

DETAIL SPECIFICATION

VALVES, EXPANSION, THERMOSTATIC, REFRIGERANT-12 (R-12) AND REFRIGERANT-22 (R-22)

Inactive for new design after 1 April 1996.

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 (R-12) and refrigerant 22 (R-22).

1.2 Classification. The thermostatic expansion valves described in this specification are of the following types, styles, sizes, and capacities as specified in MS17982 (see 6.2).

1.2.1 Types. The types of thermostatic expansion valves are as follows:

1.2.1.1 Type I. Type I valves have an internal equalizer. Valves for use with R-12 have a pressure limiting feature. Valves for R-22 do not have a pressure limiting feature.

1.2.1.2 Type II. Type II valves for use with R-12 and R-22 are the external equalizer type.

1.2.2 Styles.

1.2.2.1 Style I. Straight-through pattern as specified in MS17982.

1.2.2.2 Style II. Angle pattern as specified in MS17982.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 or 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 or 4 of this specification, whether or not they are listed.

Comments, suggestions, or questions on this document should be addressed to: DLA Land and Maritime, Attn: VAI, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to FluidFlow@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.



2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MS17982 - Valves, Expansion, Thermostatic, Refrigerant-12 (R-12) and Refrigerant-22 (R-22)

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-1916 - DoD Preferred Methods for Acceptance of Product

(Copies of these documents are available online at <https://assist.dla.mil>.)

2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), the text of this document take precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern.

3.2 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.3 Materials. Materials shall be as identified herein. However when a definite material is not specified, a material shall be used which will enable the thermostatic expansion valves used with refrigerants R-12 and R-22 to meet the requirements of this specification.

3.3.1 Recycled, recovered, environmentally preferable, or biobased materials. Recycled, recovered, environmentally preferable, or biobased materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.4 Design. The thermostatic expansion valves shall be designed as specified herein and in accordance with MS17982 for use with R-12 or R-22 as applicable (see 4.4.1). The maximum envelope dimensions of the valve, and the type and size of inlet, outlet, and external equalizer connections shall be as specified in MS17982. The valve inlet and outlet configuration shall be straight-through (style I) or angle (style II) as specified in MS17982. Valves MS17982-1 and MS17982-2 shall have a removable strainer provided at the inlet side of the valve.

3.4.1 Type I and II valves. 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 valve shall be with respect to the superheat change of the gas in the suction line. The valve shall provide means for external adjustment of the superheat setting.

3.4.2 Fabrication. Method of fabrication (welding, brazing, soldering, and scaling) shall be at the option of the individual manufacturer.

3.5 Performance.

3.5.1 Capacity. The minimum capacities, in British Thermal Units per hour (Btuh) of the types I and II valves shall be as specified in MS17982 when tested in accordance with 4.4.4.

3.5.2 Superheat setting (type I and II). Type I and II valves shall be tested for superheat setting in 4.4.5. The superheat setting shall be as specified in MS17982.

3.5.3 Superheat change (type I and II). Type I and II valves the superheat change induced by the seat leakage test of 3.5.5 shall not exceed the value specified in MS17982.

3.5.4 Pressure limit (R-12 type I). MS17982-1 and MS17982-2 type I R-12 valves shall be set as specified in MS17982. 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 in accordance with 4.4.6.

3.5.5 Valve seat leakage (types I and II). The valve seat for types I and II valves shall meet the requirements of the test specified in 4.4.7.

3.6 Marking for identification. Valves shall be marked in accordance with commercial practice. In addition, valves shall be marked to include the applicable part number as specified in MS17982.

3.6.1 Valve body flow indicator. The valve body shall have an arrow or other significant marking legibly and permanently stamped or embossed showing the direction of refrigerant flow.

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

3.8 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. VERIFICATION

4.1 Classification of inspection. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2. First article inspection. One sample of the applicable Part or Identifying Number (PIN) (see 6.2) shall be subjected to the testing as specified in [table I](#) and [table II](#). Any nonconformance with specified requirements shall be cause for rejection of the lot.

4.2.1 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified herein.

4.2.2 Inspection lot. An inspection lot shall consist of all the valves of the same PIN, produced under essentially the same conditions, and offered for inspection at one time.

4.2.3 Samples. The sample unit for the first article inspection shall be one completely fabricated valve randomly chosen from the inspection lot.

TABLE I. First article inspection.

