



ASHRAE STANDARD

Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment

Approved by the ASHRAE Standards Committee on February 3, 2005; by the ASHRAE Board of Directors on February 10, 2005; and by the American National Standards Institute on March 11, 2005.

ASHRAE Standards are scheduled to be updated on a five-year cycle; the date following the standard number is the year of ASHRAE Board of Directors approval. The latest copies may be purchased from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: orders@ashrae.org. Fax: 404-321-5478. Telephone: 404-636-8400 (worldwide) or toll free 1-800-527-4723 (for orders in U.S. and Canada).

© Copyright 2005 ASHRAE, Inc.

ISSN 1041-2336



**American Society of Heating, Refrigerating
and Air-Conditioning Engineers, Inc.**

1791 Tullie Circle NE, Atlanta, GA 30329

www.ashrae.org

ASHRAE Standard Project Committee 37
Cognizant TC: TC 8.11, Unitary and Room Air Conditioners and Heat Pumps
SPLS Liaison: Matt R. Hargan

Alberto A. da Rosa, *Chair**
Greg S. Bennett
Darryl Denton*
Piotr A. Domanski
Brian P. Dougherty*

Byron F. Horak*
H. Michael Hughes*
Biol I. Kilkis*
Arvo Lannus

**Denotes members of voting status when the document was approved for publication*

ASHRAE STANDARDS COMMITTEE 2004-2005

Dean S. Borges, *Chair*
Richard D. Hermans, *Vice-Chair*
Donald B. Bivens
Paul W. Cabot
Hugh F. Crowther
Brian P. Dougherty
Hakim Elmahdy
Matt R. Hargan
Roger L. Hedrick
John F. Hogan
Frank E. Jakob
Stephen D. Kennedy

David E. Knebel
Merle F. McBride
Mark P. Modera
Cyrus H. Nasser
Davor Novosel
George Reeves
John Sabelli
Stephen V. Santoro
Gideon Shavit
David R. Tree
James E. Woods
Michael F. Beda, *BOD ExO*
William A. Harrison, *CO*

Claire B. Ramspeck, *Manager of Standards*

SPECIAL NOTE

This American National Standard (ANS) is a national voluntary consensus standard developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Consensus is defined by the American National Standards Institute (ANSI), of which ASHRAE is a member and which has approved this standard as an ANS, as "substantial agreement reached by directly and materially affected interest categories. This signifies the concurrence of more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that an effort be made toward their resolution." Compliance with this standard is voluntary until and unless a legal jurisdiction makes compliance mandatory through legislation.

ASHRAE obtains consensus through participation of its national and international members, associated societies, and public review.

ASHRAE Standards are prepared by a Project Committee appointed specifically for the purpose of writing the Standard. The Project Committee Chair and Vice-Chair must be members of ASHRAE; while other committee members may or may not be ASHRAE members, all must be technically qualified in the subject area of the Standard. Every effort is made to balance the concerned interests on all Project Committees.

The Manager of Standards of ASHRAE should be contacted for:

- a. interpretation of the contents of this Standard,
- b. participation in the next review of the Standard,
- c. offering constructive criticism for improving the Standard,
- d. permission to reprint portions of the Standard.

DISCLAIMER

ASHRAE uses its best efforts to promulgate Standards and Guidelines for the benefit of the public in light of available information and accepted industry practices. However, ASHRAE does not guarantee, certify, or assure the safety or performance of any products, components, or systems tested, installed, or operated in accordance with ASHRAE's Standards or Guidelines or that any tests conducted under its Standards or Guidelines will be nonhazardous or free from risk.

ASHRAE INDUSTRIAL ADVERTISING POLICY ON STANDARDS

ASHRAE Standards and Guidelines are established to assist industry and the public by offering a uniform method of testing for rating purposes, by suggesting safe practices in designing and installing equipment, by providing proper definitions of this equipment, and by providing other information that may serve to guide the industry. The creation of ASHRAE Standards and Guidelines is determined by the need for them, and conformance to them is completely voluntary.

In referring to this Standard or Guideline and in marking of equipment and in advertising, no claim shall be made, either stated or implied, that the product has been approved by ASHRAE.

