Method for Measuring the Performance of Portable Household Electric Room Air Cleaners Following Accelerated Particulate Loading

AHAM AC-3-2009

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PREFACE

The Association of Home Appliance Manufacturers (AHAM) develops standards in accordance with AHAM's "Policy and Procedures Governing Technical Standards" which states:

> "AHAM Standards shall be in the best interest, mutually, of consumers who use appliances, the industries which provide and service appliances, and other interested parties. They shall relate to actual use conditions, and be technically and scientifically sound."

Use or observance of AHAM standards is voluntary.

This standard contains test procedures which may be applied to any brand or model of portable household electric room air cleaners within the stated confines of the standard's limits for measuring performance. Results of tests in accordance with this standard may be publicly stated in accordance with Section 13, Reporting Results.

When using any of the test procedures to determine performance rating status or to compare the performance of appliances, it is recommended that multiple test units (typically at least 3) be run to ensure that the results obtained are statistically valid.

With regard to safety, AHAM recommends that all appliance products - both major and portable appliances - manufactured or marketed in the United States be submitted to a Nationally Recognized Testing Laboratory (NRTL) for inspection and listing in conformance with the safety standards and procedures followed by such laboratories.

The annexes to this standard are included for informational purposes only unless the annexes are noted as normative.

AHAM welcomes comments and suggestions regarding this standard. Any standard may be reviewed and improved as needed. All standards must be updated or reconfirmed at least every five years. Any interested party, at any time, may request a change in an AHAM standard. Such request should be addressed to AHAM's President, and should be accompanied by a statement of reason for the request and a suggested alternate proposal.

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

TABLE OF CONTENTS

1. PURPOSE

1.1 This test method establishes a uniform, repeatable procedure for measuring a specified product characteristic of portable household electric room air cleaners.

1.2 Used in conjunction with ANSI/AHAM AC-1, this test method provides a means to evaluate and compare the performance of portable household electric air cleaners before and after the air cleaners have been subjected to accelerated particulate loading conditions designed to simulate defined periods of use.

1.3 This test method is not intended to inhibit improvement and innovation in product testing, design or performance.

2. SCOPE

2.1 This test method applies to portable household electric room air cleaners as defined in ANSI/AHAM AC-1.

2.2 This test method is applicable to any type or design of portable electric household electric room air cleaner, provided the device can be adequately plenum mounted since a plenum system is needed to load the particulate matter, and provided the device also meets the conditions specified in 2.3 through 2.5 below.

2.3 The initial and final measurements of performance, know as Clean Air Delivery Rates (CADR) are determined utilizing ANSI/AHAM AC-1. The limits of measurability and precision stated in ANSI/AHAM AC-1 shall apply**.**

Therefore, this standard only applies to portable household electric air cleaners that have a CADR rating that falls within the following ranges (cfm = cubic feet per minute):

Dust	CADR = 10 cfm – 400 cfm
Cigarette smoke	CADR = 10 cfm – 450 cfm
Pollen	CADR = 25 cfm – 450 cfm

NOTE Units that have a lower or upper limit that is outside the range specified are not within the scope of this test method.

2.4 The stated results of this test method include the percentage change in CADR performance after 90 simulated days of filter loading. See Section 13 for more information.

2.5 The maximum air cleaner airflow rate for the method is 600 cfm (16.9 m^3/min). It is necessary to have an air flow rate no greater than 600 cfm in order to be able to aerodynamically load the air cleaner in a plenum with a sufficient mass of loading material.

2.6 The minimum air cleaner airflow rate is 10 cfm (0.283 m^3/min). It is necessary to have an air flow rate of at least 10 cfm in order to adequately transport particles of the loading material to the air cleaner without significant particle loss to gravity or to the plenum walls. At low flow/volume rates below 10 cfm, the drive and assist fans may not operate accurately and reproducibly.

3. DEFINITIONS

The definitions as stated in ANSI/AHAM AC-1 apply. In addition, the following terms used in this test method are defined:

3.1 Filter sets – any combination of individual or multiple filters used and or sold in combination for insertion into an air cleaner for the purpose of removing particulate matter or gaseous contaminants.

3.2 Maintenance – any service or cleaning procedure for the air cleaner defined by the manufacturer for the purpose of removing particulate matter from the filters or cabinet of an air cleaner, including replacement of the filter material or media.

3.3 Transition plenum – that portion of the intake or exhaust plenum that connects directly between the air cleaner and the intake or exhaust plenum.

3.4 Discharge chamber – the exhaust containment structure consisting of the air cleaner exhaust transition plenum (if required), HEPA filter, discharge transition, and exhaust assist fan.

3.5 Intake plenum – round ducted stainless steel comprised of an adjustable intake assist fan (squirrel cage type), dust injection port, cigarette injection port, and auxiliary intake air "T". The plenum connects to the particulate matter injection vessels and the intake transition plenum.

3.6 Dust generator – an assembly providing continuous addition of dust to the intake plenum.

3.7 Cigarette smoke generator – an assembly for the mounting, generation, and delivery of cigarette smoke to the intake plenum. The assembly may be manual, automatic, or semi-automatic.

3.8 Duration Clock – A stop watch or stop clock that is able to record the total length of time for loading. See 5.2.3 for more information.

4. SUMMARY OF THE TEST METHOD

4.1 The test method provides a uniform process for loading a portable electric air cleaner, in an accelerated manner, with a specific amount of particulate matter that the portable electric air cleaner would normally be subjected to during a specific period of time and evaluating the effect of the accelerated loading on the performance of the air cleaner.

4.2 Prior to initiating the accelerated particulate loading, the portable electric air cleaner's performance shall be evaluated in accordance with ANSI/AHAM AC-1 to determine the initial CADR values.

4.3 The portable electric air cleaner shall then be loaded utilizing elevated particulate matter concentrations through an open loop system over a short time period (accelerated loading).

4.4 The test plenum design and portable electric air cleaner connections utilized during the loading process are constructed such that a standardized intake and exhaust plenum may be modified to fit a wide variety of air cleaners. Air plenums linking the air cleaner intake and exhaust ports are connected using standard, accepted angles to prevent aerodynamic loss of particles, and to uniformly load the air cleaner with particulate matter.