

AIR QUALITY GUIDANCE

Information obtained from ICAO Circular 344 and recommendations from AFA Air Safety, Health, & Security Committee (ASHSC)

Various types of fumes, smoke, haze and mist may contaminate the cabin and flight deck air supply system. Outside air may be contaminated with engine oil, hydraulic fluid, engine exhaust, ground service vehicle exhaust, fuel, de-icing fluid or ozone. Recirculation fans are another potential source of contaminated air. Also, electrical systems and cabin items such as carry-on baggage, galley equipment and food items, lavatories, cleaning products and disinfectants may contaminate the cabin and/or flight deck air. Of most concern is the negative impact to crew safety and health due to exposure to **oil and hydraulic fluid** and is the focus of this communication. However, in order to adequately address and respond to Air Quality Fume Events, we need to understand:

- Sources and types of onboard fumes;
- Odor descriptors;
- Potential for impairment;
- Response to fume events (e.g. – recognize event, type, describe, communicate, protect, mitigate, document)

Sources and Potential Contaminants

The ventilation air supply system can distribute contaminants that are either internal to the aircraft systems (e.g. engine oil, hydraulic fluid) or external to the aircraft itself (e.g. exhaust, de-icing fluid, fuel, ozone). Items in the cabin and/or flight deck can also be sources of fumes. It is important to distinguish, where possible, between these two sources (ventilation supply air vs. items in the cabin or flight deck).

Sources of On-Board Fumes

- Ventilation supply air
- Items in the cabin and/or flight deck

Ventilation Supply Air Potential Contaminants

De-icing fluid

Applied to the exterior of the aircraft in large volumes and under high pressure. If procedures are not properly applied, then fumes may enter the cabin and flight deck. For example, if the de-icing applicators spray the engines or APU intake, then the fluid can be heated to high temperatures in the engines or APU, and fumes can contaminate the aircraft air supply. It is usually apparent if fumes in the cabin are sourced to de-icing fluid because these operations are highly visible and the odor of the fumes is distinctive.

Electrical faults

Fumes from either failed or faulty electrical systems can contaminate the aircraft air supply to the cabin and flight deck. Electrical fumes can also be sourced to in-cabin electrical faults.

Engine compressor wash

After washing the engine compressor using detergent, fumes from residual detergent may enter the cabin and flight deck air supply systems.

Engine oil

Engine seals, starter generator, accessory gear box, and oil-lubricated bearings are engine and APU components that can leak oil into the cabin and flight deck ventilation supply air. In addition, the oil reservoir for an engine or APU can be over-filled, resulting in spillage and ingestion into the aircraft air supply system.

Exhaust fumes

Fumes from diesel-powered ground service vehicles and other aircraft can be ingested into the air supply, especially if the air intake is located near the vehicles.

Fuel fumes

Fueling operations at an aerodrome, aircraft tank venting during filling, and failed engine relights are sources of fuel fumes that may enter the cabin and flight deck air supply systems.

Hydraulic fluid fumes

Hydraulic fluid leaks and spills on the surface of the fuselage can be drawn into the APU, along with the outside air intended for ventilation. In such instances, the hydraulic fluid and outside air are heated in the compressor and, ultimately, supplied to the cabin and flight deck.

Recirculation fan failure

Recirculation fans can fail and produce fumes caused by electrical or bearing failure.

Other

Other sources include industrial pollution, ozone, bird strikes and volcanic ash.

Items In Cabin or Flight Deck Potential Fumes

- Carry-on baggage
- Cleaning products
- Disinfectants
- Food Items
- Galley equipment
- Lavatories

It is important to note that contaminants in the cabin and/or flight deck, whether sourced to the ventilation supply air, or an in cabin or flight deck item, are typically odorous but are rarely accompanied by visible smoke or haze.

Odor Descriptors

Crewmembers use a wide variety of terms to describe oil and hydraulic fluid fumes. Often, oil fumes do not smell like oil. Instead, they are typically described as smelling like dirty socks/smelly feet, foul, or musty. Hydraulic fluid often has a distinctive and recognizable odor that is often described as acrid.

Odor is subjective, such that different people can experience and describe the same fumes differently. Also, olfactory fatigue reduces a person's ability to detect odors over time. This can occur within 3 minutes.

Potential For Impairment

Potential acute symptoms from exposure to oil or hydraulic fluid fumes include: irritated eyes, sinus congestion, respiratory symptoms, gastrointestinal upset and neurological symptoms. Neurological symptoms may downgrade crew member performance during flight operations in areas such as: alertness, attention span, information processing, working memory and response time. Symptoms may develop slowly, and degraded performance may not be initially obvious.

Seek medical treatment as needed per FAM.

Response to Fumes/Odors

*Note – If Smoke/Fire Odors (any odor accompanied by visible smoke and/or particulate matter FAs must immediately implement firefighting procedures (refer to Fires in section 2.400 of the FAM)

Utilizing the [Flight Attendant Onboard Air Quality Checklist](#) and working with your crew:

- Quickly try to identify the source (in cabin item or coming from vents)
 - If in-cabin item, attempt to address directly
 - If coming from cabin air vents, notify the Flight Deck of the following by clearly stating from the completed AQ Checklist:
 - Description and strength of fumes/odor
 - Apparent source of fumes/odor (if air supply, any obvious source outside cabin? (De-icing, exhaust, etc.)
 - Location in cabin of fumes/odors
 - Phase of flight when fumes/odors first detected
 - Physiological effects, if any, experienced by crew or passengers
- If adverse physical reaction consistent with hypoxia (headache, lightheaded, dizzy, fainting, euphoria, poor coordination, impaired vision, impaired judgment), don oxygen per company First Aid policy.

- If you or a flying partner require additional, immediate medical attention:
 - In the air, notify the Flight Deck to call MedLink
 - At the gate: ask CSA to call paramedics. Deplane if possible and call Global Crew Support at (800) 350-4390
- If you go to the hospital/urgent care, take your Air Quality Quick Reference Card*. Show your physician the “Info for your Doctor” section. If you don’t have a card you can access a printable version by [clicking here](#).

* *It is recommended that you keep this card with you at all times with your company ID or in your purse/wallet so that it is accessible when needed. Cards can be obtained from your [Local Air Safety, Health, & Security Committee](#) or a printable version can be accessed by [clicking here](#).*