



Flight Operations Briefing Notes Cabin Operations Dangerous Goods Awareness

I Introduction

Many everyday items and substances can be dangerous when transported by air. Due to the variations in temperature and pressure during a flight, some of these items may leak or break, generating toxic fumes or possibly starting a fire.

Employee's who may come into contact with dangerous goods need to be aware of the nature of such goods, their potential for causing incidents and accidents and how they should be dealt with.

The aim of this Flight Operations Briefing Note is to provide cabin crew with information and guidance for dangerous goods carried in the passenger cabin.

II Background Information

II.1 Definition

The International Civil Aviation Organization (ICAO) defines **dangerous goods** as;

"Articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those Instructions."

(ICAO *Technical Instructions for the Safe Transport of Dangerous Goods by Air*)

II.2 Dangerous Goods Regulatory Requirements and Recommendations

The International Civil Aviation Organization (ICAO) "*Technical Instructions for the Safe Transport of Dangerous Goods by Air*", provides Operators with the basic legal requirements for transporting dangerous goods by air.

The International Civil Aviation Organization (ICAO) and the International Air Travel Association (IATA) provide guidance material for Operators who wish to develop their dangerous goods training programs. The ICAO and IATA guidance material is updated annually and provides Operators with an excellent source of information on dangerous goods.

Many aviation authorities require that Operators provide dangerous goods training for cabin crew during initial and recurrent training.

Operators should include dangerous goods as part of the cabin crew training program to increase cabin crew awareness to:

- The risks involved in carrying dangerous goods by air
- How to deal with a dangerous goods incident onboard the aircraft.

II.3 Reported Dangerous Goods Incidents

Prohibited dangerous goods may inadvertently be carried onboard an aircraft by passengers who are not aware of, or who deliberately ignore, the regulations. Items that passengers are entitled to carry onboard an aircraft may also cause an incident.

Here are some examples of cases where baggage contained dangerous goods onboard the aircraft:

- "Upon arrival, customs officers found a passenger's baggage contained 48 long fireworks (roman candle type), 32 packets of friction ignition (match style) fireworks and 2 cigarette lighters, all packed in the same bag. The passenger had started his journey with another operator and had made two transit stops prior to connecting with the flight in question." (*Source: Civil Aviation Authority, United Kingdom Safety Regulation Group, Dangerous Goods Monthly Report, April 2007*).
- The picture below shows damage to passenger baggage due to damaged bottles of 35-percent hydrogen peroxide solution in water, an oxidizer with corrosive properties that leaked in a cargo compartment.

The bottles were in an ice chest that was checked in by a passenger on the flight.

The suitcase was found smoldering in the cargo compartment by the baggage handlers.



Photo Credit: National Transportation Safety Board, (NTSB) DCA-99-MZ-001

Damage to Passenger Baggage

III Dangerous Goods Classification

The main document of reference used by operators is the International Air Transport Association (IATA) Dangerous Goods Regulations (DGR) guide. The IATA DGR provides operators with information regarding the marking, packaging, labeling and, the documents required for dangerous shipments, based on international and national air regulations.

The IATA Dangerous Goods Regulations are developed in accordance with the ICAO Technical Instructions.

Dangerous goods are classified into hazard classes. Each hazard class is divided into several sections and specific labels are applied to each one of these classes and/or sections.

A system of diamond-shaped placards and labels are used to identify dangerous goods. Different colors and symbols, such as a flame for flammables or skull and crossbones for poisons, identify the dangers associated with the product.

Note:

These symbols are as known at the time of the publication of this Flight Operations Briefing Note and are subject to revision. Operators should refer to the IATA Dangerous Goods Regulations.

Class 1: Explosives – Explosive substances, explosive articles, and pyrotechnic devices, for example, ammunition, and fireworks.



Class 2: Gases

- **Class 2.1 Flammable Gas:** Gases, which ignite on contact with an ignition source, such as acetylene and hydrogen
- **Class 2.2 Non-Flammable Gases:** Gases, which are neither flammable nor poisonous.
- **Class 2.3 Poisonous Gases:** Gases liable to cause death or serious injury to humans if inhaled for example hydrogen cyanide



Class 3: Flammable liquids – Examples are petrol, alcohol, and perfume.



