



STANDARD

ANSI/ASHRAE Standard 23.2-2019
(Supersedes ANSI/ASHRAE Standard 23.2-2014)

Methods of Test for Rating the Performance of Positive Displacement Compressors that Operate at Supercritical Pressures of the Refrigerants

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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

ASHRAE Standard 23.2 provides methods of test for rating the performance of positive displacement compressors and compressor units that operate at supercritical pressures of the refrigerant. It is written in compliance with ASHRAE's mandatory language requirements.

This standard does not apply to the performance testing of positive displacement compressors that operate at supercritical pressures of the refrigerant (for example, compressors that operate on CO₂).

1. PURPOSE

This standard prescribes methods for performance testing positive displacement refrigerant compressors and compressor units that operate at supercritical pressures of the refrigerant.

2. SCOPE

2.1 This standard applies to methods for performance testing single-stage and multistage positive displacement refrigerant compressors and condensing units that operate at discharge pressures greater than the critical pressure of the refrigerant.

2.2 This standard applies to compressors and condensing units that either (a) do not have intermediate cooling or refrigerant injection or (b) do have intermediate cooling or refrigerant injection and the power required for intermediate cooling or refrigerant injection, if any, is included in the measured total input power to the compressor or condensing unit.

3. DEFINITIONS

The following definitions apply to the terms used in this standard.

accuracy: the degree of conformity of an indicated value to the corresponding true value.

bubble-point temperature: a liquid-vapor equilibrium point for a pure liquid or for a multicomponent mixture of miscible, pure component liquids, in the absence of noncondensables, where the temperature of the mixture at a defined pressure is the minimum temperature required for a vapor bubble to form in the liquid.

calorimeter: a thermally insulated apparatus containing a heat exchanger that is used to determine the mass flow rate of a refrigerant by measuring the heat input/output that will result in a corresponding enthalpy change for the refrigerant.

capacity: the rate of heat removal by the refrigerant used in the compressor or compressor unit in a refrigerating system. This rate equals the product of the refrigerant mass flow rate and the difference in the specific enthalpies of the refrigerant

vapor at its thermodynamic state entering the compressor or compressor unit and refrigerant liquid at the thermodynamic state entering the expansion device.

compressor: see *positive displacement refrigerant compressor*.

compressor or compressor unit efficiency (isentropic efficiency): the ratio of the work absorbed for compressing a unit mass of refrigerant entering the stage of the compressor or compressor unit to the work absorbed for compressing the same unit mass of refrigerant by isentropic compression within the stage.

compressor unit: one or more positive displacement compressors and motors with ancillaries. (**Informative Note:** Ancillaries might include fans, liquid receivers, heat exchangers, strainers, service valves, check valves, suction filters, lubricant separators, motor starters, unloaders, and variable-capacity controls, as supplied or specified by the manufacturer.)

confirming test: an independent and simultaneous test performed to validate the primary test results (compare to *primary test*). Compressor or compressor unit ratings are determined from the primary test results.

cooling liquid flow rate: the total mass flow rate of liquid required for all cooling purposes in a compressor or compressor unit.

dew-point temperature: a vapor-liquid equilibrium point for a pure liquid or for a multicomponent mixture of miscible, pure components, in the absence of noncondensables, where the temperature of the mixture at a defined pressure is the maximum temperature required for a liquid drop to form in the vapor.

economizer: a heat exchanger or flash tank that is used to reduce enthalpy entering the evaporator via refrigerant flow to a compressor at intermediate pressure.

energy efficiency ratio (EER): a dimensional ratio of the cooling capacity (Btu/h) to the power input (W).

error: the difference between the test result and its corresponding true value.

flowmeter: a device employing a detecting element that determines the flow rate of a refrigerant in the gaseous, liquid, or supercritical phase within a closed conduit by measuring a response of the detecting element.

hermetic compressor: a compressor assembly containing a motor within a gas-tight housing that is permanently sealed by welding or brazing with no access for servicing internal parts in the field.

intermediate cooling: a method of using a heat exchanger to (a) cool the compressor mechanism or lubricant or (b) cool the refrigerant to reduce discharge temperature. The heat exchanger component of the intermediate cooling means is integral to the compressor. The intermediate cooling thermal load is not taken into account in the calculations of isentropic efficiency, compressor or compressor unit capacity, or volumetric efficiency.

liquid injection: a method of (a) internally cooling the compressor mechanism or lubricant or (b) reducing discharge