

PUBLICLY AVAILABLE SPECIFICATION

PRE-STANDARD

Method for measuring performance of portable household electric room air
cleaners



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2008 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00



IEC/PAS 62587

Edition 1.0 2008-09

PUBLICLY AVAILABLE SPECIFICATION

PRE-STANDARD

Method for measuring performance of portable household electric room air
cleaners

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE

ICS 13.040.20

ISBN 2-8318-9932-X

CONTENTS

| | |
|---|----|
| FOREWORD..... | 3 |
| INTRODUCTION..... | 4 |
| 1 Scope..... | 5 |
| 2 Normative references | 6 |
| 3 Terms and definitions | 6 |
| 4 General conditions for measurement | 9 |
| 5 Test procedure for determining performance on cigarette smoke | 11 |
| 6 Test procedure for determining performance on test dust | 13 |
| 7 Test procedure for determining performance on paper mulberry pollen | 14 |
| 8 Calculation procedures (see Annex D)..... | 16 |
| 9 Measurement of operating power..... | 19 |
| 10 Measurement of standby power | 19 |
| 11 Reporting | 20 |
| 12 Safety..... | 20 |
| Annex A (normative) Details of test chamber construction and equipment..... | 21 |
| Annex B (normative) Sources of test materials (equivalent substitutes are acceptable)..... | 27 |
| Annex C (informative) Standard laboratory operation procedures when testing portable room air cleaners | 28 |
| Annex D (informative) Standardization of calculations — Rounding procedures for data and calculations..... | 31 |
| Annex E (informative) Derivation of effective room size | 32 |
| Annex F (informative) Sample data | 34 |
| Annex G (informative) Test stand for wall mount and plug-in type air cleaners | 40 |
| Annex H (informative) Data acquisition — Sequence of steps and timelines..... | 41 |
| Figure A.1 – Air cleaner chamber..... | 22 |
| Figure G.1 – Test stand for wall mount and plug-in type air cleaners | 40 |

INTERNATIONAL ELECTROTECHNICAL COMMISSION

METHOD FOR MEASURING PERFORMANCE OF PORTABLE HOUSEHOLD ELECTRIC ROOM AIR CLEANERS

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

A PAS is a technical specification not fulfilling the requirements for a standard, but made available to the public.

IEC-PAS 62587 has been prepared by the Association of Home Appliance Manufacturers (AHAM) and processed by IEC technical committee 59: Performance of household and similar electrical appliances. It is based on ANSI/AHAM AC-1-2006

The text of this PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document

| Draft PAS | Report on voting |
|------------|------------------|
| 59/499/PAS | 59/506/RVD |

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned will transform it into an International Standard.

This PAS shall remain valid for an initial maximum period of 3 years starting from the publication date. The validity may be extended for a single 3-year period, following which it shall be revised to become another type of normative document, or shall be withdrawn.

INTRODUCTION

This Publicly Available Specification (PAS) contains test procedures for measuring the relative reduction by the air cleaner of particulate matter suspended in the air in a specified test chamber. It also prescribes a method for measuring the operating power and standby power of the air cleaner. The test procedures may be applied to any brand or model of portable household electric room air cleaners within the stated confines of the standard's limits of measurability for measuring performance.

The annexes to this PAS are included for informative purposes only unless the annexes are noted as normative.

This PAS may involve hazardous materials, operations, and equipment. This PAS does not purport to address all of the safety problems associated with its use. It is the responsibility of whoever uses this PAS to consult and establish appropriate safety and health practices and determine the applicability of any regulatory limitations prior to use.

METHOD FOR MEASURING PERFORMANCE OF PORTABLE HOUSEHOLD ELECTRIC ROOM AIR CLEANERS

1 Scope and object

This Publicly Available Specification establishes a system of uniform, repeatable procedures and standard methods for measuring specified product characteristics of portable household electric room air cleaners.

The standard methods provide a means to compare and evaluate different brands of portable household electric room air cleaners regarding characteristics significant to product use.

The standard methods of measurement are not intended to inhibit improvement and innovation in product testing, design or performance.

This standard method applies to portable household electric room air cleaners as defined in Clause 3.

This standard method includes definitions and safety characteristics of portable household electric room air cleaners of the types indicated.

This standard method measures the relative reduction by the air cleaner of particulate matter suspended in the air in a specified test chamber. It also prescribes a method for measuring the operating power and standby power of the air cleaner.

This standard method has defined limits of measurability based on the statistical accuracy of the methods. Based on a 95 % confidence limit (2 standard deviations), a clean air delivery rate (CADR) (see 3.5) cannot be distinguished between zero (0) and a CADR rating less than those CADR limits shown below. Therefore, this PAS only applies to air cleaners with minimum CADR ratings of:

| | |
|-----------------|---------------|
| Dust | CADR = 10 cfm |
| Cigarette smoke | CADR = 10 cfm |
| Pollen | CADR = 25 cfm |

The maximum CADR values are determined based on theoretical maximum limits. The theoretical maximum limits are determined by the maximum number of initial available particles, the acceptable minimum number of available particles, an average background natural decay rate (from statistical study), the size of the chamber, and the available minimum experiment time. CADR values greater than those listed will not have the necessary statistical data required by this method. Therefore, the document only applies to air cleaners with maximum CADR ratings of:

| | |
|-----------------|----------------|
| Dust | CADR = 400 cfm |
| Cigarette smoke | CADR = 450 cfm |
| Pollen | CADR = 450 cfm |

The precision of this document as based on a 0 CADR air cleaner expressed as 2 standard deviation limits (95 %) are:

| | |
|-----------------|---------------------|
| Dust | CADR = ± 10 cfm |
| Cigarette Smoke | CADR = ± 10 cfm |
| Pollen | CADR = ± 25 cfm |

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ASTM E747, *Standard Test Method for Determining Air Change in a Single Zone by Means of a Tracer Gas Dilution*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

aerosol spectrometer

device for measuring particle size distribution in room air (see Annex A)

3.2 Air circulating equipment

3.2.1

ceiling mixing fan

high volume ceiling fan used to mix the chamber during contaminant aerosol generation

3.2.2

recirculation fan

fan capable of producing between 300 cfm and 400 cfm and used for the purpose of maintaining a homogeneous environment within the chamber (as specified in Annex A)

3.3

aerodynamic particle size

classification of particle sizes as spheres of unit density based on terminal settling velocities

3.4

cigarette smoke diluter

device for reducing the concentration of cigarette smoke by a known factor to a level suitable for measurement

3.5

Clean Air Delivery Rate

CADR

measure of air cleaner performance by this test procedure.

NOTE Within the scope of this PAS, CADR is defined as the measure of the delivery of contaminant free air by a portable household electric room air cleaner, expressed in cubic feet per minute (cfm). More technically, clean air delivery rates are the rates of contaminant reduction in the test chamber when the unit is turned on, minus the rate of natural decay when the unit is not running, times the volume of the test chamber as measured in cubic feet (see 8.5). CADRs are always the measurement of a unit's performance as a complete system, and they have no linear relationship to air movement *per se* or to the characteristics of any particular particle removal methodology.

3.6 Design characteristics

3.6.1

fan with filter

air cleaners which operate with an electrical source of power and which contain a motor and fan for drawing air through a filter media