

**ANSI/ASHRAE Standard 158.2-2011**  
**(Supersedes ANSI/ASHRAE Standard 158.2-2006)**



# ASHRAE STANDARD

## Methods of Testing Capacity of Refrigerant Pressure Regulators

Approved by the ASHRAE Standards Committee on June 25, 2011; by the ASHRAE Board of Directors on June 29, 2011; and by the American National Standards Institute on June 30, 2011.

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#### NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE Web site at [www.ashrae.org/technology](http://www.ashrae.org/technology).

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## FOREWORD

*This standard was written at the request of the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) to provide a standard method of test for the capacity of refrigerant pressure regulators. AHRI Standard 770, Refrigerant Pressure Regulating Valves, requires that this standard be used as a method of test for capacity. AHRI will continue to maintain Standard 770 as it relates to standard methods of rating refrigerant service pressure regulators. Standard 770 may also include information concerning other refrigerant pressure regulator performance characteristics.*

*The basis for the method of testing and calculation of capacity for flow through regulators is a research project (PRF 5233) performed at the Ray W. Herrick Laboratories, Purdue University, Lafayette, Indiana, and sponsored by AHRI. This research followed a study performed at Herrick Laboratories, under AHRI auspices, 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 regulators. 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 regulator capacity in kW (tons) or other appropriate units are included in Informative Annex B of this standard for the user's convenience.*

## 1. PURPOSE

This standard provides methods of determining the mass flow capacity of refrigerant pressure regulators with sufficient accuracy to facilitate proper engineering application of the device in systems operating at various conditions with various refrigerants by

- a. prescribing a method of measuring key flow and gradient characteristics of refrigerant pressure regulators using air or water as the working fluid and
- b. prescribing computational means to enable reliable prediction of refrigerant vapor and liquid mass flow capacity based on the measured flow and gradient characteristics.

## 2. SCOPE

**2.1** This standard applies to refrigerant pressure regulators that meet the definition found in Section 3 and that are intended for refrigerant service in applications where only single-phase flow occurs within the regulator.

**2.2** This standard is applicable to refrigerant pressure regulators in the following circumstances:

- a. for use in either liquid or vapor refrigerant applications and
- b. for use with refrigerants deemed suitable according to *ANSI/ASHRAE Standard 15, Safety Standard for Refrigeration Systems*<sup>1</sup> and *ANSI/ASHRAE Standard 34, Designation and Safety Classification of Refrigerants*.<sup>2</sup>

**2.3** This standard specifies procedures, apparatus, and instrumentation that will produce capacity and gradient information with sufficient accuracy to support the proper application of the tested regulator.

**2.4** This standard does not do the following:

- a. specify rating conditions or electrical or mechanical design requirements (rating conditions may be found in *AHRI Standard 770, Refrigerant Pressure Regulating Valves*<sup>3</sup>),
- b. make recommendations for safety, or
- c. specify tests for production, specification compliance, or field testing of regulators.

## 3. DEFINITIONS AND SYMBOLS

### 3.1 Definitions

**capacity:** the mass flow rate of a selected refrigerant that will pass through the regulator at specified conditions.

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

**controlled parameter:** as used in this standard, this term refers to the system pressure that is regulated by the regulator under test.

**controlled parameter change (CPC):** the difference between the setpoint and the regulated pressure when the regulator is operating at a specified capacity.<sup>4</sup> (See Figure A-1 in Informative Annex A.)

**direct-operated pressure regulator:** a throttling valve of any size that responds directly to changes in its regulated pressure. A change in regulated pressure (CPC) provides all the work necessary to position the closure member of the valve.

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

**gradient:** the change in regulated pressure (controlled parameter) required to cause the closure member of a refrigerant pressure regulator to move from its opening point (setpoint) to a specified flow capacity.<sup>4</sup>

**pilot-operated pressure regulator:** a relatively large throttling valve in which a smaller direct-operated pressure regulator (i.e., a pressure pilot) senses and responds to changes in the regulated pressure by producing a pressure that is intermediate between the large valve's inlet and outlet pressures. The intermediate pressure is applied to an area (i.e., a piston or a