



**BSR/ASHRAE Addendum c to
ANSI/ASHRAE Guideline 28-2016**

Public Review Draft

Proposed Addendum c to Guideline 28-2016, Air Quality within Commercial Aircraft

**First Public Review (August 2018)
(Draft shows Proposed Changes to Current Guideline)**

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FOREWORD

The purpose of this addendum is to update Section 8.1.2.11 Pyrethroid Pesticides, and add two references related to these changes to the references in Section 9.

Note: In this addendum, changes to the current guideline 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 below.

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 started 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 below. The rest 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, US Department of Transportation, Washington, DC