



**BSR/ASHRAE Addendum n
to ANSI/ASHRAE Standard 62.1-2019**

Public Review Draft

Proposed Addendum n to Standard 62.1-2019, Ventilation and Acceptable Indoor Air Quality

**First Public Review (June 2022)
(Draft shows Proposed
Changes to Current Standard)**

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ASHRAE, 180 Technology Parkway, Peachtree Corners, Georgia 30092

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FOREWORD

The Indoor Air Quality procedure (IAQP) requires that a mass balance calculation be performed. Any mass balance that includes filtration or air cleaning requires a particle filtration efficiency or gaseous removal efficiency. This addendum requires that the efficiencies of these devices be tested to current standards. However, with no specific testing requirements, there is no assurance that designs will work.

ASHRAE's Position Document on Filtration and Air Cleaning¹ (January 2015) states "All filtration and air-cleaning technologies should be accompanied by data documenting their performance regarding removal of contaminants; these data should be based on established industry test standards." Previous draft addenda to the standard included testing to ASHRAE standards but were viewed by some as being overly restrictive. This addendum is more inclusive, citing ISO standards for example. To ensure objectivity for test equipment suppliers, no specific design of the test apparatus is specified. Instead requirements of apparatus properties and validation tests are specified.

¹ASHRAE Position Document on filtration and air cleaning. January 29, 2015. Atlanta: ASHRAE.
<https://www.ashrae.org/File%20Library/About/Position%20Documents/Filtration-and-Air-Cleaning-PD.PDF>

[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~striketrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]

Addendum n to 62.1-2019

Add New Section 6.3.4 as shown below. Renumber other sections and tables as appropriate.

6.3.4 Air cleaning. Where particulate matter or gas phase air cleaning is included in the design, the removal efficiencies shall be specified as follows. Particulate matter filters shall report an efficiency reporting value (MERV) in accordance with ASHRAE Standard 52.2¹² or reporting in accordance with ISO 16890^x. Gas phase air cleaners shall report an efficiency test for all compounds included in the design in accordance with any of the following:

1. ASHRAE Standard 145.2^{xx}
2. ISO 10121-2^{oo}
3. Testing by methods in Section 6.1.2, 10.4, and 10.5 and reported as required in Section 11 of ASHRAE Standard 145.2
4. Testing to a national consensus standard approved by the authority having jurisdiction.
5. For technologies not covered by any of the above, tests developed to demonstrate the removal efficiency shall be performed by a third-party. The custom efficiency test shall be conducted for all compounds included in the design and shall comply with the following:
 - A. Test of the background concentration without the air cleaning in operation
 - B. Test of the output concentration with the air cleaning in operation

- C. Be conducted under air cleaning operating conditions that matches the IAQP design operating conditions
 Informative note: Air cleaning operating conditions include fan voltage, flow rate, and other settings that are consistent with the manufactures operating specifications.
- D. Be conducted using the relevant laboratory methods for analysis and quantification as specified in Table 7.1. Inorganic compounds and PM_{2.5} may be measured instead using direct read instruments that are calibrated in accordance with the device manufacturer’s recommendations, capable of measuring below the design limit, and consistent with the performance requirements specified in Table 7.2.

Any custom efficiency test description, covering points 1 to 4 above and challenge test concentration shall be documented and approved by the authority having jurisdiction. All test results along with relevant equipment settings shall be provided upon request.

Table 7.1. Allowed laboratory test methods

Compound	Allowed Test Methods
VOCs except formaldehyde, acetaldehyde and acetone	ISO 16000-6 ^{YY} ; EPA IP-1 ^{GG} , EPA TO-17 ^{EE} ; ISO 16017-1 ^{AA} ; ISO 16017-2 ^{BB} ; ASTM D6345-10 ^{KK}
Formaldehyde, acetaldehyde and acetone	ISO 16000-3 ^{ZZ} ; EPA TO-11 ^{FF} ; EPA IP-6 ^{II} ; ASTM D5197 ^{LL}
carbon monoxide	ISO 4224 ^{DD} ; EPA IP-3 ^{HH}

Table 7.2. Direct reading instruments minimum specifications

	Ozone	PM _{2.5}	CO
Accuracy (±)	5 ppb	Greater of 5 µg/m ³ or 20% of reading	Greater of 3 ppm or 20% of reading
Resolution (±)	1 ppb	5 µg/m ³	1 ppm

Add the following reference to Section 9. The remainder of Section 9 is unchanged.

