ANSI/AHRI Standard 771-2020 (SI)

2020 Standard for

Performance Rating of Refrigerant Pressure Regulating Valves

Approved by ANSI on 8 June 2023

we make life better®

2311 Wilson Boulevard, Suite 400
Arlington, VA 22201, USA
www.ahrinet.org
PH 703.524.8800
FX 703.562.1942

IMPORTANT

SAFETY DISCLAIMER

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 tests conducted under its standards/guidelines will be non-hazardous or free from risk

ICS Code: 27.200

Note:

This standard supersedes AHRI Standard 771-2014 (SI)

For I-P ratings, see ANSI/AHRI Standard 770-2020 (I-P).

This standard was approved as an American National Standard (ANS) on 8 June 2023.

AHRI CERTIFICATION PROGRAM DISCLAIMER

AHRI Standards are developed independently of AHRI Certification activities and can have scopes that include products that are not part of the AHRI Certification Program. The scope of the applicable AHRI Certification Program can be found on AHRI's website at http://www.ahrinet.org.

TABLE OF CONTENTS

PAGE

SECTIONS

TABLES

APPENDICES

PERFORMANCE RATING OF REFRIGERANT PRESSURE REGULATING VALVES

Section 1. Purpose

1.1 *Purpose*. The purpose of this standard is to establish for Refrigerant Pressure Regulating 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 Refrigerant Pressure Regulating Valves controlling volatile refrigerant flow that primarily respond to pressure. The types of Refrigerant Pressure Regulating Valves are those that are responsive to inlet, to outlet, or to differential pressures sensed locally or remotely.

2.2 *Exclusions*. Excluded from this standard are thermostatic expansion valves covered under AHRI Standard 751 and electronic expansion valves covered under AHRI Standard 1371.

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 *Bubble Point*. Refrigerant liquid saturation temperature at a specified pressure.

3.2 *Dew Point*. Refrigerant vapor saturation temperature at a specified pressure.

3.3 *Gradient*. The change in controlled pressure required to move the refrigerant pressure regulating Valve Closure Member from its opening point to its standard rated capacity, expressed in kPa. In some types of pilot-operated controllers, the Gradient could be essentially zero.

3.4 *Pressure Drop*. The pressure difference between the refrigerant pressure regulating valve inlet and the refrigerant pressure regulating valve outlet, with the main port (orifice) open, expressed in kPa

3.5 *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. As used herein, 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.

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

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

3.6 *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.

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

3.7 *Refrigerant Pressure Regulating Valve*. A self or pilot-operated controller in which the energy to position the Valve Closure Member is provided by the pressure of the controlled refrigerant, sensed locally or remotely.

3.7.1 *Valve Closure Member. The part of a valve which is positioned to close, open or modulate the flow through the valve port(s).*

3.8 *Refrigerant Pressure Regulating Valve Capacity*. The capacity of a fluid flowing through the Refrigerant Pressure Regulating Valve equated to KW of refrigeration at the specified conditions.

3.9 *Set Point*. A predetermined pressure or pressure differential which the Refrigerant Pressure Regulating Valve is set to maintain, expressed in kPa.

3.10 *"Shall" or "Should."* "Shall" or "should" are interpreted as follows:

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

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

3.11 *Volatile Refrigerant*. A fluid used for heat transfer in a refrigerating system which absorbs heat at a low temperature and low pressure of the fluid and transfers heat at a higher temperature and a higher pressure of the fluid, usually involving changes of state of the fluid.

Section 4. Test Requirements

4.1 *Capacity Tests*. All refrigerant pressure regulating valve capacity tests shall be in accordance with the test procedure defined in ANSI/ASHRAE Standard 158.2.

Section 5. Rating Requirements

5.1 *Rating Requirements*. Published Ratings for capacity shall consist of Standard Ratings and may include Application Ratings. The AHRI Standard Ratings of Refrigerant Pressure Regulating Valve Capacity shall be stated in KW of refrigeration at the conditions specified in Section 5.2.

5.2 *Standard Rating Conditions*. Refrigerant Pressure Regulating Valve Rating Conditions are defined in Table 1.

