



Briefing paper Cabin air quality - risk of contagious viruses

The overall risk of contracting a disease from an ill person onboard an airplane is similar to that in other confined areas with high occupant density, such as a bus, a subway, or movie theatre for a similar time of exposure... anywhere where a person is in close contact with others.

That said, the risk on airplanes is probably lower than in many confined spaces because modern airplanes have cabin air filtration systems equipped with highly efficient HEPA-type filters.

HEPA or high efficiency particulate air type filters have similar performance to those used to keep the air clean in hospitals, operating rooms and industrial clean rooms. These filters are very effective at trapping microscopic particles as small as bacteria and viruses.

HEPA filters are effective at capturing greater than 99 percent of the airborne microbes in the filter air. Filtered, recirculated air provides higher cabin humidity levels and lower particulate levels than 100% outside air systems.

The cabin air system is designed to operate most efficiently by delivering approximately 50 percent outside air and 50 percent filtered, recirculated air. This normally provides between 15 to 20 cubic feet of total air supply per minute per person in economy class. The total air supply is essentially sterile and particle-free.

Cabin air circulation is continuous. Air is always flowing into and out of the cabin. Total airflow to the cabin is supplied at a bulk flow rate equivalent to 20 to 30 air changes per hour. This provides temperature control, and minimizes temperature gradients within the cabin.

Frequently Asked Questions

Q1: What is a HEPA filter?

According to the European air filter efficiency classification, a HEPA (High Efficiency Particulate Air) filter can be any filter element rated between 85% and 99.995% removal efficiency.

For their production of aircraft with cabin air recirculation systems, manufacturers have chosen the higher efficiency filters, which are similar to what you would find in a hospital operating theatre.

Q2: Are all commercial aircraft fitted with HEPA filters?

The majority of modern, large, commercial aircraft, which use a recirculation type of cabin air system, utilise HEPA filters. A small number of older aircraft types have filters with lower efficiencies.

Q3: What is the smallest particle size that the cabin air filter element can remove?

Air filters can remove very small particles such as bacteria and viruses. Virtually all viruses and bacteria are removed; even the most difficult particles in the range of 0.1 to 0.3 are filtered out with an efficiency level of 99.995% . Contrary to popular belief, very small particles below 0.1 micron are easily filtered out by the mechanism of diffusional interception.

Q4: How often are filters changed?

The interval varies by aircraft. Most airlines replace cabin air filters at regular "hard time" intervals to fit in with routine scheduled maintenance periods, as long as these intervals do not exceed manufacturers' recommendations.

Q5: What happens if the cabin air filter elements are not changed out regularly?

Air flow through the filter might be reduced, but the efficiency of the filter at capturing viruses and bacteria is not affected.

Q7: Is there a danger to the maintenance personnel by removing used cabin air filters?

There is no more risk involved in replacing a cabin air filter than carrying out general maintenance on any aircraft part that has been in service for a number of years. Working with WHO, IATA has published guidance material for maintenance staff which is available at www.iata.org/flu.

In addition to the questions & answers above, both of the web sites from Airbus & Boeing contain further information regarding cabin air quality.

www.boeing.com/commercial/cabinair/facts
www.airbus.com/customer/fast20.asp

* This briefing paper was assembled from information provided by Airbus, Boeing and Pall Corporate.