Inspection	Requirement paragraph	Inspection
Visual examination	3.4 , 3.6 , and 3.8	4.4.1 and 4.4.2
Capacity test	3.5.1	4.4.4
Superheat setting	3.5.2	4.4.5
Superheat change	3.5.3	---
Pressure limit ^{1/}	3.5.4	4.4.6
Valve seat leakage	3.5.5	4.4.7

^{1/} MS17982-1 and MS17982-2 type I, R-12 valves only.

4.3. Conformance inspection.

4.3.1 Inspection of product for delivery. Inspection of product for delivery shall consist of the examinations in [table I](#).

4.3.2 Production lot sampling. Sampling for inspection shall be performed in accordance with MIL-STD-1916, except where otherwise indicated.

4.4 Performance.

4.4.1 Dimensional examination. Examination shall be made of the end item to determine compliance with the dimensional requirements as specified in MS17982. Any dimension that does not meet specified requirements shall be classified a defect.

4.4.2 Visual examination. Visual examination shall be made of the valve for defects specified in [table II](#).

TABLE II. Visual examinations.

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

4.4.3 Test fixture.

- a. The test apparatus shall be as shown on [figure 1](#).
- b. The total volume of the outlet side of the fixture (including gauges and hand valves) shall be 20 ± 1 cubic inches (327.74 ± 16.39 cubic cm).
- c. The air supply to the valve shall be clean and dry and regulated to the pressure indicated.
- d. A bleed orifice of proper diameter to match the MS PIN of the valve being tested shall be selected as shown below for each test to be performed.

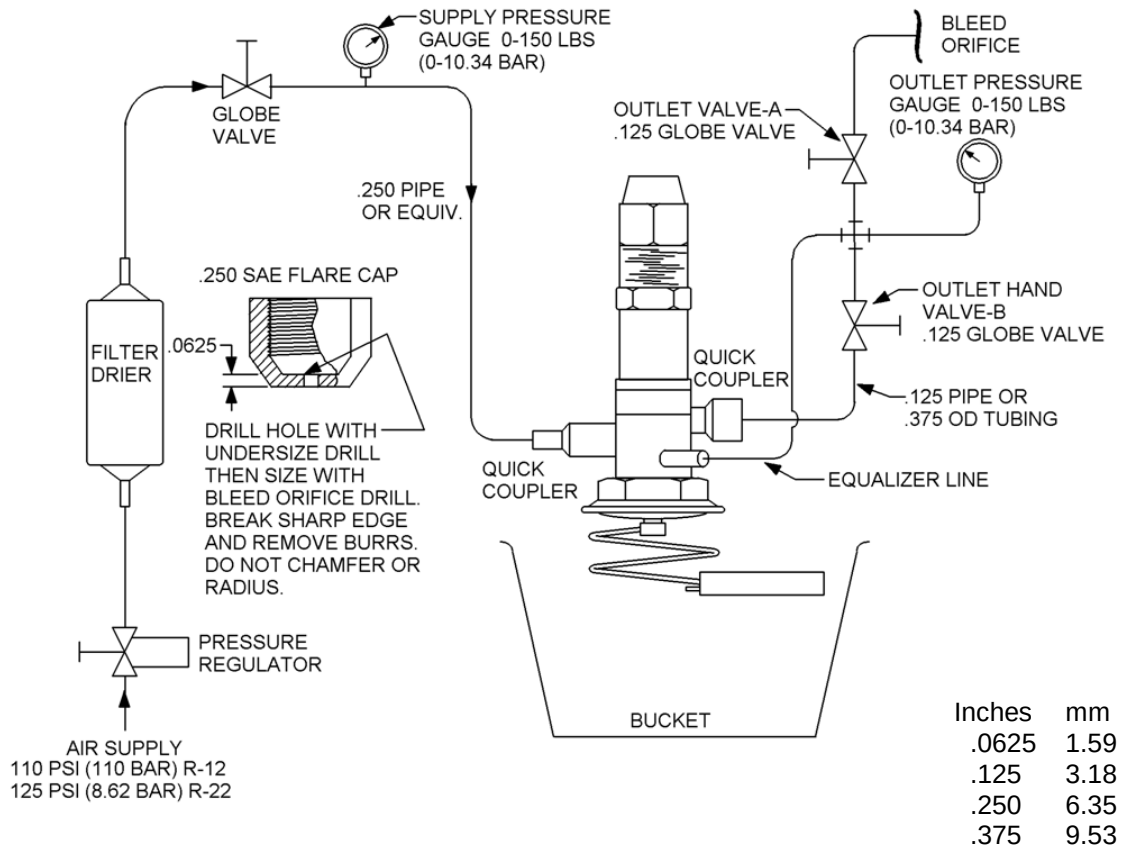
MS17982 dash number	-1, -2 -3, -5, -14	-4, -16	-5, -17	-6, -8
Bleed orifice diameter (mm)	.025 (0.64)	.047 (1.19)	.060 (1.52)	.047 (1.19)

MS17982 dash number	-7, -8, -9, -19, -20, -21	-10, -22	-11, -12, -23, -24
Bleed orifice diameter (mm)	.060 (1.52)	.060 (1.52)	.089 (2.26)

- e. The bleed orifice shall be 1/16 (.0625) inch (1.59 mm) thick and sharp edged, and may be fabricated from an SAE flare cap as shown on figure 1.

