STANDARD

ANSI/ASHRAE Standard 164.3-2015

Method of Test for Commercial and Industrial Isothermal Humidifiers

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SPECIAL NOTE

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ASHRAE obtains consensus through participation of its national and international members, associated societies, and public review.

ASHRAE Standards are prepared by a Project Committee appointed specifically for the purpose of writing the Standard. The Project Committee Chair and Vice-Chair must be members of ASHRAE; while other committee members may or may not be ASHRAE members, all must be technically qualified in the subject area of the Standard. Every effort is made to balance the concerned interests on all Project Committees.

The Senior Manager of Standards of ASHRAE should be contacted for

a. interpretation of the contents of this Standard,
b. participation in the next review of the Standard,
c. offering constructive criticism for improving the Standard, or
d. permission to reprint portions of the Standard.

CONTENTS

ANSI/ASHRAE Standard 164.3-2015, Method of Test for Commercial and Industrial Isothermal Humidifiers

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.

(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

This standard provides rules for the testing of isothermal humidifiers for commercial applications. It was prepared by ASHRAE Standard Project Committee SPC 164.3. The cognizant technical committee is ASHRAE TC 5.11.

The purpose of this standard is to provide a uniform method for testing in a laboratory environment. Although the method of test originated in ARI Standard 640, Performance Rating Industrial and Commercial Humidifiers*, the committee has developed this separate method of test to be used independently of the ARI rating standard so manufacturers, specifiers, installers, and users of industrial and commercial humidifiers can test can test a humidifier's capacity under a variety of conditions with uniform results.*

ASHRAE Standard 41.7-1984 (RA 2006), Method of test for Measurement of Flow Gas, *is used for steam flow measurement with the assumption that steam is a volatile refrigerant (R-718).*

This test method does not address the application practices for absorbing generated moisture in an airstream or space.

1. PURPOSE

This standard method of test establishes a uniform method of laboratory testing for rating commercial and industrial isothermal humidifiers.

2. SCOPE

2.1 The scope of this standard covers a method of test for the humidification rate of commercial and industrial isothermal humidifiers.

2.2 This method of test describes the test apparatus, conduct of the test, and information to be recorded.

2.3 Information resulting from the application of this method of test is intended for use by manufacturers, specifiers, installers, and users of commercial and industrial humidifiers.

3. DEFINITIONS

commercial and industrial humidifier: a device designed to add moisture to air for commercial and industrial applications.

direct injection steam humidifiers: a type of humidifier, intended for duct and area applications, in which dry saturated steam is dispersed directly into the air.

heated tank humidifiers: a type of humidifier that converts tank water to steam using electricity, gas, steam, or hot fluid. The steam is dispersed into a duct system through dispersion manifolds. If the humidifier is a free-standing unit, the steam is dispersed directly into the air space through a fan.

humidification rate: a measure of the ability of a humidifier to add moisture to its surrounding atmosphere, expressed as a unit of weight of water evaporated per unit of time.

shall: the word *shall* indicates requirements of this standard.

4. UNITS OF MEASUREMENT

4.1 Systems of Units. The International System of Units (le Systeme International d'Unites)[1] is employed in this standard. Values shall be based on the National Institute of Standards and Technology (NIST) values which, in turn, are based on the fundamental values of the International Bureau of Weights and Measures. Inch-pound units appear in parentheses (I-P) after SI units.

4.2 Basic Units. The unit of length is either the metre (foot) designated "m" ("ft") or the millimeter (inch), designated "mm" ("in."). The unit of mass is the kilogram (pound mass), designated "kg" ("lb_m"). The unit of time is the minute, designated "min," or the second, designated "s." The unit of temperature is the degree Celsius (Fahrenheit), designated "°C" ("°F").

4.2.1 Flow Rate, Humidification Rate, and Velocity. The units for the flow rate for air are litres per second (cubic feet per minute), designated "L/s" ("cfm"). The unit for the flow rate for water is kilograms per hour (pounds mass per hour), designated "kg/h" ("lb_m/h"). The unit for velocity is metres per second (feet per minute), designated "m/s" ("fpm").

4.2.2 Pressure. The unit of pressure is the Pascal or kilopascal (pounds per square inch, inch water gage, or the inch mercury column), designated "Pa" or "kPa" ("psi," "in. wc" or "in. Hg"). The inch mercury column shall be based on a one-inch column of mercury at 0°C (32°F), under standard gravity *(in vacuo*).

4.2.3 Power and Energy. In this standard, the unit of electrical voltage is the volt, designated as "V." The unit of electrical power is the kilowatt, designated "kW." The unit of electrical energy is the kilowatt-hour, designated "kWh." The unit for thermal energy is the kilojoule (British thermal unit), designate "kJ" ("Btu"). The unit for steam mass flow is kilograms per hour (pounds per hour), designated as "kg/h" ("lb/h").

5. INSTRUMENTATIONS AND METHODS OF MEASUREMENT

5.1 Calibration. Except where noted, instruments shall be calibrated annually over the range to be encountered in the test. Calibration shall be certified traceable to the NIST or other national physical measures recognized as equivalent to NIST.

5.2 Mass Flow Instruments

5.2.1 Direct Steam Humidifier Test Stand. Steam mass flow shall be determined by measuring the pressure differential across a flat plate orifice in accordance with ASHRAE Standard 41.7-1984, *Method for Gas Flow Measurement.*[3] It is acceptable to use measurement devices alternative to those described in Section 6 of Standard 41.7, provided the device meets the required accuracy. The accuracy of the measuring instrument shall be ±2% of the observed steam mass flow rate.