



ADDENDA

**ANSI/ASHRAE Addendum a to
ANSI/ASHRAE Standard 41.10-2020**

Standard Methods for Refrigerant Mass Flow Rate Measurements Using Flowmeters

Approved by ASHRAE and the American National Standards Institute on October 29, 2021.

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FOREWORD

The purposes of Addendum a is to (a) clearly define the steady-state criteria, (b) add requirements to the test plan to match the inputs needed to determine when steady-state operating conditions have been achieved, and (c) correct the expansion factor equation.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~striking through~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum a to Standard 41.10-2020

Add a new definition for “steady-state criteria” to Section 3 as shown.

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

Revise Section 5.1 as shown.

5.1 Test Plan. A test plan shall specify the refrigerant mass flow rate measurement system accuracy ~~and the test points to be performed.~~ Additionally, the test plan shall include the test points, targeted set points, and corresponding operating tolerances to be performed. The test plan shall be one of the following documents:

- A document provided by the person or the organization that authorized the tests and calculations to be performed.
- A method of test standard.
- A rating standard.
- A regulation or code.
- Any combination of items (a) through (d).

Modify Section 7.4.2 to correct Equation 7-5 as shown.

The dimensionless expansion factor ε for a long-radius nozzle^{10,11} shall be obtained from Equation 7-5.

$$\varepsilon = \left[r^{2/\gamma} \left(\frac{\gamma}{\gamma-1} \right) \left(\frac{1-r^{(\gamma-1)/\gamma}}{1-r} \right) \left(\frac{1-\beta^4}{1-\beta^4 r^{2/\gamma}} \right) \right]^{1/2} \quad (7-5)$$

where

r = absolute pressure ratio = $(p_2/p_1)(p_1/p_2) = [p_1/(p_1 - \Delta p)]$, dimensionless

γ = ratio of specific heat at constant pressure to specific heat at constant volume, dimensionless

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Through its *Handbook*, appropriate chapters will contain up-to-date Standards and design considerations as the material is systematically revised.

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