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ANSI/ASHRAE Standard 24-2025
Methods of Testing for Rating Evaporators Used for Cooling Liquids

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Uncertainty Calculation Workbook: www.ashrae.org/pub4993271

NOTE

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

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FOREWORD

ANSI/ASHRAE Standard 24-2025 is a revision of ANSI/ASHRAE Standard 24-2019. 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 with the goal of having uniform standards throughout the industry.

The following changes were made for the 2025 revision:

- *References were updated.*
- *Minor editorial changes were made.*

This standard includes an Excel workbook to assist with uncertainty calculations (Informative Appendix A). Download the workbook from the ASHRAE website at www.ashrae.org/pub4993271.

1. PURPOSE

This standard prescribes methods of testing the thermal performance and liquid-side pressure drop of evaporators that operate at subcritical pressures of the evaporating refrigerant.

2. SCOPE

This standard

a. Lists and defines the terms for rating the thermal performance and liquid-side pressure drop of evaporators used for cooling liquids;
b. Establishes the methods of test that shall be used as a basis for obtaining the thermal performance and pressure drop of evaporators that operate at subcritical pressures of the evaporating refrigerant; and
c. Applies to laboratory testing for purposes of rating evaporators within its scope. This standard is not intended for field testing of evaporators of any type.

3. DEFINITIONS

evaporator: a factory-made assembly of elements in which heat is transferred from the liquid to the refrigerant, causing the refrigerant to evaporate and the liquid to be cooled.

liquid: a nearly incompressible fluid that conforms to the shape of its container but retains a nearly constant volume independent of pressure. For the purposes of this standard, operating temperatures shall be limited to being greater than the fluid's freezing/melting temperature and less than 70% of the fluid's critical temperature on an absolute temperature scale, and operating pressures shall be limited to being greater than 150% of the fluid's bubble temperature and less than 30% of the fluid's critical pressure absolute.

net refrigeration capacity: that portion of the total refrigeration capacity of an evaporator that produces useful cooling. This is the product of the mass flow rate of liquid and the differences in enthalpy between entering and leaving liquid expressed in energy units per unit of time. It is represented also by the total refrigeration capacity less the heat leakage rate.

pressure drop of flowing fluids: the difference in static pressure between two points along a flow stream.

superheat: the difference between the measured refrigerant temperature leaving the evaporator and the dewpoint temperature of the refrigerant corresponding to the pressure of the refrigerant leaving the evaporator.

temperature of flowing fluids: the mixed mean stream temperature at a station perpendicular to the flow direction.

total refrigeration capacity (of the evaporator): the product of the mass flow rate of refrigerant and the difference in enthalpy between the leaving and entering refrigerant, expressed in energy units per unit of time.

uncertainty: an estimated value for the error in a measurement, which may be the result of both systematic and random error.

4. REQUIRED TEST RESULTS

4.1 Test results shall be expressed in the following terms:

a. Net refrigeration capacity, kW (Btu/h)
b. Temperature of entering liquid, °C (°F)