CONTENTS

ANSI/ASHRAE Standard 41.10-2024
Standard Methods for Refrigerant Volumetric or Mass Flow Measurement Using Flowmeters

NOTE

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

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

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 2024 edition of Standard 41.10 includes supercritical phase refrigerant flow measurements in addition to gaseous phase and liquid phase refrigerant flow measurements, volumetric refrigerant flow measurements in addition to refrigerant mass flow measurements, updated methods for determining when steady-state operation has been achieved for data recording, changes to make it easier for higher tier standards to adopt this standard by reference, and a new uncertainty example prepared in accordance with the latest uncertainty methods. This revision of Standard 41.10-2020 meets ASHRAE's mandatory language requirements.

1. PURPOSE

This standard prescribes methods for refrigerant volumetric or mass flow rate measurement using flowmeters in laboratory and field applications. 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 the following:

a. Refrigerant volumetric or mass flow rate measurements using flowmeters in laboratory and field applications
b. Systems where the refrigerants are mixed with lubricant
c. Systems where the entire flow stream of the refrigerant in the refrigerant/lubricant mixture both enters and exits the flowmeter in a gaseous phase, liquid phase, or supercritical phase during data recording

2.2 This standard does not apply to the following:

a. Flow rate measurement of gaseous refrigerant not mixed with lubricant within the scope of ANSI/ASHRAE Standard 41.7
b. Flow rate measurement of liquid refrigerant not mixed with lubricant within the scope of ANSI/ASHRAE Standard 41.8

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 observed value of the measurand and its corresponding true value.

flowmeter: a device employing a detecting element that determines the flow rate of a refrigerant in the gaseous phase, liquid phase, or supercritical 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/lubricant mixture 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 interval 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 refrigerant mass flow rate is the refrigerant plus lubricant mass flow rate minus the lubricant mass flow rate.