Class 4: Flammable solids – Examples are matches, flammable metal powder

- **Class 4.1: Spontaneous Combustibles**
- **Class 4.2: Dangerous When Wet** - Solid substances that emit a flammable gas when wet or react with water when wet, such as sodium and potassium.



Class 5: Oxidizing Agents and Organic peroxides

- **5.1 Oxidizing Agent** - oxidizing agents, which are not organic such as ammonium nitrate and chemical oxygen generators.
- **5.2 Organic Peroxides** – are thermally unstable substances that may undergo heat generating, self-accelerating decomposition. These substances are sensitive to impact or friction, or may create a dangerous reaction when in contact with other substances. These substances may be explosive and burn rapidly. Some examples are, fertilizers, and pool chemicals.



Class 6: Toxic (poisonous) and infectious substances

- **Class 6.1 Toxic substances** - those substances that are liable to cause death or injury if swallowed, inhaled or absorbed through the skin. Examples are pesticides and poisons, mercury.

- **Class 6.2 Infectious substances** - those known to contain, or reasonably expected to contain, pathogens, such as Bacteria, Viruses, medical waste (used needles).



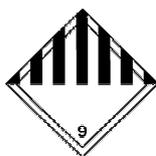
Class 7: Radioactive materials



Class 8 Corrosives –Corrosive substances can dissolve organic tissue or severely corrode certain metals for example, hydrochloric acid or sulfuric acid contained in batteries.



Class 9 Miscellaneous - Hazardous substances such as dry ice and magnets.



III.1 Dangerous Goods Accepted in the Cabin

Passengers and cabin crewmembers are permitted to carry a limited amount of classified dangerous goods for personal use in their carry-on baggage, such as:

- Toiletry articles: e.g. perfume, nail polish, nail polish remover
- Small lithium and lithium-ion batteries, such as those found in portable electronic devices
- Alcoholic beverages, with an alcohol content of less than 70%
- Dry ice.

Note:

The types of items that are authorized onboard the aircraft may vary in each country, depending on the local aviation authority and security regulations.

Other classified dangerous goods that are permitted in the cabin include required emergency equipment, in accordance with airworthiness regulations, such as:

- Oxygen
- Fire extinguishers
- CO2 gas cylinders to inflate the life vests.

III.2 Prohibited Dangerous Goods

The discovery of the following items in the cabin must be considered as a dangerous goods incident as the items below are strictly prohibited for transport in the cabin:

- Explosives - fireworks, flares, toy gun caps
- Compressed gases - filled or partly filled aqualung cylinders (including camping gas cylinders)
- Flammable liquids and solid - lighter fuel, non-safety matches, paints, thinner, fire lighters
- Oxidizers - some bleaching powders
- Organic peroxides - some types of solid hydrogen peroxide
- Poisons - arsenic, cyanide, and weed-killer
- Irritating materials - Tear gas devices
- Infectious substances - live virus materials
- Radioactive materials - medical or research samples which contain radioactive sources
- Corrosives - acids, alkalis, wet cell type car batteries, caustic soda
- Magnetized materials - instruments containing magnets.

IV Dangerous Goods Handling

Operator's should provide dangerous goods response kits onboard the aircraft to enable the cabin crew to deal with a dangerous goods incident. A dangerous goods response kit usually contains the following minimum equipment:

- Large, heavy quality polyethylene bags
- Bag ties to seal the bags correctly after use
- Long rubber gloves.

If a dangerous goods response kit is not provided onboard the aircraft, the cabin crew must improvise using the equipment that is available. There are many pieces of equipment in the cabin that the cabin crew may use in this case, such as:

- Oven gloves/fire gloves that can be covered with plastic bags to protect the hands
- Large and small polyethylene bags, e.g. waste bin bags, duty free bags or airsickness bags
- Absorbent materials, e.g. paper towels, newspapers, headrest covers, etc.
- Catering boxes
- Towels
- Blankets.

