

**AHRI Standard 1371 (SI)**

**2017 Standard for  
Performance Rating of  
Electronic Expansion Valves**



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IMPORTANT

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AHRI does not set safety standards and does not certify or guarantee the safety of any products, components or systems designed, tested, rated, installed or operated in accordance with this standard/guideline. It is strongly recommended that products be designed, constructed, assembled, installed and operated in accordance with nationally recognized safety standards and code requirements appropriate for products covered by this standard/guideline.

AHRI uses its best efforts to develop standards/guidelines employing state-of-the-art and accepted industry practices. AHRI does not certify or guarantee that any test conducted under its standards/guidelines will be non-hazardous or free from risk.

**Note:**

This is a new standard.

For I-P ratings, see AHRI Standard 1370 (I-P)-2017.

## TABLE OF CONTENTS

SECTION	PAGE
Section 1. Purpose.....	1
Section 2. Scope.....	1
Section 3. Definitions.....	1
Section 4. Test Requirements .....	2
Section 5. Rating Requirements.....	2
Section 6. Minimum Data Requirements for Published Ratings .....	2
Section 7. Marking and Nameplate Data .....	3
Section 8. Conformance Conditions .....	3

## TABLES

Table 1. Standard Rating Conditions .....	2
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## APPENDICES

Appendix A. References - Normative .....	4
Appendix B. References - Informative.....	4
Appendix C. Recommended Standard Connection Sizes - Informative .....	5

## TABLES FOR APPENDICES

Table C1. Recommended Standard Connection Sizes .....	5
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# PERFORMANCE RATING OF ELECTRONIC EXPANSION VALVES

## Section 1. Purpose

**1.1 Purpose.** The purpose of this standard is to establish for Electronic 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 Electronic Expansion Valves for use with refrigerants listed in Section 2.1.1 at evaporator temperatures between 10 °C and -40 °C.

**2.1.1 Refrigerants.** The type of refrigerants included in this standard are: CO<sub>2</sub>, hydrofluoroolefins (HFOs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), hydrocarbons (HCs), and perfluorocarbons (PFCs).

## Section 3. Definitions

All terms in this document shall follow the standard industry definitions in the *ASHRAE Terminology website* (<https://www.ashrae.org/resources--publications/free-resources/ashrae-terminology>), unless otherwise defined in this section.

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

**3.1.1** Liquid refrigerant temperature at the valve inlet, °C

**3.1.2** Saturated evaporator temperature, °C

**3.1.3** Pressure Drop Across the Valve, kPa

**3.2 Electronic Expansion Valve.** An electrically driven device which regulates the flow of volatile refrigerant into an evaporator of a refrigeration system.

**3.3 Pressure Drop Across the Valve.** The net pressure difference between the valve inlet and outlet.

**3.4 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.

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

**3.4.2 Standard Rating.** A rating based on tests performed at Standard Rating Conditions.

**3.5 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.

**3.5.1 Standard Rating Conditions.** Rating Conditions used as the basis of comparison for performance characteristics.

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

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

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

**3.7** *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.* Electronic expansion valve Published Ratings shall be verified by tests conducted in accordance with the test procedure outlined in ANSI/ASHRAE Standard 17, except that the temperature bath call-out in Section 8.1.1 of ANSI/ASHRAE Standard 17 shall be disregarded for products covered by this standard and the Electronic Expansion Valve shall be placed in the full open position.

**4.1.1** Alternative flow test methods may be used, provided the results obtained can be confirmed by the test method specified in Section 4.1 within the tolerance specified in Section 5.2.

**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 Electronic 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.* The Standard Rating is the equivalent capacity rating of the valve at the maximum capacity rating as stated in Standard Rating Condition A in Table 1.

**5.1.2** *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 shall be accompanied by the pertinent Standard Rating(s) clearly designated as such.

**5.2** *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 Electronic Expansion Valve selected at random and tested shall produce not less than 95% of its published rated capacity.

**Table 1. Standard Rating Conditions<sup>1</sup>**

Standard Rating Condition	Liquid Temperature (at expansion valve inlet), °C	Saturated Condensing Temperature (at expansion valve inlet), °C	Saturated Evaporating Temperature (at expansion valve outlet), °C
A	37	38	4
Notes:			
1. For recommended standard connection sizes, refer to Appendix C of this standard.			

**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 1371 (SI)". All claims to ratings outside the scope of this standard shall include the statement "Outside the scope of AHRI Standard 1371 (SI)." 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, W or kW of refrigeration, shall be published along with at least the following pertinent operating conditions:

- 6.2.1** Refrigerant designation(s) per ANSI/ASHRAE Standard 34.
- 6.2.2** Evaporator dew point temperature, °C.
- 6.2.3** Pressure Drop across the valve, kPa.
- 6.2.4** Capacity correction factors for liquid temperatures at the valve inlet which differ from the standard value of 37 °C. These correction factors shall be calculated based on values from NIST REFPROP (Database 23) refrigerant properties.

Note: These include corrections for liquid density and refrigerating effect and are based on an average evaporator temperature of -18 °C.

## **Section 7. Marking and Nameplate Data**

**7.1** *Nameplate Data.* Each Electronic Expansion Valve shall display the manufacturer's name or trade name, and model number.

## **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 17-2015, *Method of Testing Capacity of Thermostatic Refrigerant Expansion Valves*, 2015, ASHRAE, 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

**A1.2** ANSI/ASHRAE Standard 34-2016 with Addenda, *Designation and Safety Classification of Refrigerants*, 2016, ASHRAE, 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

**A1.3** *ASHRAE, Terminology*, <https://www.ashrae.org/resources--publications/free-resources/ashrae-terminology>, 2017, ASHRAE, 1791 Tullie Circle, N.E., Atlanta, GA 30329, U.S.A.

**A1.4** REFPROP Reference Fluid Thermodynamic and Transport Properties NIST Standard Reference Database 23 Version 9.1, 2013, U.S. Department of Commerce, Technology Administration, National Institute of Standards and Technology, Standard Reference Data Program, Gaithersburg, Maryland 20899, 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.

None.

## APPENDIX C. RECOMMENDED STANDARD CONNECTION SIZES - INFORMATIVE

<b>Table C1. Recommended Standard Connection Sizes<sup>1</sup></b>			
Capacity, kW		Nominal Connection Size (ODF <sup>2</sup> )	
R-134a, R-407A, R-404A, R-507A & R-600a	R-22, R-290, R- 407C, R-410A,	Inlet mm	Outlet mm
1.8	3.5	6	12
7.0	11	10	12
11.0	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

Notes:

1. For capacities which fall between those listed, the larger connection size is the recommended standard. For capacities greater than 350 kW, connection size is application specific.
2. ODF is defined as Outside Diameter Female.