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ANSI/ASHRAE Standard 41.9-2025
Standard Methods for Refrigerant Mass Flow Measurements Using Calorimeters

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Preview

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

This 2025 revision of Standard 41.9 makes it easier for higher-tier ASHRAE standards to adopt this standard by reference, updates the uncertainty requirements, and updates the steady-state criteria sections. This revision meets ASHRAE's mandatory language requirements.

1. PURPOSE

This standard prescribes methods for measuring mass flow rates for refrigerants and refrigerant/lubricant mixtures using calorimeters.

2. SCOPE

2.1 This standard applies to measuring mass flow rates for refrigerants and refrigerant/lubricant mixtures using calorimeters in laboratories.

2.2 This standard applies where the entire flow stream of the refrigerant or the refrigerant/lubricant mixture enters the calorimeter as a subcooled liquid and leaves as a superheated vapor (evaporator type).

2.3 This standard applies where the entire flow stream of the refrigerant or the refrigerant/lubricant mixture enters the calorimeter as a superheated vapor and leaves as a subcooled liquid (condenser type).

3. DEFINITIONS

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

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

calorimeter: a thermally insulated apparatus containing a heat exchanger that determines refrigerant mass flow rate by measuring the heat input/output that will result in a known enthalpy change for the refrigerant.

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

lubricant circulation rate: the ratio of the mass of lubricant circulating through a refrigerant system to the total mass of refrigerant and lubricant flowing through the system at a specified set of operating conditions.

measurement system: the instruments, signal conditioning systems (if any), and data acquisition system (if any).

operating tolerance limit: the upper or lower value of an operating tolerance that is associated with a test point or a targeted set point.

post-test uncertainty: an analysis to establish the uncertainty of a test result after conducting the test.

pretest uncertainty: an analysis to establish the expected uncertainty for a test result before conducting the test.

random error: the portion of the total error that varies randomly in repeated measurements of the true value throughout a test process.

refrigerant mass flow rate: the mass flow rate of refrigerant potentially mixed with lubricant.

secondary fluid: a fluid of known properties that is used as a heating or cooling medium.

secondary refrigerant: a refrigerant of known properties that is used as a heating medium.

steady-state criteria: the criteria that establish negligible change of refrigerant mass flow with time.

subcooling: at a defined pressure, the difference between a given liquid temperature and the bubble-point temperature.

superheat: at a defined pressure, the difference between a given vapor temperature and the dew-point temperature.

systematic error: the portion of the total error that remains constant in repeated measurements of the true value throughout a test process.

targeted set point: a specific set of test conditions where the required refrigerant mass flow rate is known and has an associated operating tolerance.

test point: a specific set of test operating conditions for recording data where the measured required refrigerant mass flow rate is unknown and has an associated operating tolerance.

true value: the unknown, error-free value of a test result.

uncertainty: the limits of error within which the true value lies.

unit under test (UUT): a compressor or condensing unit that is the subject of refrigerant mass flow rate measurements.

Preview