4.4.4 Capacity (see 3.5.1). The capacity test shall be performed according to the individual manufacturer's capacity test standards to determine compliance in 3.5.1. The following details shall apply:

- The valve shall be tested for minimum capacity on the fixture shown on figure 1.
- The test pressure and bleed used shall be the manufacturer's standard for each MS PIN valve.
- Any nonconformance with the minimum capacity requirements in 3.5.1 shall constitute failure of this test.



NOTES:

- Dimensions are in inches.
- Metric equivalents are given for general information only.

FIGURE 1. Test apparatus.

4.4.5 Superheat setting (see 3.5.2 and 3.5.4). The following test is used to determine the superheat setting. The following details shall apply:

- a. The test fixture shall be as shown on [figure 1](#).
- b. The size of the bleed orifice for each MS PIN valve shall be as listed in [4.4.3](#).
- c. The air supply shall be turned on and maintained at:
 - (1) R-12 valves: 110 $\pm$ 1 pounds per square inch gage (psig) (8.62 $\pm$ 0.07 bar).
 - (2) R-22 valves: 125 $\pm$ 2 psig (8.62 $\pm$ 0.14 bar).
- d. R-12 valves the bulb and 6 inches of capillary are to be at the superheat setting temperature specified in MS17982 $\pm$ 0.5 °F ($\pm$ 0.3°C).
- e. R-22 valves the bulb and 1/3 (.33) inch (8.38 mm) of capillary are to be at the superheat setting temperature specified in MS17982 $\pm$ 0.5°F ($\pm$ 0.3°C).
- f. The valve head and the remainder of the capillary are to be at 80°F $\pm$ 2°F (26.7°C $\pm$ 1.11°C).
- g. 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 MS17982 and [3.5.2](#).
- h. Any nonconformance shall constitute failure of this test.

4.4.6 Pressure limit (R-12 type I) (see [3.5.4](#)). This test applies to valves MS17982-1 and MS17982-2 type I R-12. The pressure setting of the valves shall be tested to determine the pressure limits specified in [3.5.1](#). The following details shall apply.

- a. The test fixture shall be as shown on [figure 1](#).
- b. The inlet pressure to the valve shall be 110 $\pm$ 1 psig (8.62 $\pm$ 0.07 bar).
- c. The valve head, bulb, and capillary are to be at 80° $\pm$ 2°F (26.7° $\pm$ 1.11°C).
- d. With the air supply turned on and hand valves "A" and "B" open, immerse bulb, valve, and capillary tubing in 80°F (26.7°C) bath for a period of 5 minutes.
- e. The bleed orifice in [4.4.3](#) shall be used for this test.
- f. Observe the pressure at the outlet gage.
- g. Any nonconformance with the pressure limit requirements of [3.5.4](#) shall constitute failure of this test.

4.4.7 Valve seat leak test (type I and II valves) (see [3.5.5](#)).

4.4.7.1 R-12 valve seat leak test. The valve seat for types I and II R-12 valves shall meet the requirements specified in [3.5.5](#). The following details shall apply:

- a. The test is to be performed on the fixture described on [figure 1](#).
- b. With 110 $\pm$ 1psig (8.62 $\pm$ 0.07 bar), applied to the inlet of the fixture and with the expansion valve set at the bulb reference temperature specified in MS17982, cool the bulb a maximum of 5°F (-15°C) to correspond with the maximum superheat change specified in MS17982.
- c. Then close the outlet valve "A" and allow the pressure to rise.
- d. The seat leakage shall be measured by the rise in outlet gage pressure in a measured amount of elapsed time after closing of hand valve "A".
- e. The maximum allowable pressure rise shall not exceed the values shown below.

MS17982 dash number	-1, -2, -3, -4, -5, -6, -7, -8, -9, -10	-11, -12
Seat leak pressure rise rate psig/min (bar)	12 (0.83)	25 (1.72)

- f. Any nonconformance with the above pressure rise rate shall constitute failure of this test (see [3.5.5](#)).