Table 1. Standard Rating Conditions[1]	
System Conditions	
Saturated Condensing (Bubble Point) Temperature, °C	38.0
Liquid Service Temperature, °C	38.0
Expansion Point Enthalpy, h_f,, based on: • Saturated liquid temperature, °C • Subcooling, °C	 38.0 -18.0
Enthalpy of the Refrigerant Suction Gas, h_g, based on: • Evaporator Outlet Temperature, °C	 4.5
Discharge Gas Temperature based on isotropic compression at: • Return Gas Temperature, °C • Saturated liquid condensing (Bubble Point) temperature, °C • Added approximation of polytropic refrigerant compression process, °C	 18.0 38.0 10.0
Valve Entrance Conditions	
Discharge Gas Pressure Regulator	Discharge gas temperature and pressure as defined above in discharge gas temperature service condition.
Suction Gas Regulator Vapor Pressure: • Dew Point Temperature, °C • Superheat, °C	 4.5 14.0
Note: 1. Head pressure regulator and holdback valve ratings are application ratings at manufacturer's published conditions.	

5.3 *Gradient*. Every published capacity rating shall be based on the capacity resulting from a pressure change above or below the Set Point where applicable. The maximum pressure change upon which the rating is based shall be clearly designated. Note that this does not apply to motorized valves.

5.4 *Application Rating*. Application Ratings give performance data at operating conditions other than those given above. Application Ratings shall contain all information shown in Section 6.2. Published Ratings shall be subject to the tolerances of this standard.

5.5 *Tolerances*. To comply with this standard, measured test results shall not be less than 95% of the Published Rating.

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 771 (SI)." All claims to ratings outside the scope of this standard shall include the statement "Outside the scope of AHRI Standard 771 (SI)." Wherever Application Ratings are published or printed, they shall include a statement of the conditions at which the ratings apply.

6.2 *Published Ratings*. Published Ratings shall include the following information:

6.2.1 *Set Point adjustment range, kPa*

6.2.2 *Refrigerant designation(s), in accordance with ANSI/ASHRAE Standard 34*

6.2.3 *Fluid state (liquid or gas)*

6.2.4 *Capacity at Standard Rating Conditions, KW*

6.2.5 *Pressure Drop across valve (at Standard Rating Conditions), kPa*

6.2.6 *Gradient at rated conditions, kPa*

6.2.7 *Model designation*

6.2.8 *Line connection sizes, mm*

6.2.9 *Line connection type(s)*

6.2.10 *Manufacturer's name and address*

Section 7. Marking and Nameplate Data

7.1 *Marking and Nameplate Data*. As a minimum, each Refrigerant Pressure Regulating Valve shall be marked with the following information:

7.1.1 *The manufacturer's name or trade name*

7.1.2 *Model designation*

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 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. AHRI Standard 751 (SI)-2016, Performance Rating of Thermostatic Refrigerant Expansion Valves, 2016, Air-Conditioning. Heating and Refrigeration Institute, 2311 Wilson Boulevard, Suite 400, Arlington, VA 22201, U.S.A.

A1.2. AHRI Standard 1371 (SI)-2017, Performance Rating of Electronic Expansion Valves, 2017, Air-Conditioning. Heating and Refrigeration Institute, 2311 Wilson Boulevard, Suite 400, Arlington, VA 22201, U.S.A.

A1.3. ANSI/ASHRAE Standard 34-2020 with Addenda, Designation and Safety Classification of Refrigerants, 2020, American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

A1.4. ANSI/ASHRAE Standard 158.2-2018 Methods of Testing Capacity of Refrigerant Pressure Regulators, 2018, American National Standards Institute/American Society of Heating, Refrigeration, and Air-Conditioning Engineers, Inc., 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

A1.5. *ASHRAE Terminology*, https://www.ashrae.org/technical-resources/free-resources/ashrae-terminology, 2020, 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. ANSI/ASHRAE Standard 41.1-2020 Standard Method for Temperature Measurement, 2020, American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

B1.2. ANSI/ASHRAE Standard 41.3-2014, Standard Method for Pressure Measurement, 2014, American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

B1.3. *ASHRAE Handbook - Fundamentals*, 2020, American Society of Heating Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

B1.4. *ASHRAE Handbook - HVAC Systems and Equipment*, 2020, American Society of Heating Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

B1.5. *ASHRAE Refrigerant Line Sizing RP185*, 1982, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

B1.6. ASME *Fluid Meters Their Theory and Application*, Sixth Edition, 1971, ASME International, Three Park Avenue, New York, NY 10016, U.S.A.

B1.7. *Flow Characteristics of Solenoid Valves - Report No. 3 – Final Report*, dated January 1970, a thesis submitted by George T. Kartsounes to the Faculty of Purdue University, West Lafayette, IN 47907-1077, U.S.A.