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ANSI/ASHRAE Standard 28-1996 (RA 2020)
Methods of Testing Flow Capacity of Refrigerant Capillary Tubes

NOTE

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FOREWORD

This is a reaffirmation of Standard 28-1996. This standard was prepared under the auspices of ASHRAE. It may be used, in whole or in part, by an association or government agency with due credit to ASHRAE. Adherence is strictly on a voluntary basis and merely in the interests of obtaining uniform guidelines throughout the industry. This 2020 reaffirmation includes no substantive changes to the standard.

1. PURPOSE

This standard provides uniform methods for laboratory testing of the flow capacity of refrigerant capillary tubes.

2. SCOPE

2.1 This standard prescribes two test methods, a traditional method and an alternative method, for determining the flow capacity of capillary tubes such as are used for refrigerant metering in refrigeration systems. Both methods use dry nitrogen and provide comparable results, but the alternative method is more convenient if electronic devices are used.

2.2 The results obtained by the prescribed procedures are indicative of the refrigerant flow characteristics of the tube but are not intended to represent the actual refrigerant flow characteristics in a refrigerating cycle.

2.3 The scope of this standard does not include specifications of tolerances on tube diameters or nitrogen flow capacity; however, acceptable variation in test results is suggested.

3. DEFINITIONS

capillary tube: tube of small bore (diameters generally ranging down to 0.50 mm [0.02 in.] ID with length over diameter ratio greater than 20) used for the simultaneous purposes of metering the refrigerant and of accomplishing the expansion process between condenser and evaporator in those refrigeration systems in which it is used.

nitrogen capacity: the volumetric flow rate, L/s (cfm), equivalent to the mass flow rate of dry nitrogen that would be passed for a specified inlet pressure if discharge had been to standard atmospheric pressure of 101.325 kPa (14.696 psi) absolute.

4. APPARATUS FOR TRADITIONAL METHOD

The arrangement of the traditional test apparatus shall be in accordance with Figure 1. The apparatus is described in terms of basic measurement devices (e.g., thermometers, pressure gages) with the understanding that more sophisticated devices can be used if they satisfy the required measurement accuracy specified in this standard.

The essential elements of the apparatus are listed below.

a. A supply of dry nitrogen (1) at a minimum pressure of 850 kPa gage (123.3 psig) and a maximum dew point of –32°C (–25.6°F).
b. A filter (2), which will remove any solid or liquid contaminants that may inadvertently be in the supply lines.
c. An adjustable regulator (3) by means of which any test pressure between 15 and 700 kPa gage (2.2 and 101.5 psig) can be maintained steadily (±5% or ±7 kPa [1 psi], whichever is smaller) during the test.
d. A tempering coil (4) (if necessary) to ensure that the nitrogen entering the test specimen is maintained at the ambient temperature of the apparatus, which shall be 21°C ± 3°C (70°F ± 5°F).
e. A temperature-measuring instrument (5) with an accuracy of ±0.3°C (0.5°F). Mounting shall ensure that the temperature-measuring device is placed in the nitrogen stream to accurately measure the temperature of the flowing nitrogen.