CONTENTS

ANSI/ASHRAE Standard 37-2005 Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment

SECTION	PAGE
Foreword.....	2
1 Purpose	2
2 Scope	2
3 Definitions.....	2
4 Classifications.....	2
5 Instruments.....	3
6 Airflow and Air Differential Pressure Measurement Apparatus.....	3
7 Methods of Testing and Calculation.....	9
8 Test Procedures.....	18
9 Data to be Recorded	22
10 Test Results	24
11 Symbols used in Equations	25
12 Reference Properties and Data	27
13 References	27
Appendix A: Classifications of Unitary Air Conditioners and Heat Pumps	28

NOTE

When addenda, interpretations, or errata to this standard have been approved, they can be downloaded free of charge from the ASHRAE Web site at <http://www.ashrae.org>.

© Copyright 2005 American Society of Heating,
Refrigerating and Air-Conditioning Engineers, Inc.

1791 Tullie Circle NE
Atlanta, GA 30329
www.ashrae.org

All rights reserved.

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

ANSI/ASHRAE Standard 37-2005 provides a comprehensive updating of Standard 37, which was last published in 1988. Incorporating the project committee's research into advances in unitary air conditioners and heat pumps and its research into improved testing methods, this edition of the standard updates the older version by

- *refining the equations to improve the accuracy and efficiency of the testing methods;*
- *using more generic terms such as "liquid" instead of "water" to include refrigerant, oil, or other substances;*
- *improving the drawings and illustrations to make it easier to follow the test procedures; and*
- *updating the reference section to reflect the most recent editions of the standards cited.*

These improvements should bring the standard up to date with current technology and make it easier to use.

1. PURPOSE

1.1 The purpose of this standard is to provide test methods for determining the cooling capacity of unitary air-conditioning equipment and the cooling or heating capacities, or both, of unitary heat pump equipment.

1.2 These test methods do not specify methods of establishing ratings that involve factors such as manufacturing tolerances and quality control procedures.

2. SCOPE

2.1 This standard applies to electrically driven mechanical-compression unitary air conditioners and heat pumps consisting of one or more assemblies that include an indoor air coil(s), a compressor(s), and an outdoor coil(s). Where such equipment is provided in more than one assembly, the separated assemblies are designed to be used together.

2.2 This standard does not include methods of testing the following:

- (a) cooling coils for separate use
- (b) condensing units for separate use
- (c) room air conditioners
- (d) heat-operated unitary equipment
- (e) liquid chilling packages
- (f) multiple indoor air coils operating simultaneously in heating and cooling modes

3. DEFINITIONS

air, standard: dry air having a mass density of 1.204 kg/m³ (0.075 lb/ft³).

apparatus: as used in this standard, this term refers exclusively to test room facilities and instrumentation.

capacity, heating: the rate, expressed in watts (Btu/h), at which the equipment adds heat to the air passing through it under specified conditions of operation.

capacity, latent cooling: the rate, expressed in watts (Btu/h), at which the equipment removes latent heat from the air passing through it under specified conditions of operation.

capacity, sensible cooling: the rate, expressed in watts (Btu/h), at which the equipment removes sensible heat from the air passing through it under specified conditions of operation.

capacity, total cooling: the rate, expressed in watts (Btu/h), at which the equipment removes heat from the air passing through it under specified conditions of operation.

coil, indoor: the heat exchanger that removes heat from or adds heat to the conditioned space.

coil, outdoor: the heat exchanger that rejects heat to or absorbs heat from a source external to the conditioned space.

equipment: as used in this standard, this term refers exclusively to the unitary equipment to be tested.

equipment, unitary: this term shall be defined as provided in Section 2 and Section 4.

indoor side: that part of the system that removes heat from or adds heat to the indoor airstream.

outdoor side: that part of the system that rejects heat to or absorbs heat from a source external to the indoor airstream.

pressure, standard barometric: 101.325 kPa (14.696 psi).

refrigerant, volatile: a refrigerant that changes from the liquid to the vapor state in the process of absorbing heat.

shall: where "shall" or "shall not" is used for a provision, that provision is mandatory if compliance with the standard is claimed.

should, recommended, or it is recommended: "should," "recommended," or "it is recommended" are used to indicate provisions that are not mandatory but that are desirable as a good practice.

4. CLASSIFICATIONS

Unitary equipment within the scope of this standard may be classified as follows: