ADDENDA

ASHRAE Addendum c to
ASHRAE Guideline 28-2016

Air Quality within Commercial Aircraft

Approved by ASHRAE on October 9, 2018.

This addendum was approved by a Standing Guideline Project Committee (SGPC) 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 guideline. Instructions for how to submit a change can be found on the ASHRAE® website (https://www.ashrae.org/continuous-maintenance).

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The Senior Manager of Standards of ASHRAE should be contacted for

a. interpretation of the contents of this Guideline,
b. participation in the next review of the Guideline,
c. offering constructive criticism for improving the Guideline, or
d. permission to reprint portions of the Guideline.

(This foreword is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)

FOREWORD

Addendum c updates Section 8.1.2.11, "Pyrethroid Pesticides," and adds two references related to these changes to Section 9.

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 Guideline 28-2016

Revise Section 8.1.2.11 as shown.

8.1.2.11 Pyrethroid Pesticides. The U.S. EPA does not approve any insecticides for spray application in the aircraft cabin or cockpit, whether occupied or unoccupied. Despite this, maintenance workers are sometimes instructed to spray insecticides (e.g., phenothrin, permethrin ~~pyrethrum and piperonyl butoxide~~) in the aircraft cabin, both in response to insect sightings and for routine control of cockroaches and other insects. Until at least the late-1970s, DDT was sprayed on particular domestic flights in the U.S. for seasonal insect control. Approximately 50 ~~Currently, 47~~ countries enforce quarantine laws that require incoming aircraft to be sprayed with insecticides, typically pyrethroids, either upon or prior to arrival in order to protect against importing insects that may damage public health, agriculture, or plants (ICAO 2004). Both the in-flight and residual sprays contain multiple solvents, ~~and~~ the in-flight sprays contain a propellant (typically HFCs), and sometimes the pyrethroid insecticidal activity will be augmented with piperonyl butoxide. The application method influences the exposure potential. Some countries require cabin crews to spray an aerosol product containing 2% d-phenothrin over the passengers' heads either in-flight or upon arrival. Other countries require unoccupied aircraft to have been sprayed with a 2% solution of permethrin on all surfaces of the cabin and cockpit before crew and passengers board prior to departure for a country with spraying rules, every 56 days. Pyrethroid application is endorsed by the World Health Organization (WHO) and described as safe and necessary, "if carried out with the recommended precautions" (WHO 2003). However, WHO-recommended spray volume limits can be exceeded, and they are not enforceable. Furthermore, there are no control measures to ensure that treated surfaces have dried before crew and passengers board.

Many reported incidents have centered on improper/excessive application of the insecticide (especially in the crew bunk areas) and on inadequate time between application and boarding, as well as on in-flight applications during which it is impossible for passengers and/or crew to avoid exposure. An independent investigation concluded that residual disinsection poses a health hazard to cabin crew, that current assumptions about the human health impacts of residual disinsection underestimate the risks, and that the relative efficacy of aircraft disinsection in preventing vector-borne disease are not adequately researched (Sutton et al. 2007).

Some disinsection policies change over time. For example, in 2009, two quarantine authorities changed their aircraft disinsection policies to explicitly exclude the crew bunk areas of the aircraft (AQIS/MAF 2009). As another example, Egypt, Hong Kong, and Italy began to require disinsection on flights arriving from Zika-affected regions, effective 2016 (DOT 2016).

Pyrethroid insecticides have been associated with a wide variety of symptoms, including headache, nausea, respiratory distress, chest tightness, generalized weakness, irritation, skin rash, anaphylaxis, and immune system effects (WHO 2003; Sutton et al. 2007; Zaleska et al. 2001; Altenkirch 2000; Muller-Mohnssen 1999; He et al. 1988, 1989). Both airborne and dermal exposure need to be assessed, and the most common analytical method for airborne sampling analysis is HPLC. The International Civil Aviation Organization (ICAO) recently reported its intent to coordinate with WHO and countries with spraying requirements to evaluate nonchemical approaches to aircraft disinsection (ICAO 2004). The WHO also expanded ~~enlarged~~ its definition of disinsection to include procedures that control (not just kill) insects (WHO 2005).

Revise Section 9 as shown. The remainder of Section 9 remains unchanged.

9. REFERENCES

AQIS/MAF. 2009. Schedule of Aircraft Disinsection Procedures, Version 2.0. Australian Quarantine and Inspection Service, Canberra, Australia; Ministry of Agriculture, Forestry, Biosecurity New Zealand, Auckland, New Zealand.

DOT. 2016. Aircraft disinsection requirements. Office of Aviation Enforcement and Proceedings, U.S. Department of Transportation, Washington, DC.

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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