



STANDARD

**ANSI/ASHRAE Standard 184-2016**

# **Method of Test for Field Performance of Liquid-Chilling Systems**

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**CONTENTS**  
**ANSI/ASHRAE Standard 184-2016,**  
**Method of Test for Field Performance of Liquid-Chilling Systems**

<b>SECTION</b>	<b>PAGE</b>
Foreword .....	2
1 Purpose.....	2
2 Scope.....	2
3 Use of Standard 184 .....	2
4 Definitions, Abbreviations, and Acronyms.....	2
5 Equipment Types .....	4
6 Calculations and Conversions.....	5
7 Test Requirements .....	12
8 Test Procedures.....	22
9 Data to Be Recorded.....	23
10 Reporting of Results.....	23
11 Nomenclature .....	23
12 Normative References.....	23
Informative Appendix A: References.....	28
Normative Appendix B: Measurement Points.....	29
Normative Appendix C: Calculation of Performance and Uncertainty of Results.....	36
Informative Appendix D: Instrumentation .....	37
Informative Appendix E: Additional Information for Measurement Points .....	39
Normative Appendix F: Pretest Checklist.....	46
Informative Appendix G: Best Practices for Achieving Test Conditions .....	49
Informative Appendix H: Comparison of Test Results .....	50

**NOTE**

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## FOREWORD

*ASHRAE Standard 184 prescribes methods for obtaining performance data relating to field-installed liquid-chilling systems. It is intended to provide the minimum requirements necessary to conduct field testing in accordance with test circumstances and conditions that the owner and test agency have agreed to prior to collecting test data, and are based on the actual obtainable conditions at the location of the field-installed system.*

*The standard provides a great deal of flexibility with regard to test conditions and instrumentation selection. Reporting the uncertainty of the measured and calculated performance data before and after testing is a requirement of the standard.*

*The standard does not define a set of conditions under which the system shall be operated during testing, nor does the standard address the comparison of measured and calculated performance data to any previously defined set of data or rating information.*

*A performance and uncertainty calculator in the form of a Microsoft Excel<sup>®</sup> spreadsheet is being developed and is planned for release in the future as an addendum to this standard.*

## 1. PURPOSE

The purpose of this standard is to prescribe methods of field performance testing for *liquid-chilling systems*.

## 2. SCOPE

**2.1** This standard includes the following types of *liquid-chilling systems*. These system types are further described in Section 5, "Equipment Types."

**2.1.1** Vapor compression cycle.

**2.1.2** Absorption cycle.

**2.2** This standard does not include systems with a net refrigeration *capacity* less than 10 ton<sub>R</sub> (35 kW).

**2.3** This standard does not include a specification of standardized test conditions under which the *liquid-chilling system* must operate. Test conditions typically reflect the expected *operating conditions* and are customer specified.

## 3. USE OF STANDARD 184

The standard is intended to be used to measure the performance of *liquid-chilling systems* that are newly installed equipment or existing systems in any state of operation. The standard is intended to prescribe the testing process given

existing site conditions. Additionally, the standard shall be used to determine and minimize the resultant level of measurement *uncertainty*. The standard shall be used by designers of new installations to minimize measurement *uncertainty* during field performance testing.

## 4. DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

**4.1 General.** Certain terms, abbreviations, and acronyms are defined in this section for the purposes of this standard. These definitions are applicable to all sections of this standard. Terms that are not defined shall have their ordinarily accepted meanings within the context in which they are used. Ordinarily accepted meanings shall be based on definitions in the current edition of *ASHRAE Terminology*<sup>1</sup>. If not defined in *ASHRAE Terminology*, then ordinarily accepted meanings shall be based on American Standard English language usage as documented in an unabridged dictionary accepted by the adopting authority.

### 4.2 Definitions

**auxiliary power:** See *power*.

**British thermal unit (Btu):** the quantity of heat required to raise the *temperature* of one pound of water by one degree Fahrenheit at a specified *temperature*. This standard uses the International Table (IT) definition, where the quantity of heat is defined to be 1055.05585262 J (1 Btu<sub>IT</sub>).

**capacity:** a measurable physical quantity, the rate that heat (energy) is added to or removed from the *liquid* side of a *refrigerating system*. *Capacity* is defined as the mass flow rate of the *liquid* multiplied by the difference in enthalpy of *liquid* entering and leaving the heat exchanger. This standard uses an approximation of the *liquid* enthalpy difference, based on specific heat and *temperature* difference and in some cases also the pressure losses.

**gross heating capacity:** the *capacity* of the *water-cooled condenser* as measured by the total heat transferred from the refrigerant to the *liquid* in the *condenser*. This value includes both the sensible heat transfer and the friction heat losses from *pressure loss* effects of the *liquid* flow through the *condenser*. This value is used to calculate the *energy balance* of a test.

**gross cooling capacity:** the *capacity* of the *evaporator* as measured by the total heat transferred from the *liquid* to the refrigerant in the *evaporator*. This value includes both the sensible heat transfer and the friction heat losses from *pressure loss* effects of the *liquid* flow through the *evaporator*. This value is used to calculate the *energy balance* of a test.

**net heating capacity:** the *capacity* of the *condenser* for useful heating of the thermal load, external to the *liquid-chilling system*, calculated using only the sensible heat transfer.

**net cooling capacity:** the *capacity* of the *evaporator* for useful cooling of the thermal load, external to the *liquid-*