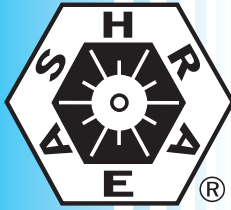


ANSI/ASHRAE Standard 127-2007
(Supersedes ANSI/ASHRAE Standard 127-2001)



ASHRAE STANDARD

Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners

Approved by the ASHRAE Standards Committee on June 23, 2007; by the ASHRAE Board of Directors on June 27, 2007; and by the American National Standards Institute on June 28, 2007.

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 US and Canada).

© Copyright 2007 ASHRAE, Inc.

ISSN 1041-2336



www.ansi.org

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

1791 Tullie Circle NE, Atlanta, GA 30329

www.ashrae.org

ASHRAE Standard Project Committee 127
Cognizant TC: TC 9.9, Mission Critical Facilities, Technology Spaces, and Electronic Equipment
SPLS Liaison: Mark P. Modera

J. Fred Stack, *Chair**
John H. Bean, Jr.*
Donald L. Beaty*
Christopher W. Kurkjian*
Geoffrey M. Lawler*
R. Michael Martin*

Richard F. Pressley, Sr.*
Terry Rodgers*
Herbert V. Sorell
Jeff P. Trower*
William Tschudi*

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

ASHRAE STANDARDS COMMITTEE 2006–2007

David E. Knebel, *Chair*
Stephen D. Kennedy, *Vice-Chair*
Michael F. Beda
Donald L. Brandt
Steven T. Bushby
Paul W. Cabot
Hugh F. Crowther
Samuel D. Cummings, Jr.
Robert G. Doerr
Roger L. Hedrick
John F. Hogan
Eli P. Howard, III
Frank E. Jakob
Jay A. Kohler

James D. Lutz
Carol E. Marriott
Merle F. McBride
Mark P. Modera
Ross D. Montgomery
H. Michael Newman
Stephen V. Santoro
Lawrence J. Schoen
Stephen V. Skalko
Bodh R. Subherwal
Jerry W. White, Jr.
James E. Woods
Richard D. Hermans, *BOD ExO*
Hugh D. McMillan, III, *CO*

Claire B. Ramspeck, *Assistant Director of Technology for Standards and Special Projects*

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 Assistant Director of Technology for Standards and Special Projects 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, or
- 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 127-2007 Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners

SECTION	PAGE
Foreword.....	2
1 Purpose	2
2 Scope	2
3 Definitions.....	2
4 Classification	3
5 Rating Requirements.....	3
6 Conformance.....	7
7 References	7
Normative Appendix A: Tests Required.....	8
Informative Appendix B: Dry-Bulb Temperature Profiles for Selected Cities.....	9
Normative Appendix C: Airflow and Static-Pressure Procedure for Down-Flow Units	10
Informative Appendix D: Comparison of Unit Ratings Using Revised versus Previous Standard	11

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>.

(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 127 was first published in 1988 and revised in 2001. This revision of the standard makes some significant changes to the 2001 edition. The major revisions and the rationale for them are summarized in the following paragraphs.

Definitions

The definition of coefficient of performance (COP) has been rewritten to clarify that it is based upon net cooling capacity. Although this rating factor was always based upon net capacity, it is now clear that the efficiency is based upon the same value.

A definition for sensible COP (SCOP) has been added and subsequently used as the basis for all energy-efficiency ratings. This recognizes that the primary load in a computer and data processing room (CDPR) is a sensible load. As new loads are added to the space, these new loads are 100% sensible. A typical CDPR room today is 90% sensible and that ratio is increasing. In data processing rooms, units with too much latent capacity waste energy.

A definition for adjusted sensible COP (ASCOP) has also been added. Data processing equipment typically operates year round, and so a method for documenting a seasonal efficiency rating based on the climate data for a particular city has been established.

Rating Requirements

The primary rating point (the Full Cooling Test A of Table 1) has been redefined at 23.9°C/45 RH (75°F/45 RH) versus the prior revision rating point of 22°C/50 RH (71.6°F/50 RH). The change was made to align the test conditions with the recommendations published in ASHRAE's Thermal Guidelines for Data Processing Environments. In addition, test points are defined in Table 1 for establishment of the ASCOP.

The system static pressure requirements (Section 5.1.4.5) have been adjusted as well as the physical unit arrangement required for testing in order to better reflect the three different types of units found in CDPR rooms. The orientation of a down-flow raised floor plenum CDPR unit during test has been defined according to how units are typically installed in actual applications.

Other key changes are as follows: standards for the testing and rating of the humidification and dehumidification systems have been added or clarified (Section 5.5), a minimum MERV rating for the air filters has been established (Section 5.6), a standard method for the test and rating of the noise emitted by the units has been established (Section 5.9), and the tolerance of the unit rating versus the test results has been tightened (Section 5.11).

The project committee is appreciative of the contributions Mukesh Khattar made in revising this standard.

1. PURPOSE

The purpose of the standard is to establish a uniform set of requirements for rating computer and data processing room (CDPR) unitary air conditioners.

2. SCOPE

This standard applies to classes of unitary equipment that are used to air condition a computer room and data processing equipment. This standard does not apply to the rating of individual assemblies, such as condensing units or direct expansion fan-coil units, for separate use.

3. DEFINITIONS

computer and data processing room (CDPR) unitary air conditioner: a computer and data processing room unitary air conditioner consisting of one or more factory-made assemblies, which include a direct expansion evaporator or chilled-water cooling coil, an air-moving device, and air-filtering devices. The air conditioner may include a compressor, condenser, humidifier, or reheating function. Where direct expansion equipment is provided in more than one assembly and the separate assemblies are to be used together, the requirements of rating outlined in this standard are based upon the use of matched assemblies. The functions of a CDPR air conditioner, either alone or in combination with a cooling and heating plant, are to provide air filtration, circulation, cooling, reheating, and humidity control.

cooling system energy coefficient of performance (COP): a ratio calculated by dividing the net total cooling capacity in watts by the total power input in watts (excluding reheaters and humidifiers) at any given set of rating conditions. The net total cooling capacity is the total gross capacity minus the energy dissipated into the cooled space by the blower system.

sensible coefficient of performance (SCOP): a ratio calculated by dividing the net sensible cooling capacity in watts by the total power input in watts (excluding reheaters and humidifiers) at any given set of rating conditions. The net sensible cooling capacity is the gross sensible capacity minus the energy dissipated into the cooled space by the fan system. (This is further explained in Section 5.1.)

adjusted sensible coefficient of performance (ASCOP): a SCOP value that provides a consistent evaluation of the energy efficiency of a unit operated in different ambient temperatures. It is calculated by the method defined in Section 5.2.

fluid economizer: a system configuration potentially available when an external fluid cooler is utilized for heat rejection. It utilizes a separate cooling coil within the unit for cooling and the cooled fluid returning from the external fluid cooler to provide cooling much like a chilled-water unit (i.e., without the use of compressors). This process is sometimes referred to as *free cooling*.