ADDENDA

ANSI/ASHRAE Addendum g to
ANSI/ASHRAE Standard 52.2-2012

Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size

Approved by ASHRAE on December 30, 2016, and by the by the American National Standards Institute on December 30, 2016.

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FOREWORD

Due to the frequent practice of prefiltering, filters are often used in two-stage systems. Because the first filter removes some of the particles from the airstream, the downstream filter sees fewer large particles and a greater percentage of smaller particles. This results in a different performance for the downstream (final) filter than would be expected based on loading with the same dust as the prefilter. Thus, an optional test method has been developed to allow standard testing for two-stage systems.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum g to Standard 52.2-2012

Add new Informative Appendix K.

INFORMATIVE APPENDIX K OPTIONAL METHOD OF TESTING TWO AIR FILTERS ARRANGED IN SERIES IN A SYSTEM TO EVALUATE PARTICLE REMOVAL, DUST LOADING, AND PRESSURE DROP INCREASE THAT MIGHT BE REALIZED IN FIELD APPLICATIONS

K1. PURPOSE OF OPTIONAL TEST

This appendix is to be used to evaluate the performance of two air-cleaning devices arranged in airflow series. In this appendix the first filter serves as a prefilter and the second filter serves as the final filter. It is possible for both filters to be the same filter. The test protocol is based on ASHRAE Standard 52.2. Equipment and procedures specified in Standard 52.2 are used to conduct this test.

This procedure measures the ability of the prefilter and final filter to remove dust as the filters become loaded with a standardized loading dust. The loading dust is fed at intervals to simulate accumulation of particles during filter service life. Resistances of the individual filters are monitored separately. The prefilter is replaced with a new prefilter whenever its preselected final resistance is reached. This process is continued until the preselected resistance of the final filter is reached. After the initial particle size efficiency (PSE) test, the resistance of the final filter is used to position the five additional PSE tests.

K2. DEFINITIONS AND ACRONYMS

K2.1 Definitions to be used in addition to those listed in Section 3 of Standard 52.2 are as follows:

dust-holding capacity final filter (DHCFF): the total weight of the synthetic loading dust captured by the second-in-series air-cleaning device over the dust-loading steps until the final filter reaches it predetermined final resistance.

dust-holding capacity prefilter #1 (DHCPF1): the total weight of the synthetic loading dust captured by the first-in-series air-cleaning device over the dust-loading steps until the prefilter reaches its predetermined final resistance. Each additional prefilter designation would be the next incremental numerical digit, i.e., DHCPF2, DHCPF3.

final filter: the second filter in the two-stage system.

prefilter: the first filter in the two-stage system.

total system dust-holding capacity (TDHC): the sum total weight of the synthetic loading of all prefilters and the final filter.

K3. SUBSECTION TO BE USED WITH SECTION 7.2, "PREPARATION OF THE SAMPLES"

K3.1 The devices shall be installed in the duct with a space between the filters of 203 to 914 mm (8 to 36 in.).

K3.2 Distance between devices should be documented in the test report.

K4. SUBSECTION TO BE USED WITH SECTION 8.2, "TEST PROCEDURES"

K4.1 Test Sequence. The sequence of tests on the two-stage system shall be as follows:

a. Resistance vs. airflow rate of the prefilter at various airflow rates as prescribed in Section 9.
b. Resistance vs. airflow rate of the final filter at various airflow rates as prescribed in Section 9.
c. PSE prescribed in Section 10.7.1.2(b) to be replaced with the following: *The prefilter after an initial conditioning step with a dust loading of 30 g or an increase of 10 Pa (0.04 in. of water) pressure drop across the prefilter, whichever comes first.*
d. PSE prescribed in Section 10.7.1.2(c) to be replaced with the following: *After the dust-loading increments have achieved an airflow resistance increase of one-quarter, one-half, and three-quarters of the difference between the beginning and the prescribed end-point limit of airflow resistance for the final filter.*
e. PSE prescribed in Section 10.7.1.2(d) to be replaced with the following: *After the dust increment that loads the final filter to its prescribed end point resistance limit.*

K5. SUBSECTION TO BE USED WITH SECTION 9, "MEASUREMENT OF RESISTANCE VERSUS AIRFLOW"

K5.1 Measure, record, and report the resistance of the prefilter, the final filter, and the system at a minimum of four airflow rates: 50%, 75%, 100%, and 125% of test airflow rate. Resistance shall be measured between the static taps.

K6. SUBSECTION TO BE USED WITH SECTION 10.7.2, "DUST LOADING PROCEDURES"

K6.1 When the prefilter reaches its prescribed final resistance, it shall be replaced by a clean prefilter. The replacement filter shall be identical to the one being replaced.

K6.2 Repeat the prefilter replacement process until the final filter reaches its final resistance.

K6.3 Weigh each prefilter to the nearest 0.1 g before and after use to determine dust weight gain (DWG).

K6.4 Weigh final filter to the nearest 0.1 g before and after use to determine dust weight gain (DWG).

K7. SUBSECTION TO BE USED WITH SECTION 10.8, "REPORTING RESULTS OF LOADING TESTS"

K7.1 Results of loading tests shall be reported in the form of PSE curves for the two-stage system:

a. clean;
b. after each incremental dust loading of the final filter, a total of four curves; and
c. at final filters final loading point.

K8. SUBSECTION TO BE USED WITH SECTION 11, "REPORTING RESULTS"

K8.1 The summary section of the performance report shall include the following information.

a. Name and location of the test laboratory
b. Date of the test
c. Test operator's names
d. Brand and model number of the particle counting and sizing devices
e. Air cleaner manufacturer's name (or name of the marketing organization if different from the manufacturer)
f. How the sample was obtained
g. Description of each test air cleaner, including the following:
    1. Brand and model number
    2. Physical description of construction (e.g., extended surface—number of pockets or number of pleats; pleated panel—number and depth of pleats)
    3. Face dimensions and depth
    4. For fiber media air cleaners
        i. Type and color of media
        ii. Effective media area
        iii. Type and amount of dust adhesive if known
        iv. Electrostatic charge if known
    5. Any other pertinent descriptive attributes
h. Operating data as stated by the manufacturer
    1. Test conditions for reporting purposes: airflow rate
    2. Final resistances for both air cleaners
    3. Any other operating data furnished
i. Test data
    1. Test air temperature and relative humidity
    2. Airflow rate
    3. Type of test aerosol
    4. Distance between the two filters from back edge of prefilter to front edge of final filter
j. Results of resistance testing
    1. Initial resistance of prefilter
    2. Initial resistance of final filter
    3. Initial resistance of system
    4. Final resistance of system
    5. Number of times the prefilter is changed
k. Performance curves
    1. A curve in Figure 11-1b format of the prefilter, final filter, and system resistance when clean vs. airflow rates from 50% to 125% of test flow
    2. A curve in Figure 11-1c format of PSE for the clean system and for the system at each of the five loading stages of the final filter
    3. A minimum PSE composite curve in Figure 11-1c format whose data points are the lowest PSEs from the six measurements in each particle size range from the curves of test results for the system
    4. Resistance vs. synthetic loading dust fed during the entire test sequence for prefilter, final filter, and system
l. Average ASHRAE dust arrestance
m. Dust holding capacity (DHC)
    1. A DHC for each prefilter
    2. A DHC for the final filter
    3. A DHC for the entire test cycle

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the standards and guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive technical committee structure, continue to generate up-to-date standards and guidelines where appropriate and adopt, recommend, and promote those new and revised standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating standards and guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.