

**ANSI/AHRI Standard 750-2007
(Formerly ARI Standard 750-2007)**

**2007 Standard for
Thermostatic Refrigerant
Expansion Valves**



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Note:

This standard supersedes ARI Standard 750-2001.

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PERFORMANCE RATING OF THERMOSTATIC REFRIGERANT EXPANSION VALVES

Section 1. Purpose

1.1 Purpose. The purpose of this standard is to establish for Thermostatic Refrigerant Expansion Valves: definitions; test requirements; rating requirements; minimum data requirements for Published Ratings; marking and nameplate data; and conformance conditions.

1.1.1 Intent. This standard is intended for the guidance of the industry, including manufacturers, engineers, installers, contractors and users.

1.1.2 Review and Amendment. This standard is subject to review and amendment as technology advances.

Section 2. Scope

2.1 Scope. This standard applies to Thermostatic Refrigerant Expansion Valves for use with refrigerants listed in 2.1.1 at evaporator temperatures between 50°F [10°C] and -40°F [-40°C].

2.1.1 Refrigerants. The refrigerants included in this standard are: R-12, R-22, R-134a, R-404A, R-407C, R-410A, R-502 and R-507A.

Section 3. Definitions

All terms in this document follow the standard industry definitions in the current edition of *ASHRAE Terminology of Heating, Ventilation, Air Conditioning and Refrigeration* unless otherwise defined in this section.

3.1 Capacity of Thermostatic Refrigerant Expansion Valves. The refrigerating effect produced by the evaporation of refrigerant which will pass through the valve under the following specified conditions:

- a. Liquid refrigerant temperature at the valve inlet
- b. Saturated evaporator temperature
- c. Pressure difference across the valve
- d. Static superheat set point
- e. Superheat change from the set point

3.2 Maximum Operating Pressure (MOP). The maximum equalizer (internal or external) pressure permitted by a pressure-limiting type Thermostatic Refrigerant Expansion Valve (See Appendix C).

3.3 Published Rating. A statement of the assigned values of those performance characteristics, under stated Rating Conditions, by which a unit may be chosen to fit its application. These values apply to all units of like nominal size and type (identification) produced by the same manufacturer. The term Published Rating includes the rating of all performance characteristics shown on the unit or published in specifications, advertising or other literature controlled by the manufacturer, at stated Rating Conditions.

3.3.1 Application Rating. A rating based on tests performed at application Rating Conditions (other than Standard Rating Conditions).

3.3.2 Standard Rating. A rating based on tests performed at Standard Rating Conditions.

3.4 Rating Conditions. Any set of operating conditions under which a single level of performance results and which causes only that level of performance to occur.

3.4.1 Standard Rating Conditions. Rating conditions used as the basis of comparison for performance characteristics.

3.5 "Shall" or "Should". "Shall" or "should" shall be interpreted as follows:

3.5.1 *Shall*. Where "shall" or "shall not" is used for a provision specified, that provision is mandatory if compliance with the standard is claimed.

3.5.2 *Should*. "Should" is used to indicate provisions which are not mandatory but which are desirable as good practice.

3.6 *Thermostatic Refrigerant Expansion Valve*. A controlling device which regulates the flow of volatile refrigerant into an evaporator of a refrigeration system and which is actuated by changes in evaporator pressure and superheat of the refrigerant gas leaving the evaporator.

3.7 *Thermostatic Refrigerant Expansion Valve Pressure Drop*. The pressure drop across the valve, which is the net pressure difference between the valve inlet and outlet.

3.8 *Thermostatic Refrigerant Expansion Valve Superheat*. The difference between the temperature of the thermal bulb and the dew point temperature corresponding to the refrigerant pressure at the valve outlet, or at the equalizer connection, when provided.

3.8.1 *Static Superheat*. The superheat at which the manufacturer calibrates or "sets" the thermostatic expansion valve.

3.9 *Vapor-Free (Subcooled) Liquid Refrigerant*. Refrigerant which has been cooled below the bubble point temperature for a given pressure.

Section 4. Test Requirements

4.1 *Testing for Capacity*. Thermostatic refrigerant expansion valve ratings shall be based on tests conducted in accordance with the test procedure outlined in ANSI/ASHRAE Standard 17.

4.1.1 Alternative flow test methods may be used provided the results obtained can be confirmed by the test method specified in 4.1 within the tolerance specified in 5.5.

