

Cockpit Noise Level

Background

Pilot hearing loss related to noise in the cockpit has been a long debated topic. Occupational health and safety rules cover various hazards in different workplaces, with noise exposure as one of the core areas. In some Regions like Europe, North American and Oceania, there are Regulations stating the maximum noise threshold beyond which mitigating measures are required. Examples include EU Directive 2003/10/EC on noise and OSH Act (1970) in the United States. However, there is currently no international design Standard addressing the level of noise in the cockpit, nor is there any agreed-upon threshold triggering hearing protection requirements.

Mechanism and Definition of hearing loss due to noise

Hearing loss patterns can vary greatly depending on ethnicity, genetics, habits, work environment and so on. Hearing loss due to noise can also be temporary or permanent. Temporary hearing loss (temporary threshold shift) leads to a reduced sensitivity to sound, usually as a result of brief exposure to a loud noise, and may only last for a short period of time. Permanent hearing loss can be the result of either a one-time exposure to very loud noise (+120db) or long term exposure to loud noise.

Definitions of hearing loss vary between regions. In a clinical environment, frequencies between 500 and 2000 Hz (which correspond to human conversation) are sometimes used for audiogram assessment. If the hearing threshold is elevated above a certain level within this range, hearing loss is confirmed.

ICAO provisions on hearing requirements for a Class 1 Medical Certificate (Annex 1, Chapter 6)

The applicant, when tested on a pure-tone audiometer, should not have a hearing loss, in either ear separately, of more than 35 dB at any of the frequencies 500, 1 000 or 2 000 Hz, or more than 50 dB at 3 000 Hz. An applicant with a hearing loss greater than the above may be declared fit provided that the applicant has normal hearing performance against a background noise that reproduces or simulates the masking properties of flight deck noise upon speech and beacon signals.

Note 1

It is important that the background noise be representative of the noise in the cockpit of the type of aircraft for which the applicant's licence and ratings are valid.

Note 2

In the speech material for discrimination testing, both aviation-relevant phrases and phonetically balanced words are normally used.

Alternatively, a practical hearing test conducted in flight in the cockpit of an aircraft of the type for which the applicant's licence and ratings are valid may be used.

Noise in the cockpit and its measurement

There are multiple sources of noise in the cockpit such as engines, vibrations, instruments, ventilation equipment and airframe aerodynamic noise, to name a few. Different seating positions in the cockpit may also result in different levels of exposure to noise. It is therefore important, for accuracy and research purposes, that noise measurements be taken at all these positions, ie both pilots seats and any jumpseats, for the entire duration of the longest leg that a particular aircraft could fly.

IFALPA position

IFALPA believes that the following two international Standards should be established as soon as possible:

- A design Standard for the maximum acceptable level of noise in the cockpit under all normal operating conditions;
- A threshold Standard beyond which specific noise mitigation measures are required, as well as the nature of such measures.

Both Standards should include specific figures on noise level, frequency and duration of exposure.

IFALPA further calls for research to be conducted on the long-term effects of cockpit noise on pilot hearing loss, and considers such research as essential to aviation safety.