9. References

- XX. *ANSI/ASHRAE Standard 145.2-2016, Laboratory Test Method for Assessing the Performance of Gas-Phase Air-Cleaning Systems: Air-Cleaning Devices.* Atlanta: ASHRAE.
- YY. *ISO Standard 16000-6 (2011), Indoor air -- Part 6: Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA sorbent, thermal desorption and gas chromatography using MS or MS-FID.* Geneva, Switzerland, International Organization for Standardization.
- ZZ. *ISO Standard 16000-3 (2011), Indoor air -- Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air -- Active sampling method.* Geneva, Switzerland, International Organization for Standardization
- FF. *EPA TO-11 (1999). Determination of Formaldehyde in Ambient Air Using Adsorbent Cartridge Followed by High Performance Liquid Chromatography (HPLC) [Active Sampling Methodology] in Compendium*

- of Methods for the Determination of Toxic Organic Compounds in Ambient Air*, Second Edition. Cincinnati, OH, USEPA
- II. *EPA IP-6 (1990). Determination of Formaldehyde or other Aldehydes in Indoor Air in Compendium of Methods for the Determination of Air Pollutants in Indoor Air.* RTP, NC, USEPA
- LL. *ASTM D5197 (2016). Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology).* ASTM International, West Conshohocken, PA.
- MM. *ISO 16000-24:2018 Indoor air -- Part 24: Performance test for evaluating the reduction of volatile organic compound concentrations by sorptive building materials.* Geneva, Switzerland, International Organization for Standardization.
- NN. *ISO 16000-23:2018 Indoor air -- Part 23: Performance test for evaluating the reduction of formaldehyde and other carbonyl compounds concentrations by sorptive building materials.* Geneva, Switzerland, International Organization for Standardization.
- OO. *ISO 10121-2:2013. Test methods for assessing the performance of gas-phase air cleaning media and devices for general ventilation -- Part 2: Gas-phase air cleaning devices (GPACD).* Geneva, Switzerland, International Organization for Standardization
- GG. *EPA IP-1 (1990). Determination of Volatile Organic Compounds (VOCs) in Indoor Air in Compendium of Methods for the Determination of Air Pollutants in Indoor Air.* RTP, NC, USEPA.
- EE. *EPA TO-17 (1999). Determination of Volatile Organic Compounds in Ambient Air Using Active Sampling Onto Sorbent Tubes in Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*, Second Edition. Cincinnati, OH, USEPA.
- AA. *ISO Standard 16017-1 (2000), Indoor, ambient and workplace air -- Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography -- Part 1: Pumped sampling.* Geneva, Switzerland, International Organization for Standardization.
- BB. *ISO Standard 16017-2 (2003), Indoor, ambient and workplace air -- Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography -- Part 2: Diffusive sampling.* Geneva, Switzerland, International Organization for Standardization.
- KK. *ASTM D6345-10 (2010). Standard Guide for Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air.* ASTM International, West Conshohocken, PA.
- DD. *ISO Standard 4224 (2000), Ambient air -- Determination of carbon monoxide -- Non-dispersive infrared spectrometric method.* Geneva, Switzerland, International Organization for Standardization.
- HH. *EPA IP-3 (1990). Determination of Carbon Monoxide (CO) or Carbon Dioxide (CO₂) in Indoor Air in Compendium of Methods for the Determination of Air Pollutants in Indoor Air.* RTP, NC, USEPA.