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CONTENTS
ANSI/ASHRAE Standard 41.8-2023
Standard Methods for Liquid Flow Measurement

SECTION	PAGE
Foreword	2
1 Purpose	2
2 Scope	2
3 Definitions	2
4 Classifications	2
5 Requirements	3
6 Instruments	7
7 Liquid Flow Measurement Methods	8
8 Uncertainty Requirements	18
9 Test Report	19
10 References	20
Informative Appendix A: Informative References and Bibliography	21
Informative Appendix B: An Uncertainty Analysis Example for a Differential Pressure Flowmeter	22
Informative Appendix C: Information Regarding Liquid Flow Measurement Uncertainties for Installations That do not Meet the Flowmeter Manufacturer's Requirements	34
Informative Appendix D: Flowmeter Accuracy Comparisons	35

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

Selecting an appropriate liquid flowmeter can be a daunting task given the wide variety of operating principles, measurement precision, and costs of commercial products. Whether liquid flow measurements are to be taken in a laboratory or in the field, selecting the appropriate meter should be based on the required measurement accuracy. Once a liquid flowmeter has been selected, the user may need to consult with the meter manufacturer regarding installation specifics, operating range limits, calibration limits, and other similar specifics in order to obtain the expected measurement accuracy.

The 2023 edition of Standard 41.8 includes 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 procedures. This edition of ASHRAE Standard 41.8 meets ASHRAE's mandatory language requirements.

1. PURPOSE

This standard prescribes methods for liquid flow measurement.

2. SCOPE

This standard applies to laboratory and field liquid flow measurement for testing heating, ventilating, air-conditioning, and refrigerating systems and components. This standard is restricted to applications where the entire flowstream of liquid enters and exits the liquid flowmeter in a liquid-only state during data recording with the following exception:

a. This standard does not apply to liquid-phase refrigerant mass flow measurements where the liquid flow includes circulating lubricant. Those measurements are within the scope of ANSI/ASHRAE Standard 41.10 [1].

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.

measurement system: the instruments, signal conditioning systems, and data acquisition system.

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 prior to 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.

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

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 liquid 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 liquid 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: equipment that is subjected to liquid flow measurements.

4. CLASSIFICATIONS

4.1 Liquid Flow Measurement Applications. Liquid flow measurement applications that are within the scope of this standard shall be classified as one of the following types: