

ICS 49.095

English Version

Cabin air quality on civil aircraft - Chemical compounds

Qualité de l'air en cabine d'avions civils et Composés
chimiques

Kabinenluftqualität in Verkehrsflugzeugen - Chemische
Parameter

This Technical Report was approved by CEN on 30 October 2022. It has been drawn up by the Technical Committee CEN/TC 436.

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European foreword

This document (CEN/TR 17904:2022) has been prepared by Technical Committee CEN/TC 436 “Cabin air quality”, the secretariat of which is held by AFNOR.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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Introduction

Air quality on civil aircraft requires particular attention, given the characteristics of the cabin environment.

An environmental control system (ECS) is used to regulate the aircraft cabin pressure, temperature and ventilation supply air to provide a safe and comfortable environment for the passengers and air crew. The aircraft cabin by design and operation is enclosed and is a densely occupied environment (with only a small amount of per person dilution volume), creating the potential for elevated levels of bio-effluents in the cabin, such as carbon dioxide (see Annex A). ECS architecture on civil passenger aircraft can be broadly separated in two categories: bleed air ECS systems and bleed free ECS systems (see Annex A). Most aircraft manufactured today, and nearly all aircraft in service, have bleed air ECS.

This document focuses on the chemical compounds potentially present in cabin air. It sets out recommendations and supporting annexes to enable airline operators, manufacturers and suppliers to identify - and either prevent or mitigate - exposure to contaminants in the cabin air, with particular emphasis on bleed air contaminants sourced to or generated from engine oil and hydraulic fluid. This includes some limited measures intended to protect workers assigned to troubleshoot and service the aircraft ventilation supply air systems.

NOTE Aircraft accident investigation agencies, aviation regulators from the EU and US, and the International Civil Aviation Organization (ICAO) have recognized that bleed air contamination can compromise flight safety.

The recommendations in this document take into account that the fluids used in aviation (including jet engine oils) and their pyrolysis products are complex mixtures. Some of these mixtures contain organophosphates, ultra-fine particles, and other chemical compounds.

The recommendations in the document take into account current and developing legal frameworks in order to enable the industry to meet their legal obligation to provide a safe environment for air crew and passengers. This document also acknowledges, at the European Commission level, the value of using the Precautionary Principle in relation to risk management, and the use of risk assessment in this industry to protect workers and the environment.

Within this document, emphasis is placed upon exposure prevention, sensor technology, worker training, reporting systems, and collation of data and information from air crew and passengers. Safety Management Systems (SMS) can be a useful tool to enable operators to apply these measures to monitor and respond to system degradation.

This document does not define acceptability/suitability for health, comfort, safety, or airworthiness of the cabin air.

Annex I contains a summary of maximum levels of the marker compounds listed in Annex B that have been published.

1 Scope

This document defines recommendations dealing with the quality of the air on civil aircraft concerning chemical compounds potentially originating from, but not limited, to, the ventilation air supplied to the cabin and flight deck.

A special emphasis is on the engine and APU bleed air contaminants potentially brought into the cabin through the air conditioning, pressurization and ventilation systems.

This document is applicable to civil aircraft in operation from the period that is defined as when the first person enters the aircraft until the last person leaves the aircraft.

This document recommends means to prevent exposure to certain type of chemical compounds, including those that could cause adverse effects, taking into account the Precautionary Principle.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

adverse effect

change in morphology, physiology, growth, development or lifespan of an organism which results in impairment of its functional capacity or impairment of its capacity to compensate for additional stress or increased susceptibility to the harmful effects of other environmental influences

[SOURCE: ISO 13073-3:2016, 2.1]

3.2

aerosol

system of solid particles and/or liquid droplets suspended in gas

3.3

air crew

people working on an aircraft in the period that is defined as when the first person boards the aircraft until the last person leaves the aircraft, including pilots and cabin crew

3.4

airline operator

entity authorized by an Air carrier Operator Certificate (AOC) from its national Civil Aviation Authority to operate civil transport aircraft flights for commercial carriage of passengers, cargo or mail

Note 1 to entry: The airline operator holds responsibility for compliance with civil aviation authority regulations on its flights, including when the relevant tasks are performed by sub-contractors.

[SOURCE: ISO 16412:2005, 3.3, modified — The terms originally defined were “operator”, “airline” and “carrier”.][2]