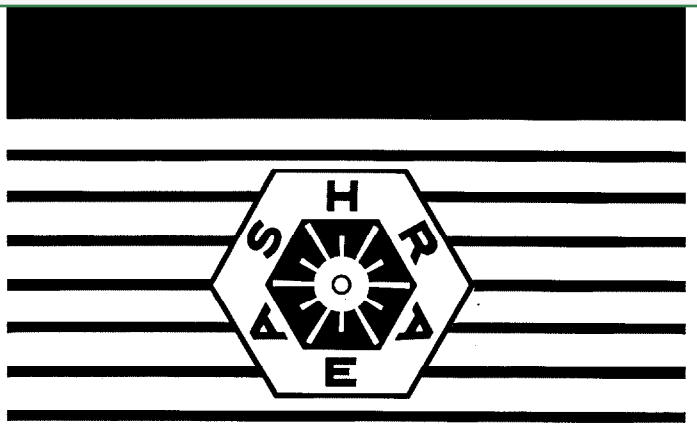

ANSI/ASHRAE 35-1992
(Supersedes ASHRAE 35-1983)

ASHRAE® STANDARD

AN AMERICAN NATIONAL STANDARD

Method of Testing Desiccants for Refrigerant Drying

This standard was approved by the ASHRAE Standards Committee on October 5, 1991; by the ASHRAE Board of Directors on January 30, 1992; and by the American National Standards Institute on April 20, 1992.

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1. PURPOSE

This standard establishes a method of testing desiccants for use in refrigerant drying.

2. SCOPE

2.1 This standard provides a method of testing desiccants only. For testing and rating dryers that use these desiccants, see ASHRAE Standard 63.1-88.[1]

2.2 The principle of this standard is to keep a desiccant of known water content in contact with the desired refrigerant until equilibrium has been established under known temperature conditions, after which the water content of the refrigerant is determined.

3. CLASSIFICATION

3.1 This method is concerned with testing desiccants, specifically in regard to determining the water-holding capacity of a desiccant and the water concentration of a refrigerant when they are in equilibrium.

3.2 Since this standard is concerned only with equilibrium conditions at a given temperature, no consideration is given to the effect of design of the container holding the desiccant. However, the method discussed here, with certain modifications, can be used to test the desiccant contained in a completed dryer unit to determine its water-holding capacity when in equilibrium with the refrigerant containing a given amount of water. The modifications are described in ASHRAE Standard 63.1-88.[1]

3.3 This method of testing desiccants uses liquid refrigerant in equilibrium with the desiccant.

3.4 The rate of drying is not considered in this standard. Measurements are made under conditions ensuring practical equilibrium.

3.5 Physical characteristics of the desiccant not considered in this standard method are particle size, dusting properties, hardness, and specific form (i.e., molded or granular).

This standard is suitable for all refrigerants that do not react with phosphoric anhydride or the desiccant, except those that condense to liquids in the low-pressure part of the equipment.

4. DEFINITION OF TERMS

desiccant: a solid that will collect and hold water and in itself is insoluble in the refrigerant medium used.

equilibrium-point dryness (EPD): the water content of a liquid refrigerant after being in contact with a specific desiccant at a particular temperature long enough to reach an equilibrium state. Equilibrium-point dryness is expressed as parts of water per million parts of refrigerant (ppm) on a weight basis.

water collecting and holding capacity: the amount of water collected and held by the desiccant while maintaining a specified EPD in the liquid refrigerant passing through it at a certain liquid refrigerant temperature. Water capacity is measured in grams of water per 100 grams of desiccant activated in accordance with the manufacturer's instructions.

5. APPARATUS

5.1 A constant-temperature bath or cabinet that will maintain a given set temperature with an accuracy of $\pm 1°C$ and is capable of being set at any temperature within the range of desiccant use. When a constant-temperature bath is used above room temperature, the refrigerant supply cylinder should be warmed by a heating mantle 5°C to 10°C above bath temperature. The entire apparatus (Figure 1) can be placed inside a constant-temperature cabinet.

5.2 An analytical balance having a sensitivity of 0.0001 g and a capacity of 100 g.

5.3 A pan-type balance having a sensitivity of 1.0 g and a capacity of 5,000 g.

5.4 Nesbitt-type gas-absorption bulbs filled with phosphoric anhydride-inert material* and having a filter mat layer of glass fiber both above and below the column of mixture. A flow rate indicator is attached to the third Nesbitt bulb (see Figure 2).

5.5 An air-drying train composed of two gas scrubbing towers in series filled with phosphoric anhydride-inert material. A preliminary drying tower can be placed ahead of these two and filled with a suitable desiccant in order to remove most of the water from the airstream and minimize the duty of the phosphoric anhydride towers.

5.6 Crucibles with lids (platinum-fused silica or porcelain) of sufficient volume to contain 10 g of the desiccant being tested.

5.7 Desiccant containers for the flow test having a capacity of at least 200 g and a minimum length-to-diameter ratio of 3:1, equipped with screens or metallic filters to retain the desiccant and provided with inlet and outlet connections so arranged that flowing fluid must pass through the desiccant charge. A refillable type of refrigerant dryer shell fitted with 1/4-in. (8 mm DIN) Society of Automotive Engineers (SAE) flare connections is recommended.

5.8 Liquid refrigerant supply cylinders having a capacity of approximately .003 m^3. These cylinders must be properly cleaned, dried, and evacuated.

5.9 Copper tubing, flare fittings, and needle valves as required to complete the assembly shown in Figure 1.

5.10 Assembled equipment shall be adequately dried and leak tested.

6. PREPARATION AND ANALYSIS

6.1 Preparation of Desiccants

6.1.1 In this test procedure, water is introduced to the system by adding it to the activated desiccant and then accurately determining the amount added. The performance of the desiccant can be calculated from a measurement of the water content of the refrigerant at equilibrium with the desiccant containing a predetermined quantity of water. The desiccant can be adjusted to approximately the desired

*Aquasorb AR®, or equivalent