4.2.2 End item inspection. The inspection lot shall consist of all valves of one type, style, size, and capacity offered for inspection at one time. The sample unit for the inspection shall be one completely fabricated valve.

4.2.2.1 Visual examination. Examination shall be made of the end item for defects in table I. The inspection level shall be level II with an acceptable quality level (AQL) of 2.5 for major defects and 6.5 for total defects, expressed in terms of defects per hundred units.

TABLE I. Classification of defects

Examine	Defect	Classification	
		Major	Minor
Finish	Finish not manufacturer's standard type		X
Design, construction and workmanship, general (applicable to all components and assemblies)	Fractured, split, punctured, dented or malformed	X	
	Sharp burrs, slivers, splinters	X	
	Part missing	X	
	Not connected or joined as specified	X	
	Marking missing for showing direction of refrigerant flow	X	
Soldering (where applicable)	Soldering not clean (flux or flux residue not removed); pin holes in solder, not complete, not adherent		X
Welding and brazing (where applicable)	Welding and brazing having slag, inclusions, undercutting; not complete, not properly fused, not uniform; with scale or flux deposits not removed	X	
Marking for identification	Missing, incomplete, not legible	X	

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4.2.2.2 Dimensional examination. Examination shall be made of the end item to determine compliance with the dimensional requirements of MS 17982. Any dimension that does not meet specified requirements shall be classified a defect. The inspection level shall be S-2 with an AQL of 2.5 defects, expressed in terms of defects per hundred units.

4.2.2.3 Testing of the end item. One unit from each production lot shall be tested as specified in 4.3. Any nonconformance with specified requirements shall be cause for rejection of the lot.

4.2.3 Standards compliance. Proof of compliance with ANSI and ARI requirements of 3.2 shall be submitted to the Government representative.

4.2.4 Examination of preparation for delivery. Examination shall be made for preservation, packaging, packing and marking in accordance with MIL-V-3.

4.3 Tests.

4.3.1 Test fixture. The test apparatus shall be as shown in figure 1. The total volume of the outlet side of the fixture including gages and hand valves shall be 20, plus or minus 1 cubic inch. The air supply to the valve shall be clean and dry and regulated to the pressure indicated. A bleed orifice of proper diameter to match the MS part number of the valve being tested shall be selected as shown below for each test to be performed. The bleed orifice shall be 1/16 inch thick sharp edged and may be fabricated from an SAE flare cap as shown in figure 1.

MS 17982	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12
Part No.	-13	-14	-15	-16	-17	-18	-19	-20	-21	-22	-23	-24

Superheat  
set orifice:

Diameter (inches)	0.025	0.025	0.025	0.047	0.060	0.047	0.060	0.060	0.060	0.060	0.089	0.089
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4.3.2 Capacity. The valves shall be tested for minimum capacity on the fixture shown in figure 1. The capacity test shall be performed according to the individual manufacturer's capacity test standards to determine compliance with 3.4.1. The test pressures and bleeds used shall be the manufacturer's standard for each MS part number valve. Any nonconformance with the minimum capacity requirements of 3.4.1 shall constitute failure of this test.

