



STANDARD

ANSI/ASHRAE Standard 41.10-2020
(Supersedes ANSI/ASHRAE Standard 41.10-2013)

Standard Methods for Refrigerant Flow Measurement Using Flowmeters

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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

Selecting an appropriate refrigerant flowmeter can be a daunting task given the wide variety of operating principles, measurement precision, and costs. Once a flowmeter has been selected, the user may need to consult with the source of the meter regarding installation specifics, operating range limits, calibration limits, and other similar performance specifics in order to obtain the expected measurement accuracy.

The 2020 edition of Standard 41.10 includes updated references and new reference to ANSI/ASHRAE Standard 15, Safety Standards for Refrigerant Systems. A new appendix for informative references has also been added. Additional changes were made to improve clarity and readability. This standard complies with ASHRAE's mandatory language requirements.

1. PURPOSE

This standard prescribes methods for refrigerant mass flow rate measurement in laboratory and field applications using flowmeters. Refrigerant mass flow rate measurements are required for compressor performance tests and for testing other heating, ventilating, air-conditioning, and refrigerating systems and components. Each refrigerant mass flow rate is determined by subtracting the measured lubricant mass flow rate from the measured refrigerant/lubricant mixture mass flow rate.

2. SCOPE

2.1 This standard applies to refrigerant mass flow rate measurements in laboratory and field applications where the entire flow stream of the refrigerant enters and exits the flowmeter either as a vapor-only or liquid-only state during data recording.

2.2 This standard does not apply to

- a. gaseous refrigerant flow rate measurement for refrigerants that are not mixed with lubricant because those measurements are within the scope of ASHRAE Standard 41.7¹ or
- b. liquid refrigerant flow rate measurement for refrigerants that are not mixed with lubricant because those measurements are within the scope of ASHRAE Standard 41.8².

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.

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 or liquid phase within a closed conduit by measuring the corresponding response of the detecting element.

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.

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

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

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