Section 5. Rating Requirements

5.1 *Published Capacity Ratings*. Published capacity ratings shall consist of Standard Ratings and may include Application Ratings. Such ratings shall be based on tests of valves made for use with the refrigerant specified in the ratings. All Published Ratings shall be based on Vapor-free (Subcooled) Liquid Refrigerant entering the Thermostatic Refrigerant Expansion Valve. The tests shall be made in accordance with the test procedure outlined in Section 4 of this standard.

5.1.1 *Standard Ratings*. Standard Ratings of capacity shall be published for all Standard Rating Conditions, shown in Table 1, falling within the intended range of application of the valve.

5.1.2 *Nominal Rating*. The nominal rating is the equivalent capacity rating of the valve at the 40°F [4°C] evaporator Standard Rating Condition (See Standard Rating Condition A in Table 1).

5.1.3 *Application Ratings*. Application Ratings provide capacities under operating conditions which differ from those in Table 1. Wherever Application Ratings are published or printed, they shall include a statement of conditions at which the ratings apply and be accompanied by the pertinent Standard Rating(s) clearly designated as such.

5.2 *Interpolation and Extrapolation of Air Test Data*. Published capacity ratings shall be based on air-fixture tests made at two or more evaporator dew point temperatures. Air-fixture test data may be extrapolated or interpolated no more than 15°F [8°C] from test points and only when the same thermostatic charge is used. In the case of Refrigerants R-12 and R-134a, data may be extrapolated a maximum of 25°F [14°C] below the lowest test point in order to obtain a rating at -40°F [-40°C] evaporator dew point temperature.

5.3 *Superheat Change*. Every published capacity rating shall be based on the capacity resulting from a superheat change above the Static Superheat. This superheat change shall not exceed 7°F [4°C] for any Published Rating unless clearly designated.

5.4 *Static Superheat*. For purposes of rating, the Static Superheat shall be no less than 2°F [1°C].

5.5 Tolerance. To comply with this standard, published capacity ratings shall be based on data obtained in accordance with the provisions of this section, and shall be such that any production Thermostatic Refrigerant Expansion Valve selected at random and tested shall produce not less than 95% of its published rated capacity.

Table 1. Standard Rating Conditions						
Standard Rating Condition	Liquid Temperature (at expansion valve inlet)		Saturated Condensing Temperature (at expansion valve inlet)		Saturated Evaporating Temperature (at expansion valve outlet)	
	°F	°C	°F	°C	°F	°C
A	98	37	100	38	40	4.4
B	98	37	100	38	20	-6.7
C	98	37	100	38	-10	-23
D	98	37	100	38	-40	-40

Section 6. Minimum Data Requirements for Published Ratings

6.1 Minimum Data Requirements for Published Ratings. As a minimum, Published Ratings shall include all Standard Ratings. All claims to ratings within the scope of this standard shall include the statement “Rated in accordance with AHRI Standard 750”. All claims to ratings outside the scope of this standard shall include the statement “Outside the scope of AHRI Standard 750”. Wherever Application Ratings are published or printed, they shall include a statement of the conditions at which the ratings apply.

6.2 Published Capacity Ratings. Capacity ratings for net refrigerant capacity, Btu/h [W] or tons of refrigeration [kW], shall be published along with at least the following pertinent operating conditions:

- Refrigerant designation(s) per ANSI/ASHRAE Standard 34 with Addenda
- Evaporator dew point temperature, °F [°C]
- Pressure drop across the valve, psi [kPa]
- Maximum superheat change from set point at which ratings apply, °F [°C]
- Capacity correction factors for liquid temperatures at the valve inlet which differ from the standard value of 98°F [37°C]. (These include corrections for liquid density and refrigerating effect and are based on an average evaporator temperature of 0.0°F [-18°C]).

Section 7. Marking and Nameplate Data

7.1 Nameplate Data. Each Thermostatic Refrigerant Expansion Valve shall display the manufacturer's name or trade name, model number, and refrigerant designation(s).

Section 8. Conformance Conditions

8.1 Conformance. While conformance with this standard is voluntary, conformance shall not be claimed or implied for products or equipment within the standard's *Purpose* (Section 1) and *Scope* (Section 2) unless such product claims meet all of the requirements of the standard and all of the testing and rating requirements are measured and reported in complete compliance with the standard. Any product that has not met all the requirements of the standard shall not reference, state, or acknowledge the standard in any written, oral, or electronic communication.