- \* 4.3.3 Superheat setting. The test fixture shall be as shown on figure 1. The size of the bleed orifice for each size valve shall be as listed in 4.3.1. The air supply shall be turned on and maintained at 110 pounds per square inch gage (psig), plus or minus 1 psig for refrigerant 12 valves; 125 psig plus or minus 2 psig for refrigerant 22 valves. The bulb and 6 inches of capillary are to be at the superheat setting temperature specified in MS 17982, plus or minus 0.5F for refrigerant 12; the bulb and 1/3 inch of capillary are to be at the superheat temperate specified in MS 17982, plus or minus 0.5F for refrigerant 22. The valve head and the remainder of the capillary are to be at 80F plus or minus 2F. With the air supply turned on and the hand valves "A" and "B" open the outlet pressure shall indicate the pressure corresponding to the refrigerant saturation temperature. The difference between the temperature of the thermal bulb and the saturation temperature obtained above shall be the superheat setting as specified in MS 17982 and 3.5.1. Any nonconformance shall constitute failure of this test.
- \* 4.3.4 Maximum operating pressure. This test applies to valves MS 17982-1 and MS 17982-2. The test fixture shall be as shown on figure 1. The inlet pressure to the valve shall be 110 psig, plus or minus 1 psig. The valve head, bulb, and capillary are to be at 80F, plus or minus 2F. With the air supply turned on and hand valves "A" and "B" open, immerse bulb, valve, and capillary tubing in 80F bath for a period of 5 minutes. The superheat setting orifice specified in 4.3.1 shall be used for this test. Observe the pressure at the outlet gage. Any nonconformance with the pressure limit requirements of 3.5.3 shall constitute failure of this test.
- \* 4.3.5 Seat leak test (type I and II valves).
- \* 4.3.5.1 Refrigerant 12 valves. The test is to be performed on the fixture described in figure 1. With 110 psig, plus or minus 1 psig, applied to the inlet of the fixture and with the expansion valve set at the bulb reference temperature specified in MS 17982, cool the bulb a maximum of 5F to correspond with the maximum superheat change specified in MS 17982, then close the outlet valve "A" and allow the pressure to rise. The seat leakage shall be measured by the rise in outlet gage pressure in a given amount of elapsed time after closing of hand valve "A". The maximum allowable pressure rise shall not exceed that shown below.

MS 17982												
Part No.	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12
Seat leak												
pressure rise	12	12	12	12	12	12	12	12	12	12	25	25
(psig/min.)												

Any nonconformance with the above pressure rises shall constitute failure of this test (see 3.5.4).

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\* 4.3.5.2 Refrigerant 22 valves. The test is to be performed on the fixture described in figure 1. With 125 psig, plus or minus 2 psig, applied to the inlet of the fixture and with the expansion valve set at the bulb reference temperature specified in MS 17982, close the outlet valve "A" and allow the pressure to rise. The seat leakage shall be measured by the rise in outlet gage pressure in a given amount of elapsed time after closing of hand valve "A". The maximum allowable pressure rise shall not exceed that shown below.

MS 17982												
Part No.	-13	-14	-15	-16	-17	-18	-19	-20	-21	-22	-23	-24
Seat leak pressure rise (psig/min.)	12	12	12	12	12	12	12	12	12	12	25	25

Any nonconformance with the above pressure rises shall constitute failure of this test (see 3.5.4).

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, packing and marking. Valves shall be preserved, packaged and marked in accordance with the applicable requirements of MIL-V-3. Preservation and packaging shall be level A or C, and packing shall be level A, B, or C (see 6.2).

6. NOTES

\* 6.1 Intended use. The thermostatic expansion valves covered by this specification are intended for use with military standard refrigerating and air-conditioning equipment. The selection of a particular valve for a specific application can be determined by using table I or table II of MS 17982, as applicable. Valves MS 17982-1 to MS 17982-12 inclusive are for refrigerant 12 use. Valves MS 17982-13 to MS 17982-24 inclusive are for refrigerant 22 use. Type I valves MS 17982-1, MS 17982-2, MS 17982-13 and MS 17982-14 are primarily for use in military standard refrigeration systems using military standard fractional horsepower hermetic compressors. Valves MS 17982-1, MS 17982-2, MS 17982-13, and MS 17982-14 are internally equalized valves. Valves MS 17982-1 and MS 17982-2 incorporate a pressure limit means which limits the suction pressure to pre-set maximum. Type II valves MS 17982-3, MS 17982-4, MS 17982-5, MS 17982-15, MS 17982-16, and MS 17982-17 are for use in military standard refrigeration systems using military standard open type and integral horsepower hermetic compressors. Type II valves MS 17982-6 to MS 17982-12 inclusive and MS 17982-18 to MS 17982-24 inclusive are for

use in military standard air conditioning systems and high temperature refrigeration systems using military standard open type and integral horsepower hermetic compressors. Valves MS 17982-3 to MS 17982-12 inclusive and MS 17982-15 to MS 17982-24 inclusive are externally equalized and should be used with multi circuit evaporators fed through a refrigerant distributor. No pressure limiting means is required for valves MS 17982-3 to MS 17982-12 inclusive and MS 17982-13 to MS 17982-24 inclusive.

\* 6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type, style, size, refrigerant, and capacity required (see 1.2).
- (c) Level of preservation and packaging, and level of packing required (see 5.1).

