



ADDENDA

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

Air Quality within Commercial Aircraft

Approved by the ASHRAE Standards Committee on February 1, 2017; by the ASHRAE Board of Directors on February 1, 2017; and by the American National Standards Institute on March 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) or in paper form from the Senior Manager of Standards.

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ISSN 1041-2336



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

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FOREWORD

This addendum requires documentation of abnormal cabin air quality conditions and provides a recommended template for collecting relevant data.

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

Addendum a to Standard 161-2013

Add a new Section 10 and a new Figure 10.1 as shown below. Figure 10.1 is completely new; however, it is not shown in underline here. Renumber the current Section 10 (References) as Section 11.

10. DOCUMENTATION

Pilots, cabin crew, and maintenance workers shall be required to document abnormal air quality conditions (including airborne contaminants, cabin pressure, ventilation, and thermal conditions) with their airline on a standardized reporting form (paper, online, or both). Personnel shall be trained in the proper use of this reporting system. The requirement to complete this reporting form shall be referenced in the relevant airline operational manuals for pilots, cabin crew, and maintenance staff. The data from these forms (after appropriately redacting the names of the reporter or reporters to protect their privacy) shall also be reported to the relevant manufacturer(s) and regulatory agency and shall be incorporated into voluntary reporting systems (if applicable). The reporting form shall be completed and submitted as soon as practicable and shall include, at a minimum, the fields listed in Figure 10.1.

Note: Maintenance personnel need your help to troubleshoot cabin air quality issues. Your time will help return the aircraft to service quickly and prevent a repeat of this problem. Thank you!

| | |
|---|--|
| Form completed by: <input type="checkbox"/> pilot <input type="checkbox"/> cabin crew <input type="checkbox"/> maintenance <input type="checkbox"/> other: _____ | Event date: (DD/MM/YYYY): _____ Airline: _____ |
| Reporter name: _____ Employee no.: _____ Email or phone: _____ (preferred means of communication) | Aircraft type: _____ Aircraft no: _____ Flight no: _____ If not applicable, check here: <input type="checkbox"/> City pair: _____ to _____ Total flight hours: _____ |
| Abnormal conditions noted by: <input type="checkbox"/> pilot(s) <input type="checkbox"/> cabin crew <input type="checkbox"/> passenger(s) | |
| Incident type: <input type="checkbox"/> airflow <input type="checkbox"/> cabin pressure <input type="checkbox"/> contaminant(s) <input type="checkbox"/> humidity <input type="checkbox"/> insecticides (disinsection) <input type="checkbox"/> thermal <input type="checkbox"/> other: _____ | Recent history of similar conditions on same a/c? <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> don't know Number of days since last related logbook entry: _____ |
| Air supply source: <input type="checkbox"/> APU <input type="checkbox"/> engines <input type="checkbox"/> don't know <input type="checkbox"/> high pressure ground air <input type="checkbox"/> preconditioned air <input type="checkbox"/> other: _____ Altitude (if known): _____ | Recent aircraft service history: <input type="checkbox"/> aircraft deiced <input type="checkbox"/> none <input type="checkbox"/> maintenance activity <input type="checkbox"/> pesticide application <input type="checkbox"/> unknown service history <input type="checkbox"/> engine/APU oil serviced <input type="checkbox"/> hydraulic fluid serviced <input type="checkbox"/> other: _____ |
| ECS configuration: <input type="checkbox"/> known <input type="checkbox"/> unknown If known, describe options for packs/bleeds configuration: _____ _____ | Phase(s) of flight: <input type="checkbox"/> gate <input type="checkbox"/> cruise <input type="checkbox"/> engine start <input type="checkbox"/> top of descent <input type="checkbox"/> taxi out <input type="checkbox"/> descent <input type="checkbox"/> take off <input type="checkbox"/> landing <input type="checkbox"/> climb <input type="checkbox"/> taxi in |

FIGURE 10-1 Smoke/fumes reporting form (for each question, mark all that apply).