V Discovery of Dangerous Goods in the Cabin

The first alert to a dangerous goods spillage or leak may be from a passenger who notices an unusual odor or fumes, or who simply identifies an item that is leaking from cabin baggage.

When a dangerous good is discovered in the cabin, the cabin crew must **notify the flight crew immediately**.

The cabin crew should ask the passenger concerned to **identify the item**. The passenger may be able to provide the cabin crew with some guidance on the hazard involved. The cabin crew should try to collect as much information as possible, e.g. check for:

- A dangerous goods label
- Numbers on the packaging
- Written information on the packaging
- Odors
- Fumes
- Smoke
- An effect on passengers.

In the case of a spill of known or suspected dangerous goods in powder form:

- *Leave everything undisturbed*
- *Do not use a fire extinguisher or water*
- *Cover the area with polyethylene, plastic bags and blankets*
- *Isolate the area until after landing.*

V.1 Crew Communication and coordination

The cabin crew should provide the flight crew with an accurate description of the item, and the effects in the cabin, in order to help the flight crew to apply the appropriate procedure. It is essential that the cabin and flight crews coordinate their actions and that they keep each other fully informed of their actions and intentions.

V.2 Protection

The cabin crew should put on gloves before they touch leaking, suspicious packages or items in order to protect their hands. If rubber gloves are not provided, fire-resistant gloves or oven gloves covered by polyethylene bags are a suitable alternative.

The cabin crew should also use Portable Breathing Equipment (PBE) to protect themselves from fumes or smoke.

If there are fumes or smoke, the cabin crew should take prompt action and move passengers away from the affected area, provide wet towels or cloths to passengers, and instruct passengers to breathe through them.

If the item or substance is emitting fumes or smoke, or if there is a fire, the cabin crew must apply the procedures for smoke and fire incidents provided in The Flight Operations Briefing Notes **Cabin Smoke Awareness** and **Managing Fire in the Cabin**.

Water should not be used on a spillage or when fumes are present as it may spread the spillage or increase the fumes. Consideration should also be given to the possible presence of electrical components when using water extinguishers.

V.3 Dangerous Goods Removal

The dangerous good and the associated contaminated materials should be removed from the cabin.

The dangerous good should be placed in a dangerous goods bag or a polyethylene bag, with the broken part or opening facing upwards. Put all materials that become contaminated when removing the dangerous good in the same bag.

Close the bag and expel excess air, twist the open end of the bag, and seal it by tying a knot or using a bag tie.

Note:

The cabin crew must not make the bag airtight. It must be tight enough to be secure, but not so tight that pressure equalization cannot take place.

Take off the gloves, and avoid skin contact with any contaminants. Put the gloves in the second bag. Place the first bag into the second dangerous goods bag using the same procedure.

All contaminated materials, such as seat covers and sections of carpet should be treated in the same manner as a dangerous good.

V.4 Stowing Dangerous Goods Items

After the cabin crew cleans up the dangerous goods spill, they must ensure that the polyethylene bags containing the dangerous goods are safely stowed and secured.

If a catering box is available, the cabin crew can use it to store the bags containing the dangerous goods.

Dangerous goods should be stored in a location that is as far away from the cockpit and passengers as possible. The cabin crew may use an aft galley or aft lavatory, if possible. However, boxes or plastic bag(s) must not be stored against the pressure bulkhead or fuselage wall.

If the cabin crew uses a lavatory to store dangerous goods, boxes should be put on the floor, bag(s) should be stowed in an empty waste container, and the lavatory door should be locked from the outside. Using the lavatory to store the dangerous goods will prevent fumes from entering the cabin.

Note:

In a pressurized aircraft, if a lavatory is used, any fumes will be vented away from passengers.

When moving a box that contains dangerous goods, the cabin crew must ensure that the opening remains upward. When moving a bag, the cabin crew must ensure that the receptacle containing the dangerous goods remains upright.

