ANSI/ASHRAE Standard 22-2007
(Supersedes ANSI/ASHRAE Standard 22-2003)

ASHRAE STANDARD

Methods of Testing for Rating Water-Cooled Refrigerant Condensers

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NOTE

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FOREWORD

This is a revision of ASHRAE Standard 22-2003.

This standard prescribes methods for testing water-cooled refrigerant condensers. To attain this objective, the standard lists and defines the terms suggested for rating water-cooled refrigerant condensers and establishes testing methods that may be used as a basis for obtaining ratings of water-cooled refrigerant condensers.

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The changes made for the 2007 revision were that the references were updated.

1. PURPOSE

This standard prescribes methods of testing the thermal performance of water-cooled refrigerant condensers.

2. SCOPE

To attain this objective, this standard

a. lists and defines the terms suggested for the rating of water-cooled refrigerant condensers and
b. establishes methods of test that can be used as a basis for obtaining ratings of water-cooled refrigerant condensers.

3. DEFINITION OF TERMS

condensing heat rejection (q_c): the portion of the total heat rejection of a condenser that is used for desuperheating and condensing the entering refrigerant vapor to a saturated liquid. This is the product of the mass rate of refrigerant flow (w_r) and the difference between the enthalpy of the entering refrigerant vapor and that of the saturated refrigerant liquid at the leaving pressure.

subcooling heat rejection (q_s): the total heat rejection minus the condensing heat rejection. This is the product of the mass rate of refrigerant flow (w_r) and the difference between the enthalpy of a saturated refrigerant liquid at the pressure of the leaving refrigerant and that of the refrigerant liquid at the actual leaving temperature.

total heat rejection (q_t): the total useful capacity of a water-cooled refrigerant condenser for removing heat from the refrigerant circulated through it. This is the product of the mass rate of refrigerant flow (w_r) and the difference of enthalpy of the entering and leaving refrigerant fluid.

water-cooled refrigerant condenser: a factory-made assembly of elements by which the flows of refrigerant vapor and water are maintained in such a heat transfer relationship that the refrigerant vapor is condensed into a liquid.

4. EXPRESSION OF TEST RESULTS

4.1 Terms Recommended for Expressing Test Results

4.1.1 In expressing test results, the following factors should be stated:

a. condensing heat rejection (q_c), Btu/h (kW),
b. subcooling heat rejection (q_s), Btu/h (kW),
c. saturated temperature of entering refrigerant vapor, °F (°C),
d. temperature of entering water, °F (°C),
e. water mass flow rate (w_w), lb_m/h (kg/s), and
f. water pressure drop through condenser, psi (kPa).

5. TEST METHODS

5.1 Standard Test Methods

5.1.1 Tests shall consist of a primary test and a simultaneous confirming test at the conditions specified.

5.1.2 Specified conditions will include

a. either the total heat rejection, Btu/h (kW), or the saturated temperature of entering refrigerant vapor, °F (°C),
b. temperature of entering water, °F (°C),
c. water mass flow rate, lb_m/h (kg/s),
d. minimum superheat of entering vapor, °R (K),
e. minimum ambient temperature, °F (°C),
f. subcooling, °F (°C), and
g. refrigerant used.

5.1.3 The results of the confirming test shall be within 3% of the primary test, but the primary test shall govern for rating purposes.

5.1.4 Refrigerant flow through the condenser shall be produced by one of the following means (see Figures 1a and 1b):

a. refrigerating compressor and low-side evaporator or calorimeter (preferred method) or
b. refrigerant boiler.

5.2 Primary Test Methods

5.2.1 The primary test for closed condensers (see Figure 2) shall consist of determination of the heat rejected from the refrigerant by

a. measurement of heat rejected to the water and
b. calculation of heat rejected through the external surfaces of the condenser to the ambient air.