| | | | | | | | | | | | |
|---|--|--------------------------------|-------------------------------|--|--------------------------------------|--------------------------------------|--|-------------------------------------|---------------------------------------|--|---------------------------------------|
| <p>Packs/bleed configuration? <input type="checkbox"/> normal <input type="checkbox"/> abnormal <input type="checkbox"/> don't know</p> <p>Was ECS modified from original design? <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> don't know</p> <p>Number of engine/APU/airframe flight cycles if known: _____/_____/_____</p> | <p><input type="checkbox"/> top of climb <input type="checkbox"/> gate</p> <p>Estimated duration of incident: _____ (hrs.) _____ (mins.) _____ (sec.)</p> <p>Locations: <input type="checkbox"/> cabin; if cabin <input type="checkbox"/> forward <input type="checkbox"/> flight deck <input type="checkbox"/> mid <input type="checkbox"/> aft</p> <p>If more than one location is checked, then circle the location where the condition was most noticeable.</p> | | | | | | | | | | |
| <p>If incident type = airflow: <input type="checkbox"/> insufficient airflow <input type="checkbox"/> draftiness <input type="checkbox"/> noisy ducts <input type="checkbox"/> other: _____</p> | <p>If incident type = contaminant(s):</p> <p>Fumes/odor? <input type="checkbox"/> yes <input type="checkbox"/> no Visible smoke/haze? <input type="checkbox"/> yes <input type="checkbox"/> no</p> <p>Describe any odor:</p> | | | | | | | | | | |
| <p>If incident type = thermal: <input type="checkbox"/> too hot <input type="checkbox"/> too cold <input type="checkbox"/> door seal draft <input type="checkbox"/> other: _____</p> | <p>Describe any odor:</p> <table border="0"> <tr> <td><input type="checkbox"/> acrid</td> <td><input type="checkbox"/> fuel</td> </tr> <tr> <td><input type="checkbox"/> deicing</td> <td><input type="checkbox"/> musty/moldy</td> </tr> <tr> <td><input type="checkbox"/> dirty socks</td> <td><input type="checkbox"/> oily</td> </tr> <tr> <td><input type="checkbox"/> electrical</td> <td><input type="checkbox"/> pungent/foul</td> </tr> <tr> <td><input type="checkbox"/> exhaust</td> <td><input type="checkbox"/> other: _____</td> </tr> </table> | <input type="checkbox"/> acrid | <input type="checkbox"/> fuel | <input type="checkbox"/> deicing | <input type="checkbox"/> musty/moldy | <input type="checkbox"/> dirty socks | <input type="checkbox"/> oily | <input type="checkbox"/> electrical | <input type="checkbox"/> pungent/foul | <input type="checkbox"/> exhaust | <input type="checkbox"/> other: _____ |
| <input type="checkbox"/> acrid | <input type="checkbox"/> fuel | | | | | | | | | | |
| <input type="checkbox"/> deicing | <input type="checkbox"/> musty/moldy | | | | | | | | | | |
| <input type="checkbox"/> dirty socks | <input type="checkbox"/> oily | | | | | | | | | | |
| <input type="checkbox"/> electrical | <input type="checkbox"/> pungent/foul | | | | | | | | | | |
| <input type="checkbox"/> exhaust | <input type="checkbox"/> other: _____ | | | | | | | | | | |
| <p>If incident type = insecticides/disinsection: <input type="checkbox"/> can spray application <input type="checkbox"/> residual treatment <input type="checkbox"/> don't know</p> <p>If residual treatment, hours/days since application: _____</p> <p>Cabin surfaces dry/odor free? <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> don't know</p> <p>Crew bunks dry/odor free? <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> don't know</p> <p>If can spray, applicator was <input type="checkbox"/> agriculture agent <input type="checkbox"/> cabin crew <input type="checkbox"/> other: _____</p> | <p>Apparent source? <input type="checkbox"/> air supply vent(s) <input type="checkbox"/> inflight entertainment system <input type="checkbox"/> carry on item <input type="checkbox"/> lav <input type="checkbox"/> electrical <input type="checkbox"/> occupant <input type="checkbox"/> galley <input type="checkbox"/> unknown <input type="checkbox"/> cargo <input type="checkbox"/> other: _____</p> <p>If air supply vent(s) = apparent source, type of contaminant?</p> <table border="0"> <tr> <td><input type="checkbox"/> bird</td> <td><input type="checkbox"/> oil</td> </tr> <tr> <td><input type="checkbox"/> deicing fluid</td> <td><input type="checkbox"/> ozone</td> </tr> <tr> <td><input type="checkbox"/> exhaust</td> <td><input type="checkbox"/> pollution/ash</td> </tr> <tr> <td><input type="checkbox"/> fuel</td> <td><input type="checkbox"/> unknown</td> </tr> <tr> <td><input type="checkbox"/> hydraulic fluid</td> <td><input type="checkbox"/> other: _____</td> </tr> </table> | <input type="checkbox"/> bird | <input type="checkbox"/> oil | <input type="checkbox"/> deicing fluid | <input type="checkbox"/> ozone | <input type="checkbox"/> exhaust | <input type="checkbox"/> pollution/ash | <input type="checkbox"/> fuel | <input type="checkbox"/> unknown | <input type="checkbox"/> hydraulic fluid | <input type="checkbox"/> other: _____ |
| <input type="checkbox"/> bird | <input type="checkbox"/> oil | | | | | | | | | | |
| <input type="checkbox"/> deicing fluid | <input type="checkbox"/> ozone | | | | | | | | | | |
| <input type="checkbox"/> exhaust | <input type="checkbox"/> pollution/ash | | | | | | | | | | |
| <input type="checkbox"/> fuel | <input type="checkbox"/> unknown | | | | | | | | | | |
| <input type="checkbox"/> hydraulic fluid | <input type="checkbox"/> other: _____ | | | | | | | | | | |
| <p>All incidents: symptoms reported? <input type="checkbox"/> yes</p> | <table border="1"> <tr> <td>Symptoms (if applicable)</td> <td>Pilot(s)</td> <td>Cabin</td> <td>Maintenance</td> <td>Passenger(s)</td> </tr> </table> | Symptoms (if applicable) | Pilot(s) | Cabin | Maintenance | Passenger(s) | | | | | |
| Symptoms (if applicable) | Pilot(s) | Cabin | Maintenance | Passenger(s) | | | | | | | |

