



**STANDARD**

**ANSI/ASHRAE Standard 190-2013**

# **Method of Testing for Rating Indoor Pool Dehumidifiers**

Approved by the ASHRAE Standards Committee on January 26, 2013; by the ASHRAE Board of Directors on January 29, 2013; and by the American National Standards Institute on May 3, 2013.

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 edition of an ASHRAE Standard may be purchased on the ASHRAE website ([www.ashrae.org](http://www.ashrae.org)) or from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: [orders@ashrae.org](mailto: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). For reprint permission, go to [www.ashrae.org/permissions](http://www.ashrae.org/permissions).

© 2013 ASHRAE

ISSN 1041-2336



**ASHRAE Standard Project Committee 190**  
**Cognizant TC: TC 8.10, Mechanical Dehumidification Equipment and Heat Pipes**  
**SPLS Liaison: Rita M. Harrold**

Titu R. Doctor, *Chair\**

Harry M. Milliken, *Vice Chair\**

Scotty M. Hutto, *Secretary\**

Alois Malik\*

Stanley A. Mumma\*

Mick I. Nelson\*

Randy C. Schrecengost\*

Richard W. Trent\*

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

---

**ASHRAE STANDARDS COMMITTEE 2012–2013**

Kenneth W. Cooper, *Chair*

William F. Walter, *Vice-Chair*

Douglass S. Abramson

Karim Amrane

Charles S. Barnaby

Hoy R. Bohanon, Jr.

Steven F. Bruning

David R. Conover

Steven J. Emmerich

Julie M. Ferguson

Krishnan Gowri

Cecily M. Grzywacz

Richard L. Hall

Rita M. Harrold

Adam W. Hinge

Debra H. Kennoy

Jay A. Kohler

Rick A. Larson

Mark P. Modera

Janice C. Peterson

Heather L. Platt

Ira G. Poston

Douglas T. Reindl

James R. Tauby

James K. Vallort

Craig P. Wray

Charles H. Culp, III, *BOD ExO*

Constantinos A. Balaras, *CO*

Stephanie C. Reiniche, *Manager of Standards*

---

**SPECIAL NOTE**

This American National Standard (ANS) is a national voluntary consensus standard developed under the auspices of 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, 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 190, Method of Testing for Rating Indoor Pool Dehumidifiers

SECTION	PAGE
Foreword.....	2
1 Purpose .....	2
2 Scope .....	2
3 Instruments.....	2
4 Airflow and Air Differential Pressure Measurement Apparatus .....	2
5 Methods of Testing and Calculation .....	2
6 Test Procedures .....	5
7 Data to Be Recorded .....	5
8 Test Results.....	8
9 Symbols Used in Equations.....	8
10 Reference Properties and Data .....	9

#### NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE Web site at [www.ashrae.org/technology](http://www.ashrae.org/technology).

© 2013 ASHRAE

1791 Tullie Circle NE · Atlanta, GA 30329 · [www.ashrae.org](http://www.ashrae.org) · All rights reserved.

ASHRAE is a registered trademark of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.  
ANSI is a registered trademark of the American National Standards Institute.

(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

*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 and merely in the interests of obtaining uniform standards throughout the industry.*

## 1. PURPOSE

The purpose of this standard is to prescribe test methods for determining the moisture removal capacity and efficiency, the pool heating capacity, and sensible and total cooling capacity for indoor pool dehumidifiers.

## 2. SCOPE

**2.1** This standard applies to indoor pool dehumidifiers using electrically driven, mechanical vapor-compression refrigeration systems consisting of one or more factory-made assemblies that dehumidify and circulate air and may include pool water heating, air reheating, cooling, filtering, and heat recovery.

**2.2** Systems other than the above are excluded.

## 3. INSTRUMENTS

### 3.1 Temperature-Measuring Instruments

**3.1.1** All temperature measurements shall be made in accordance with ANSI/ASHRAE Standard 41.1 *Standard Method for Temperature Measurement*.

### 3.2 Pressure-Measuring Instruments

**3.2.1** Pressure measurements shall be made in accordance with ASHRAE Standard 41.3 *Standard Method for Pressure Measurement*.

### 3.3 Air Differential Pressure and Airflow Measurements

**3.3.1** The static pressure difference across nozzles and velocity pressures at nozzle throats shall be measured according to ASHRAE Standard 41.6 *Standard Method for Measurement of Moist Air Properties*.

### 3.4 Electrical Instruments

**3.4.1** Electrical measurements shall be made with either indicating or integrating instruments.

**3.4.2** Instruments used for measuring the electrical power input to fan motors, compressor motors, or other

equipment accessories shall be accurate to  $\pm 1.0\%$  of the indicated value.

**3.4.3** Instruments used for measuring the electrical power input to heaters or other apparatus furnishing heat loads shall be accurate to  $\pm 1.0\%$  of the quantity measured.

**3.4.4** Voltages shall be measured at the equipment terminals. Instruments used for measuring voltages shall be accurate to  $\pm 1.0\%$  of the quantity measured.

## 3.5 Liquid Flow Measurement

**3.5.1** Water flow rates shall be measured with a liquid flowmeter or quantity meter having an accuracy of  $\pm 1.0\%$  of the indicated value in accordance with ASHRAE Standard 41.8 *Standard Methods of Measurement of Flow of Liquids in Pipes Using Orifice Flowmeters*.

**3.5.2** Condensate collection rates shall be determined using a liquid quantity meter having an accuracy of  $\pm 1.0\%$  of the indicated value.

## 3.6 Time and Mass Measurements

**3.6.1** Time interval measurements shall be made with an instrument having an accuracy of  $\pm 0.2\%$  of the indicated value.

**3.6.2** Mass measurements shall be made with an instrument having an accuracy of  $\pm 1.0\%$  of the indicated value.

## 4. AIRFLOW AND AIR DIFFERENTIAL PRESSURE MEASUREMENT APPARATUS

### 4.1 Air Enthalpy Apparatus

**4.1.1** Recommended configurations for the test apparatus are provided in ASHRAE Standard 41.2 *Standard Methods for Laboratory Air-Flow Measurement* at the desired wet-bulb and dry-bulb temperatures.

### 4.2 Airflow-Measuring Apparatus

**4.2.1** Airflow measurements shall be made in accordance with ASHRAE Standard 41.2 *Standard Methods for Laboratory Air-Flow Measurement*.

### 4.3 External Static-Pressure Measurements.

**4.3.1** External static pressure shall be measured in accordance with ASHRAE Standard 41.2 *Standard Methods for Laboratory Air-Flow Measurement*.

## 5. METHODS OF TESTING AND CALCULATION

### 5.1 Standard Test Method

**5.1.1** The following test method for measuring space-conditioning capacity, for all component arrangements shown in Table 1, is covered in this standard:

a. Indoor Air Enthalpy Method.

**5.1.2** For the validation of the air enthalpy measurements, it is required to use the cooling condensate mass method. Section 5.2 describes a method for measuring cooling condensate and determining moisture removal capacity. Condensate mass measurements shall be  $\pm 5\%$  of measurement of air enthalpy test results.