



STANDARD

ANSI/ASHRAE Standard 158.1-2019
(Supersedes ANSI/ASHRAE Standard 158.1-2012)

Methods of Testing Capacity of Refrigerant Solenoid Valves

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NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE website at www.ashrae.org/technology.

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FOREWORD

ANSI/ASHRAE Standard 158.1 provides a standard method of test for the capacity of refrigerant solenoid valves. ANSI/AHRI Standard 760 (I-P), Performance Rating of Solenoid Valves for Use With Volatile Refrigerants, and ANSI/AHRI Standard 761 (SI) Performance Rating of Solenoid Valves for Use With Volatile Refrigerants, require this standard be used as a method of test for capacity. It is further anticipated that AHRI will continue to maintain Standard 760/761 as it relates to standard methods of rating refrigerant service solenoid valves. AHRI Standard 760/761 may also include information concerning other solenoid valve performance characteristics.

The basis for the method of test and the calculation of capacity for flow through solenoid valves is AHRI-sponsored research project PRF 5233, performed at Ray W. Herrick Laboratories, Purdue University, West Lafayette, Indiana. This research followed a study performed at Herrick Laboratories, under the auspice of AHRI, by R.T. McKenzie, J.B. Chaddock, and W.E. Fontaine between September 1963 and September 1966.

This standard provides a means of accurately measuring the refrigerant mass flow capacity of solenoid valves. The flow capacity may be expressed in terms of refrigerating effect with various refrigerants by performing simple thermodynamic computations. Examples of the computations necessary to express valve capacity in kilowatts (tons) or other appropriate units are included in Informative Appendix B of this standard.

ANSI/ASHRAE Standard 15, Safety Standard for Refrigeration Systems, and ANSI/ASHRAE Standard 34, Designation and Safety Classification of Refrigerants, list the various refrigerants to which this standard is applicable.

1. PURPOSE

This standard prescribes a method of testing the capacity of refrigerant solenoid valves for use in refrigerating systems.

2. SCOPE

2.1 This standard is applicable to refrigerant solenoid valves in the following circumstances:

- As defined in Section 3, "Definitions"
- For either liquid or vapor refrigerant applications
- For use with refrigerants deemed available and suitable according to ANSI/ASHRAE Standard 15, *Safety Standard for Refrigeration Systems*¹, and ANSI/ASHRAE Standard 34², *Designation and Safety Classification of Refrigerants*

2.2 This standard specifies procedures, apparatus, and instrumentation that will produce accurate capacity data.

2.3 This standard does not do the following:

- Specify rating conditions or electrical or mechanical design requirements (Rating conditions may be found in ANSI/AHRI Standard 760, *Performance Rating of Solenoid Valves for Use with Volatile Refrigerants*³, for I-P units, or ANSI/AHRI Standard 761, *Performance Rating of Solenoid Valves for Use with Volatile Refrigerants*⁴, for SI units.)
- Make recommendations for safety
- Specify tests for production, specification compliance, or field testing of solenoid valves

3. DEFINITIONS

capacity: the mass flow rate of a selected refrigerant that will pass through the valve under test at specified conditions.

certified standard instrument: an instrument that is calibrated by the manufacturer or other reliable agency and is certified traceable to the National Institute for Standards and Technology (NIST).

direct-operated solenoid valve: a valve in which the solenoid functions to directly open and close the main valve port, which is the only flow path in the valve.

equilibrium temperature (maximum attained temperature): temperature in the solenoid coil that is reached when the resistance bridge meter reading ceases to rise.

flowmeter: a device for determining the mass flow rate through the valve under test.

pilot-operated solenoid valve: a valve in which the solenoid functions to directly open and close a relatively small (pilot) flow port. Flow through the pilot port parallels the flow path of the main port. Starting or stopping flow through the pilot port creates a pressure imbalance on the main valve member, thereby causing the main valve port to be opened or closed.

refrigerant solenoid valve: a two-way (i.e., one inlet and one outlet), two-position (i.e., open or closed) valve that is actuated by a solenoid and is suitable for use with any of the refrigerant fluids designated in Section 2.1(c). It may be pilot or direct operated.

"shall," "should," "recommended," and "it is recommended" shall be interpreted as follows:

shall and **shall not** are used to indicate that a provision is mandatory if compliance with the standard is claimed.

should, **recommended**, and **it is recommended** are used to indicate provisions that are not mandatory but that are desirable as good practice.

4. INSTRUMENTATION

4.1 **General.** Instruments shall have the accuracies listed in this standard and shall be certified standard instruments.

4.2 Temperature Measuring Instruments

4.2.1 Temperature shall be measured with any device meeting the requirements of ANSI/ASHRAE Standard 41.1, *Standard Method of Temperature Measurement*⁵.

4.2.2 The accuracy of temperature measuring instruments shall be within $\pm 0.28^{\circ}\text{C}$ (0.5°F).