APPENDIX A. REFERENCES - NORMATIVE

A1 Listed here are all standards, handbooks and other publications essential to the formation and implementation of the standard. All references in this appendix are considered as part of the standard.

A1.1 ANSI/ASHRAE Standard 17-1998 (RA 2003), *Methods of Testing for Capacity Rating of Thermostatic Refrigerant Expansion Valves*, 2003, American National Standards Institute/American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036, U.S.A./1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

A1.2 ANSI/ASHRAE Standard 34-2004 with Addenda, *Designation and Safety Classification of Refrigerants*, 2004, American National Standards Institute/American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036, U.S.A./1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

A1.3 *ASHRAE Terminology of Heating, Ventilation, Air Conditioning and Refrigeration*, Second Edition, 1991, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

APPENDIX B. REFERENCES - INFORMATIVE

B1 Listed here are standards, handbooks and other publications which may provide useful information and background but are not considered essential. References in this appendix are not considered part of the standard.

B1.1 ARI Guideline N-2002, *Assignment of Refrigerant Container Colors*, 2002, Air-Conditioning and Refrigeration Institute, 4100 North Fairfax Drive, Suite 200, Arlington, VA 22203, U.S.A.

APPENDIX C. RECOMMENDED MAXIMUM OPERATING PRESSURES FOR PRESSURE-LIMITING TYPE THERMOSTATIC REFRIGERANT EXPANSION VALVES - INFORMATIVE

Table C1. Recommended Maximum Operating Pressures for Pressure-Limiting Type Thermostatic Refrigerant Expansion Valves						
Refrigerant	Air-Conditioning		Commercial Refrigeration Medium Temperature		Commercial Refrigeration Low Temperature	
	psig	kPa (gage)	psig	kPa (gage)	psig	kPa (gage)
R-12	55	380	35	240	10	70
R-22	100	690	65	450	25	170
R-134a	55	380	35	240	10	70
R-404A	120	830	80	550	30	210
R-407C	100	690	65	450	25	170
R-410A	170	1170	115	790	50	340
R-502	110	760	75	520	30	210
R-507A	120	830	80	550	30	210
NOTE: These are approximate system values. They are subject to the valve manufacturers' tolerances and to variations in systems.						

APPENDIX D. RECOMMENDED COLOR CODING FOR VALVE IDENTIFICATION BY REFRIGERANT - INFORMATIVE

Table D1. Recommended Color Coding for Valve Identification by Refrigerant		
Refrigerant	Color	*PMS Number
R-12	White	none
R-22	Light Green	352
R-134a	Light Blue	2975
R-404A	Orange	021
R-407C	Medium Brown	471
R-410A	Rose	507
R-502	Light Purple	251
R-507A	Blue Green (Teal)	326
<p>*Denotes Pantone Matching System</p> <p>NOTE: Producers and wholesalers of refrigerants use a color coding system which may differ from that above. Therefore, <i>dependence should not be placed</i> solely on the color code as a means of identifying the refrigerant (see AHRI Guideline N).</p>		

APPENDIX E. RECOMMENDED STANDARD CONNECTION SIZES - INFORMATIVE

Table E1a. Recommended Standard Connection Sizes - IP Nominal			
Capacity		Nominal Connection Size, ODF	
R-12, R-134a, R-404A, R-502, & R-507A	R-22, R-407C, R-410A	Inlet	Outlet
Tons	Tons	in	in
0.50	1.0	1/4	1/2
2.0	3.0	3/8	1/2
3.0	5.0	1/2	5/8
7.5	10	5/8	7/8
10	16	7/8	1-1/8
20	20	7/8	1-1/8
30	30	1-1/8	1-3/8
50	50	1-1/8	1-3/8
70	70	1-1/8	1-3/8
80	80	1-1/8	1-3/8
100	100	1-1/8	1-3/8
NOTE: For capacities which fall between those listed, the larger connection size is the recommended standard.			

Table E1b. Recommended Standard Connection Sizes - SI Nominal			
Capacity		Nominal Connection Size, ODF	
R-12, R-134a, R-404A, R-502, & R-507A	R-22, R-407C, R-410A	Inlet	Outlet
kW	kW	mm	mm
1.8	3.5	6	12
7.0	11	10	12
11	18	12	16
26	35	16	22
35	56	22	28
70	70	22	28
110	110	28	35
180	180	28	35
250	250	28	35
280	280	28	35
350	350	28	35
NOTE: For capacities which fall between those listed, the larger connection size is the recommended standard.			