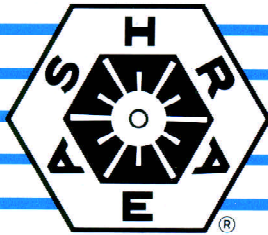


ANSI/ASHRAE Standard 33-2000



ASHRAE[®] STANDARD

Method of Testing Forced Circulation Air Cooling and Air Heating Coils

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1. PURPOSES

1.1 The purposes of this standard are to:

- a. Describe and specify testing instruments and apparatus
- b. Describe and specify laboratory test methods and procedures
- c. Describe and specify test data to be recorded
- d. Describe and specify calculations to be made from test data
- e. Define terms used in testing
- f. Specify standard thermodynamic properties

1.2 It is not the purpose of this standard to specify the types of tests used for production or field testing.

2. SCOPE

2.1 This standard prescribes laboratory methods of testing forced-circulation air-cooling coils, for application under nonfrosting conditions, and forced-circulation air-heating coils to ensure uniform performance information for establishing ratings.

3. METHOD OF USING STANDARD

3.1 Determine whether this standard is applicable by review of Sections 1 through 5.

3.2 Select the instruments required for test from Section 6 and the apparatus from Section 7.

3.3 Test and calculate in accordance with the appropriate methods in Sections 8 through 11.

4. CLASSIFICATION

4.1 Coil Classification

Air-cooling and air-heating coils may be classified, with regard to their cooling or heating function, by identifying the heating or cooling fluid as follows:

4.1.1 *Volatile Refrigerant*. Liquid-vapor mixtures used for air cooling controlled by a thermal expansion valve.

4.1.2 *Steam*. Used for air heating.

- (a) Single tube (standard) type
- (b) Steam distributing tube type

4.1.3 *Water or Aqueous Glycol Solution*. Liquids used for air cooling or air heating.

- (a) Continuous circuit type
- (b) Self-draining type
- (c) Cleanable type

5. DEFINITIONS

5.1 Forced-Circulation Air-Cooling or Air-Heating Coil

A *forced-circulation air-cooling or air-heating coil* is a coil for use in an airstream whose circulation is caused by a difference in pressure produced by a fan or blower.

5.1.1 *Forced-circulation air-cooling coil*. A heat exchanger, with or without extended surfaces, through which either chilled water, chilled aqueous glycol solution, or vola-

tile refrigerant is circulated for the purpose of total cooling (sensible cooling plus latent cooling) of a forced-circulation airstream.

5.1.2 *Forced-circulation air-heating coil*. A heat exchanger, with or without extended surfaces, through which either hot water, hot aqueous glycol solution, or steam is circulated for the purpose of sensible heating of a forced-circulation airstream.

5.2 Coil Dimensions (See Figure 1)

5.2.1 *Coil Depth*. The depth of a coil is the number of rows of tubes or the dimension in the direction of air flow.

5.2.2 *Coil Length*. The length of a coil is the dimension of the face of the coil in the direction of the tubes exposed to the flow of air. (See Dimension L , Figure 1.)

5.2.3 *Coil Height*. The height of the coil is the dimension of the face of the coil perpendicular to the direction of the tubes and includes only the height over tubes and fins exposed to the flow of air. (See Dimension H , Figure 1.)

5.2.4 *Coil Face Area*. The face area of a coil is the product of the length and the height of the coil,

$$L \times H / 144 \quad [L \times H / 10^6].$$

Note: Here and throughout this document the use of [] signifies items evaluated in SI units. If SI units are used, the immediately preceding item, which applies to inch-pound (I-P) units, is not required to also be used.

5.3 Testing Terminology

5.3.1 *Equilibrium*. Equilibrium, for the purpose of this standard, is a steady-state condition during which the fluctuations of variables being measured remain within stated limits as given in Section 9.

5.3.2 *Test*. A test is the recorded group of readings of test variables, taken while equilibrium is maintained and used in the computation of results.

5.3.3 *Test Run*. A test run is the complete group of readings of test variables, which includes:

- (a) Those observed or recorded during a sufficient period to indicate that equilibrium was attained prior to the actual test.
- (b) Those recorded during the period of the test.

6. TEST INSTRUMENTS

6.1 Temperature Measuring Instruments

6.1.1 Temperature measurements shall be made with an instrument or instrument system meeting the accuracy and precision requirements in 6.1.2. The following are in common use for this purpose:

- (a) Mercury-in-glass thermometers
- (b) Thermocouples
- (c) Electric resistance thermometers, including thermistors and other semiconductor devices

Refer to *ANSI/ASHRAE Standard 41.1-1986 (RA 91)*¹ for a more detailed discussion of temperature measurement.