Regardless of the location of the catering box or bag, the cabin crew must secure them firmly to prevent them from moving.

V.5 Reporting A Dangerous Goods Incident

The cabin and flight crew should coordinate to complete an Air Safety Report following a dangerous goods incident, in many countries this report is mandatory. This report should include:

- The date of the incident or accident, or the discovery of undeclared or incorrectly declared dangerous goods
- The flight number and flight date
- A description of the goods and the location found in the cabin
- The type of packaging, and the packaging specification marking on it
- Passenger details, e.g. seat number, name, address
- Crew actions
- Any other relevant information.

The cabin crew must enter the details of the incident in the aircraft maintenance logbook, so that the maintenance personnel can replace the dangerous goods kit (if installed) and repair any damage to the cabin caused by the incident

On Arrival

After landing, notify the ground personnel all the known facts about the Dangerous Goods item and where it is stowed.

VI Operational and Human Factors Involved in an In-Flight Dangerous Goods Incident

When dangerous goods are discovered in the cabin, this may be an indication of other problems, such as:

- A lack of security screening on ground
- A lack of dangerous goods awareness training for passenger handling staff and security staff
- Not adhering to the Operator's policy regarding the transportation of dangerous goods in the cabin
- A lack of visible information provided to passengers regarding dangerous goods that may be carried onboard, e.g. at check-in desks, or on the tickets.

VII Prevention Strategies

Dangerous goods are regularly and routinely carried on passenger and all cargo aircraft and present little hazard in transport provided they are correctly identified, packaged and handled. But, Dangerous Goods can be potentially harmful to passengers and crew, release smoke in the cabin or develop into an on-board fire. Therefore, both the operator and the cabin crewmembers should take the following preventive actions:

- Display notices for passengers at check-in areas, ticket sales desks, etc.
- Ensure that the regulations regarding the transportation of dangerous goods are strictly adhered to by ground personnel, passengers, and the cabin and flight crews
- Provide detailed and precise procedures for dangerous goods handling and emergencies to all employees who may be in contact with dangerous goods.

VIII Summary of Key Points

It is important to note the following key points:

- Operators should ensure that all cabin crewmembers receive training that takes into account:
 - The hazards associated with dangerous goods
 - Safe handling of dangerous goods
 - Emergency response procedures for dangerous goods incidents.
- Operators should ensure that passengers are aware of dangerous goods regulations by making the requirements and policies associated with the transportation of dangerous goods in the cabin visible
- Operators should ensure that dangerous goods information and safe handling procedures are included in manuals
- Operators should refer to IATA and ICAO Emergency Response Guidance to develop their dangerous goods in-flight incident procedures.

IX Associated Flight Operations Briefing Notes

The following Flight Operations Briefing Notes provide additional information about this subject:

- **Cabin Smoke Awareness**
- **Managing Fire in the Cabin**

X Regulatory References

- Jar – Ops 1 Subpart O, 1.1005 (7) Cabin Crew Training, Jar-Ops 1 Subpart R, Dangerous Goods, 1.225 - <http://www.jaa.nl/>
- International Civil Aviation Organization (ICAO) Documents:
 - Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods, 2007-2008 Edition.
 - Annex 18 – International Standards and Recommended Practices - The Safe Transport of Dangerous Goods by Air
 - Technical Instructions for the Safe Transport of Dangerous Goods by Air - www.icao.int
- IATA - Dangerous Goods Regulations – www.IATA.org

XI Additional Reading Materials / Websites References

- Flight Safety Foundation – Publications - Cabin Crew Safety – January-February 2005 – Generic Checklists Focus Response to In-Flight Dangerous-goods Incidents www.flightsafety.org
- Flight Safety Australia – Cabin Crew – November – December 2005 – Some things Were Never Meant to Fly – www.casa.gov.au

This FOBN is part of a set of Flight Operations Briefing Notes that provide an overview of the applicable standards, flying techniques and best practices, operational and human factors, suggested company prevention strategies and personal lines-of-defense related to major threats and hazards to flight operations safety.

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