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ANSI/ASHRAE Standard 173-2012 (RA 2026), Method of Test to Determine the Performance of Halocarbon Refrigerant Leak Detectors

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Preview

NOTE

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

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FOREWORD

Since 1996, ASHRAE Technical Committee 3.8, Refrigerant Containment, has defined several objectives for improving refrigerant containment and leak detection. Standard 173 has gathered practitioners and highly informed experts in order to define a practical method capable of verifying how a leak detector can properly detect small and very small leak flow rates. Leak detection is necessary for all types of refrigerants and is part of the quality management of air-conditioning and refrigeration systems.

This is a reaffirmation of Standard 173-2012. 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 version of the reaffirmation has no changes.

1. PURPOSE

The purpose of this standard is to establish a method of test for qualifying the performance of portable leak detectors designed for the detection of chlorofluorocarbon (CFC), hydrochlorofluorocarbon (HCFC), hydrofluorocarbon (HFC), and perfluorocarbon (PFC) halogenated gases.

2. SCOPE

The practices and procedures in this standard cover the testing of refrigerant leak detectors intended for use in the leak testing of refrigerating, air-conditioning, and heat pump systems and their components.

3. DEFINITIONS

Although the following terms have broader interpretations elsewhere, their specific meanings as used in this standard are as follows.

background: the refrigerant in the ambient air. The ambient environment where a leak detector is used is often contaminated with some concentration of refrigerant. A leak detector can adjust to this background concentration as the new reference zero point and retain its sensitivity for leaks in a contaminated environment.

calibrated leak: a device with a defined leak rate of a given gas under defined pressure and temperature conditions. These conditions are defined upstream and downstream of the leak element. Calibrated leaks are to be traceable to National Institute of Standards and Technology (NIST) or an equivalent recognized organization.

CFC: chlorofluorocarbon; a fully halogenated (no hydrogen remaining) halocarbon containing chlorine, fluorine, and carbon atoms.

HCFC: hydrofluorocarbon; a halocarbon that contains fluorine, chlorine, carbon, and hydrogen.

HFC: hydrofluorocarbon; a halocarbon that contains only fluorine, carbon, and hydrogen.

indicating leak detector: a leak detector indicating one or several levels of concentration, but with no numerical value of these concentrations or leak rates. The concentration or leak rate is indicated to the user through a visual and/or audible means.

leak rate: gas mass flow rate through a fissure, an orifice, or any other type of leakage path. The usual leak rate units are gram per year (g/yr) or ounce per year (oz/yr).

measuring leak detector: a leak detector that measures gas concentration and displays the value of the gas concentration or leak rate in a numerical form.

PFC: perfluorocarbon; a halocarbon composed only of fluorine and carbon.

ppm(m): parts per million gas concentration of a given gas to the total mass of the gas mixture. The units are in a "mass per mass" ratio.

ppm(V): parts per million gas concentration of a given gas to the total volume of the gas mixture. The units are in a "volume per volume" ratio.

recovery time: the time required for the output of a leak detector to return to the minimum detection threshold after the detector has been exposed to a leak flow rate of 50 g/yr for 5 s.

response time: in the moving tests described here, the time that elapses from the point at which the probe passes directly in front of the leak until the initial response of the detector occurs.

4. APPARATUS

4.1 Calibrated Leak Standard. The calibrated leak standard can be either adjustable or fixed flow rate. Testing will require calibrated leak flow rates of 1±0.15 g/yr, 50±7.5 g/yr, and any number of calibrated leaks with flow rates between the nominal 1 and 50 g/yr leaks. The number and variety of calibrated leaks available between 1 and 50 g/yr will impact the resolution attainable in the tests as described below. The calibrated leaks used in this testing shall be calibrated by methods and instruments traceable to NIST or an equivalent recognized organization with a measurement uncertainty of ±15% or less. To mitigate testing inconsistency from possible air turbulence caused by the moving probe, the leak standards can be equipped (as a certification test option) with a shroud around the orifice port. The shroud protrusion from the orifice port shall be no more than 6 mm, and a vent means for ambient air to be drawn through the shroud by the leak detector shall be provided. A view of a sample shroud configuration as allowed here is shown in

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