6.3 The margins of this specification are marked with an asterisk (\*) to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and suppliers are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Army - GL  
Navy - YD  
Air Force - 82

Preparing activity:

Army - GL  
Project No. 4130-0150

Review activity:

Army - ME

User Activities:

Navy - SH, MC

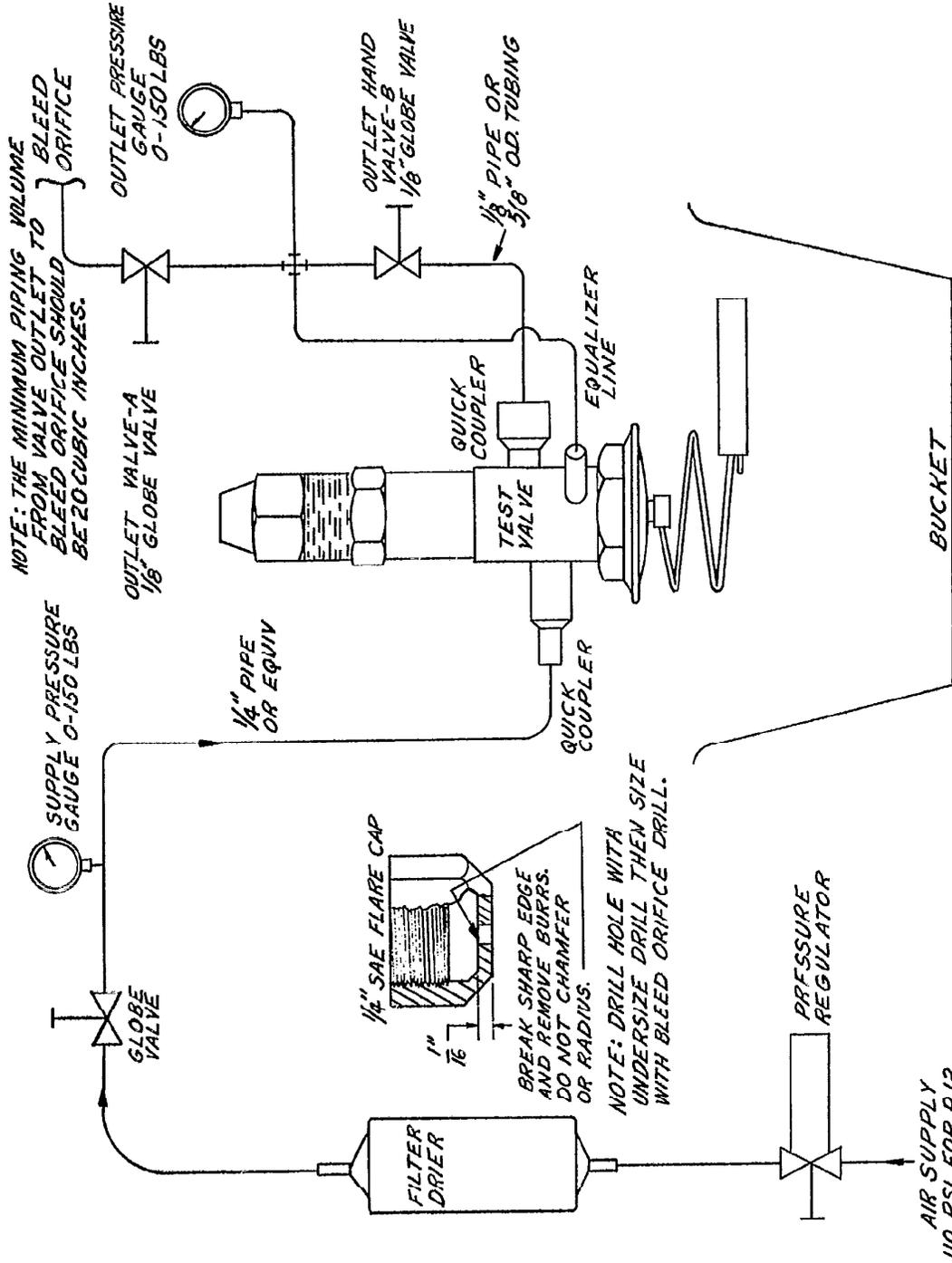


FIGURE 1 TEST APPARATUS