ADDENDA

ANSI/ASHRAE Addendum g to
ANSI/ASHRAE Standard 161-2018

Air Quality within Commercial Aircraft

Approved by ASHRAE and the American National Standards Institute on November 30, 2023.

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. Instructions for how to submit a change can be found on the ASHRAE® website (www.ashrae.org/continuous-maintenance).

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FOREWORD

Addendum g updates normative and informative references. Current versions of the references in Addenda b, c, d, and e to Standard 161-2018 have been incorporated. Addenda a through f to Standard 161-2018 can be downloaded for free at www.ashrae.org/addenda.

Informative 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 161-2018

Revise Section 3 as shown. The remainder of Section 3 is unchanged.

aircraft, commercial: an aircraft engaged in common carriage according to FAA AC120-12A~~8300:10~~ [2].

Revise Section 4 as shown.

4. COMPLIANCE

To comply with this standard, the requirements of Sections 5, 6, 7, 8, 9, and 10 shall be met. This standard is intended to be independent of specific aircraft systems and equipment.

Applying this standard requires some knowledge of common aircraft environmental control systems and equipment. Descriptions of common environmental controls systems and equipment may be found in *ASHRAE Handbook—HVAC Applications*, Chapter 13~~12~~ [3].

Revise Section 8.3 as shown. The remainder of Section 8.3 is unchanged.

8.3 Deicing Fluid. See also Section 8.2.

Control Measures	
[. . .]	
Operation	a. Deicing fluid shall not be sprayed into the engine or APU inlets during application. High-pressure sprays shall be directed to prevent impact directly on entry door seals and flight deck window seals during application. Alternative deicing procedures and products, such as infrared deicing, which is described in U.S. Federal Aviation Administration Advisory Circular (AC) 150-5300-14D [14], may reduce the likelihood of contamination. b. Pilots shall turn off the bleed air, air-conditioning packs, and ground conditioned air sources during the application of deicing fluids.

Revise Section 8.7 as shown. The remainder of Section 8.7 is unchanged.

8.7 Engine Oil. See also Section 8.2.

Control Measures	
Design	a. Engine design features that minimize the potential for engine oil and/or its byproducts to enter the cabin and flight deck air supplies shall be evaluated and implemented, where possible, on new and current engine designs. Such measures include, but are not limited to, the design of more robust oil seals and improved oil reservoir design to include a placard at each servicing point with specific instructions not to overservice and to prevent spillage. b. Information on the content of individual isomers of TCPs in engine oils used in the airline industry shall be made available to crew members as required by Title 29 CFR Section 1910.1200~~25~~26. Products with reduced content of ortho-TCPs that still provide the required performance characteristics for the specific application should be selected.
[. . .]	

Revise Section 8.9 as shown. The remainder of Section 8.9 is unchanged.

8.9 Bacteria and Viruses

Control Measures	
[. . .]	
Maintenance	a. Passengers who have symptoms of both a fever and either a rash or a persistent cough shall not be boarded. In the event that a crew member is concerned that a boarded passenger may have a serious infectious disease, the person in question should be separated from close contact with others and asked to wear a filtering face mask to reduce the number of droplets coughed into the air, as specified in Title 14 CFR 382.51 [15]. b. Air supply systems should be operated such that the minimum per-person ventilation rate in each part of the cabin, as defined in Section 5, assuming full occupancy, is maximized in order to minimize the residency time of particulate contaminants, including viruses and bacteria. c. Crew-member immunizations pertaining to the hazards that they incur as a result of their duties should be maintained, as specified in Title 14 CFR 121.~~801~~805 [16].
[. . .]	

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

8.10 Disinsection Methods to Comply with Relevant Quarantine Regulations

Control Measures	
[. . .]	
Operation	a. To ensure that disinsection is justified, governments that enforce disinsection rules on arriving aircraft shall be asked at least annually for documentation on the threats posed by imported insects. b. When the aircraft systems permit, air packs shall be operated with the highest available flow of outside air during the 24 hours following residual application, when occupied. (See U.S. Navy Shipboard Pest ~~Control~~Management Manual [21] for related information.) c. Air packs shall be operated on the highest flow setting after in-flight spraying. d. Nonchemical methods of disinsection are preferred, but if chemical methods are used then routing schedules of sprayed aircraft shall be reviewed with intent to minimize the number of pesticide applications and minimize the number of residually treated aircraft operated on flights that do not require disinsection[22].
[. . .]	

Revise Section 11 as shown.

11. REFERENCES

1. FAA. ~~1996~~2023. *Code of Federal Regulations*. Title 14, Part 25, Airworthiness Standards: Transport Category Airplanes. Washington, DC: U.S. Government Publishing Office. ***Informative Note:*** Although the scope of this standard references Title 14 CFR 25 to define the category of aircraft to which the standard applies, it is not intended to exclude aircraft of the same category certified in other jurisdictions.
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16. FAA. 2001. *Code of Federal Regulations*. Title 14, Part 121, Operating Requirements: Domestic, Flag and Supplemental Operations, Section ~~801~~805: Crewmember training for in-flight medical events. Washington, DC: U.S. Government Publishing Office.
17. CDC. 201703. *Code of Federal Regulations*. Title 42, Part 71, Foreign Quarantine, Section 1: Definitions. Washington, DC: U.S. Government Publishing Office.
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Revise Section A4.19 as shown.

A4.19 Refrigerants. In most aircraft, regardless of size, refrigerants in vapor cycle air-conditioning units are used to cool food and beverages. In smaller aircraft, this technology is also sometimes used for cabin cooling. Airline crew and passengers may be exposed to these refrigerants if there is a leak, and maintenance crews may be exposed when servicing the systems. For galley cooling units, R-134a is currently the most commonly used refrigerant. Exposure concerns have been raised, both for materials safety and occupant health (FAA 2022~~1994~~). For example, gaskets, seals, motor windings, and insulation may deteriorate after contact with R-134a. Similar concerns have been raised about some possible replacement refrigerants. Reviews on the health hazards associated with exposure to R-134a are mixed. One human inhalation study reported no adverse effects over a range of exposures considerably higher and longer in duration than in recommended exposure guidelines (Emmens et al. 2000). Conversely, some adverse health effects have also been reported for human inhalation of R-134a during controlled conditions, even though the exposures were within published exposure guidelines (USAF 1997). Dizziness and loss of concentration, as well as skin and eye irritation, have also been reported at concentrations within published exposure guidelines. Central nervous system depression, irregular heartbeat, and even death by asphyxiation have been reported with exposure to especially high concentrations (EPA 2009). In the U.S., substitutes to R-134a are being studied for use in automobiles to harmonize with European initiatives (Monforte and Caretto 2009; EPA ~~2008a,~~ 2008~~b~~). Human toxicity and flammability studies are necessary prior to using alternative refrigerants on commercial aircraft.

Revise Section A.5 as shown.

A5. APPENDIX A REFERENCES

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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.

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