4.4.7.2 R-22 valve seat (types I and II). The valve seat for types I and II R-22 valves shall meet the requirements specified in 3.5.5. The following details shall apply:

- a. The test is to be performed using the fixture described on [figure 1](#).
- b. With 125 ± 2 psig (8.62 ± 0.14 bar) applied to the inlet of the fixture and with the expansion valve set at the bulb reference temperature specified in MS17982.
- c. Close the outlet valve "A" and allow the pressure to rise.
- d. 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".
- e. The maximum allowable pressure rise shall not exceed the values shown below.

MS17982 dash number	-13	-14	-15	-16	-17	-18	-19	-20	-21	-22	-23	-24
Seat leak pressure rise rate psig/min (bar)	12 (0.83)	12 (0.83)	12 (0.83)	12 (0.83)	12 (0.83)	12 (0.83)	12 (0.83)	12 (0.83)	12 (0.83)	12 (0.83)	25 (1.72)	25 (1.72)

- f. Any nonconformance with the above pressure rise rate shall constitute failure of this test.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see [6.2](#)). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Controls Point's packaging activities within the Military Service or Defense Agency, or within the Military Service's System Commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The thermostatic expansion valves covered by this specification are intended for use with military standard refrigeration and air-conditioning equipment. Such applications are as follows: Navy ship board applications, aircraft ground support equipment and weapon system testing equipment. This reliability is obtained by first article testing. The first article testing assures through stringent testing that these valves will operate for long periods at sea and in harsh environment conditions. The selection of a particular valve for a specific application can be determined as specified in MS17982, as applicable (see [table III](#)).

TABLE III. R-12 and R-22 valve characteristics.

R-12 valves	Notes
Type I MS17982-1 MS17982-2	These valves are: a. Primarily for use in military standard refrigeration systems using military standard fractional horsepower hermetic compressors. b. Internally equalized. These valves incorporate a pressure limit means that limits the suction pressure to a pre-set maximum. Pressure limiting means is required.
Type II MS17982-3 MS17982-4 MS17982-5	These valves are: a. For use in military standard refrigeration systems using military standard open type and integral horsepower hermetic compressors. b. Externally equalized and should be used with multi-circuit evaporators fed through a refrigerant distributor.
Type II MS17982-6 MS17982-7 MS17982-8 MS17982-9 MS17982-10 MS17982-11 MS17982-12	These valves are: a. For use in military standard air conditioning systems and high temperature refrigeration systems using military standard open type and integral horsepower hermetic compressors. b. Externally equalized and should be used with multi-circuit evaporators fed through a refrigerant distributor.
R-22 valves	Notes
Type I MS17982-13 MS17982-14	These valves are: a. Primarily for use in military standard refrigeration systems using military standard fractional horsepower hermetic compressors. b. Internally equalized.
Type II MS17982-15 MS17982-16 MS17982-17	These valves are: a. For use in military standard refrigeration systems using military standard open type and integral horsepower hermetic compressors. b. Externally equalized and should be used with multi-circuit evaporators fed through a refrigerant distributor.
Type II MS17982-18 MS17982-19 MS17982-20 MS17982-21 MS17982-22 MS17982-23 MS17982-24	These valves are: a. For use in military standard air conditioning systems and high temperature refrigeration systems using military standard open type and integral horsepower hermetic compressors. b. Externally equalized and should be used with multi-circuit evaporators fed through a refrigerant distributor.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Title, number, and date of the applicable specification sheet and the complete PIN (see 3.1).
- c. Type, style, size, refrigerant, and capacity required (see 1.2).
- d. Inspection requirements if other than specified (see 4.1).
- e. First article when required (3.2 and 4.2).
- f. Packaging requirements (see 5.1).

6.3 First article. When first article inspection is required, the contracting officer should provide the specific guidance to offerors whether the item(s) should be a preproduction sample, a first article sample, a standard production item from the contractor's inspection lot (see 4.2.1), and the number of items to be tested as specified in 4.2 as applicable. The contracting officer should also include specific

instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Invitations for bids should provide that the government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.4 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification.

6.5 Subject term (key word) listing.

Evaporator
High-pressure
Low-pressure
Superheat

6.6 Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes 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 contractors 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.

CONCLUDING MATERIAL

Custodians:

Army - GL
Navy - SH
Air Force - 99
DLA - CC

Preparing activity:

DLA - CC

(Project 4820-2016-001)

Review activities:

Army - AT, CR4
Navy - MC, SA
Air Force - 71
DLA - GS

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