FIGURE 10-1 (contd.) Smoke/fumes reporting form (for each question, mark all that apply).

| <p>Symptoms reported by:</p> <p><input type="checkbox"/> no <input type="checkbox"/> don't know</p> <p><input type="checkbox"/> pilot(s) <input type="checkbox"/> cabin crew <input type="checkbox"/> maintenance</p> <p>Passenger(s) reported symptoms? <input type="checkbox"/> yes → if yes, seat(s) _____ <input type="checkbox"/> no <input type="checkbox"/> don't know</p> <p>Passenger comments? _____</p> | <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td></td> <td></td> <td></td> <td style="text-align: center;">crew</td> <td></td> <td></td> <td></td> </tr> <tr><td>Abnormal taste</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Dizziness/fainting</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Fatigue/weakness</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Headache</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Irritated eyes/nose/throat</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Mental fog/slowed thinking</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Nausea/stomach cramping</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Tingling lips/fingers/toes</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Other:</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table> | | | | crew | | | | Abnormal taste | | | | | | | Dizziness/fainting | | | | | | | Fatigue/weakness | | | | | | | Headache | | | | | | | Irritated eyes/nose/throat | | | | | | | Mental fog/slowed thinking | | | | | | | Nausea/stomach cramping | | | | | | | Tingling lips/fingers/toes | | | | | | | Other: | | | | | | |
|--|---|---------------|---------------------|--------------------------------|-------------------|--------------------------------|-------------------|-----------|----------------|--|--|--|--|--|--|--------------------|--|--|--|--|--|--|------------------|--|--|--|--|--|--|------------|--|--|--|--|--|--|----------------------------|--|--|--|--|--|--|----------------------------|--|--|--|--|--|--|-------------------------|--|--|--|--|--|--|----------------------------|--|--|--|--|--|--|--------|--|--|--|--|--|--|
| | | | crew | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Abnormal taste | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dizziness/fainting | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fatigue/weakness | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Headache | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Irritated eyes/nose/throat | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mental fog/slowed thinking | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nausea/stomach cramping | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tingling lips/fingers/toes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Emergency equipment used? <input type="checkbox"/> yes; if yes, then → <input type="checkbox"/> no <input type="checkbox"/> don't know</p> <p>If yes, describe in table opposite. Also, can provide additional comments on equipment usage here: _____</p> | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>O₂ mask</th> <th>Smoke goggles</th> <th>PBE</th> <th>Portable O₂ bottle</th> <th>Fire extinguisher</th> <th>Pax masks</th> </tr> </thead> <tbody> <tr><td>Captain</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>First officer</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Cabin crew</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Passengers</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> | | O ₂ mask | Smoke goggles | PBE | Portable O ₂ bottle | Fire extinguisher | Pax masks | Captain | | | | | | | First officer | | | | | | | Cabin crew | | | | | | | Passengers | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | O ₂ mask | Smoke goggles | PBE | Portable O ₂ bottle | Fire extinguisher | Pax masks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Captain | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| First officer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cabin crew | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Passengers | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Smoke/fumes checklist utilized (pilots)? <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> don't know</p> <p>↻ If yes, did conditions improve? <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> don't know</p> <p>Change in flight plan?</p> <p><input type="checkbox"/> none <input type="checkbox"/> a/c removed from service <input type="checkbox"/> diversion <input type="checkbox"/> emergency evacuation <input type="checkbox"/> emergency landing <input type="checkbox"/> incident flight cancelled <input type="checkbox"/> return to base <input type="checkbox"/> return to gate <input type="checkbox"/> other: _____</p> | <p>Medical assistance required? <input type="checkbox"/> none <input type="checkbox"/> pilots <input type="checkbox"/> cabin crew <input type="checkbox"/> maintenance <input type="checkbox"/> passengers <input type="checkbox"/> don't know</p> <p>↻ If yes, then type?</p> <p><input type="checkbox"/> emergency room <input type="checkbox"/> medical advisory service <input type="checkbox"/> medical clinic <input type="checkbox"/> onboard medical assistance <input type="checkbox"/> paramedics <input type="checkbox"/> other: _____</p> <p>Emergency responders met the aircraft? <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> don't know</p> <p>↻ If yes, then type?</p> <p><input type="checkbox"/> fire department <input type="checkbox"/> law enforcement <input type="checkbox"/> paramedics <input type="checkbox"/> other: _____</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Maintenance fault/source identified? <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> don't know</p> | <p>Maintenance action(s), if known: _____</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Narrative description of incident/additional comments (can continue on back of page):</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

FIGURE 10-1 (contd.) Smoke/fumes reporting form (for each question, mark all that apply).

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.

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