



# ADDENDA

**ANSI/ASHRAE Addendum c to  
ANSI/ASHRAE Standard 161-2013**

# Air Quality within Commercial Aircraft

Approved by the ASHRAE Standards Committee on January 28, 2017; by the ASHRAE Tech Council on February 1, 2017; and by the American National Standards Institute on February 2, 2017.

This addendum was approved by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE website ([www.ashrae.org](http://www.ashrae.org)) or in paper form from the Senior Manager of Standards.

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: 678-539-2129. 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).

© 2017 ASHRAE

ISSN 1041-2336



**ASHRAE Standing Standard Project Committee 161**  
**Cognizant TC: 9.3 (Lead), Transportation Air Conditioning and**  
**4.3 (Co-Cognizant), Ventilation Requirements and Infiltration**  
**SPLS Liaison: John F. Dunlap**

Paul A. Lebbin,* <i>Chair</i>	Karen Galanyk*	Christopher S. McDaniel
Judith Anderson,* <i>Secretary</i>	John M. Hall*	Daniel Reimers
Peggy Bendfeldt*	Michael Holland	David A. Rod*
Frank M. Brehany*	Jerome Johnston*	Steven J. Tochilin*
Waller S. Clements*	Byron W. Jones*	Chris Witkowski
Christopher L. Click	Joshua B. Kelton*	
Richard B. Fox*	Michael Massoni*	

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

---

**ASHRAE STANDARDS COMMITTEE 2016–2017**

Rita M. Harrold, <i>Chair</i>	Michael W. Gallagher	Cyrus H. Nasser
Steven J. Emmerich, <i>Vice-Chair</i>	Walter T. Grondzik	David Robin
James D. Aswegan	Vinod P. Gupta	Peter Simmonds
Niels Bidstrup	Susanna S. Hanson	Dennis A. Stanke
Donald M. Brundage	Roger L. Hedrick	Wayne H. Stoppelmoor, Jr.
Drury B. Crawley	Rick M. Heiden	Jack H. Zarour
John F. Dunlap,	Srinivas Katipamula	William F. Walter, <i>BOD ExO</i>
James W. Earley, Jr.	Cesar L. Lim	Patricia Graef, <i>CO</i>
Keith I. Emerson	Arsen K. Melikov	
Julie M. Ferguson	R. Lee Millies, Jr.	

Stephanie C. Reiniche, *Senior 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 Senior 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.

**(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 objections on informative material are not offered the right to appeal at ASHRAE or ANSI.)**

## FOREWORD

*Addendum c references a 2015 ICAO document regarding airline worker education/training relevant to onboard fume events, and revises Section 8.10 (formerly titled "Pesticides") with more emphasis on non-chemical methods of insect control on aircraft.*

**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 c to Standard 161-2013

*Revise Section 8.1 as shown. The remainder of Section 8.1 is unchanged.*

### 8.1 Introduction

[...] In many cases, to implement these provisions, it will be necessary to train relevant personnel, which may include the mechanics, ground staff, flight attendants, and pilots; see ICAO, 2015(a)<sup>27</sup> for guidance. [...]

*Revise Section 8.2 as shown. The remainder of Section 8.2 is unchanged.*

Control Measures	
Design	[...]
Monitoring	[...]
Remedies	a. Responsible employees shall be given training, supplies, and time to clean contaminated surfaces in order to mitigate potential health hazards associated with crew or passenger contact; see ICAO, 2015(a) <sup>27</sup> for guidance. [...]

*Revise Section 8.10 as shown. The remainder of Section 8.10 is unchanged.*

Control Measures	
Design	The availability, feasibility, and efficacy of non-chemical disinsection methods (e.g., air curtains) should be evaluated and, working with countries that require disinsection and with the World Health Organization, approval for these methods should be sought, as recommended in FAL/12 WP/117 (ICAO, 2001). <u>Nonchemical disinsection methods (e.g., air curtains and net doors) that are at least as effective as currently approved chemical methods should be utilized on aircraft in operation, both to prevent the transport of insects that carry vector-borne disease and to prevent aircraft occupant exposure to insecticides. Any disinsection method must first be approved by the World Health Organization per ICAO Standard 2.25 (ICAO, 2015[b])<sup>21</sup>.</u>
Maintenance	a. <u>Nonchemical disinsection methods are preferred, but if chemical methods are used then, if a country will accept application on an unoccupied aircraft, then this method shall be applied instead of in-flight application.</u> b. <u>Nonchemical disinsection methods are preferred, but if chemical methods are used then, for disinsecting an unoccupied aircraft (e.g., residual or blocks-away application), a program to ensure that the aircraft is properly vented following pesticide application shall be developed, implemented, and enforced, such that the surfaces (including the flight deck, galleys, seats, crew rest areas and overhead bins) are dry and all areas of the cabin are odor free before crew members and passengers are expected to board. For reference, the U.S. Navy requires that their submarines are ventilated and unoccupied for 24 hours following residual pesticide application.</u> c. <u>Nonchemical disinsection methods are preferred, but if chemical methods are used then crew rest areas (including mattresses and bedding) in the crew rest areas, bassinets, and food preparation areas shall not be sprayed, be treated off the aircraft and left until completely dry for a minimum of three days before being returned to the aircraft.</u>
Operation	[...]
Remedies	[...]

**Revise Section 10 as shown. The remainder of Section 10 is unchanged.**

## 10. REFERENCES

[...]

21. ICAO, 2004. 12th Meeting of the Facilitation (FAL) Division of the International Civil Aviation Organization, Working Paper 117 (FAL/12-WP/117), Cairo, Egypt.

21. ICAO, 2015b. “Annex 9 to the Convention on International Civil Aviation: Facilitation,” 14<sup>th</sup> Edition, International Standards and Recommended Practices. International Civil Aviation Organization, Montreal, Canada, Oct. 2015.

[...]

27. ICAO, 2015a. “Circular 344: Guidelines on Education, Training, and Reporting Practices related to Fume Events.” Cir. 344- AN/202, International Civil Aviation Organization, Montreal, Canada, Nov. 2015.

## **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.

### **About ASHRAE**

ASHRAE, founded in 1894, is a global society advancing human well-being through sustainable technology for the built environment. The Society and its members focus on building systems, energy efficiency, indoor air quality, refrigeration, and sustainability. Through research, Standards writing, publishing, certification and continuing education, ASHRAE shapes tomorrow's built environment today.

For more information or to become a member of ASHRAE, visit [www.ashrae.org](http://www.ashrae.org).

To stay current with this and other ASHRAE Standards and Guidelines, visit [www.ashrae.org/standards](http://www.ashrae.org/standards).

### **Visit the ASHRAE Bookstore**

ASHRAE offers its Standards and Guidelines in print, as immediately downloadable PDFs, on CD-ROM, and via ASHRAE Digital Collections, which provides online access with automatic updates as well as historical versions of publications. Selected Standards and Guidelines are also offered in redline versions that indicate the changes made between the active Standard or Guideline and its previous version. For more information, visit the Standards and Guidelines section of the ASHRAE Bookstore at [www.ashrae.org/bookstore](http://www.ashrae.org/bookstore).

### **IMPORTANT NOTICES ABOUT THIS STANDARD**

**To ensure that you have all of the approved addenda, errata, and interpretations for this Standard, visit [www.ashrae.org/standards](http://www.ashrae.org/standards) to download them free of charge.**

**Addenda, errata, and interpretations for ASHRAE Standards and Guidelines are no longer distributed with copies of the Standards and Guidelines. ASHRAE provides these addenda, errata, and interpretations only in electronic form to promote more sustainable use of resources.**