

# QRH

Quick Reference Handbook  
for transport of dangerous goods by air  
for Flight Crew



Disclaimer: This handbook is intended for informational purposes only, it is not meant to be used in place of national or international regulations. For specific procedures and requirements, refer to applicable laws and regulations.

2<sup>st</sup> Edition  
November 2018

Author: Cap. Pedro Villarroel



HazMat PJV



<http://villarroel98.wixsite.com/hazmat-pjv>

© 2018 Pedro Villarroel  
ISBN: 9781370050147

## WHEN TRANSPORT DANGEROUS GOODS AS CARGO

- You MUST receive a NOTOC – (NOTOC is NOT required for: DG in excepted quantities, radioactive material in excepted packages, magnetized material and “UN3373 biological substances Cat. B.”.)
- Check the NOTOC is completely filled and signed.
- Confirm with the loading supervisor that segregation and loading requirements have been accomplished.
- Check emergency procedures in case of incident or accidents with dangerous goods on-board.
- Brief the Crew, keep the NOTOC easily available and be aware of any situation.
- For any doubt about the dangerous goods shipment, contact the DG department + \_\_\_\_\_.

## SPILLAGE ON GROUND OF DANGEROUS GOODS OR UNKNOW SUBSTANCES

Spillages on ground must be content by qualified personnel from emergency responder or your airline, as appropriate, the flight crew must work with such personnel providing assistance and information they need, once the situation is under control, the flight crew will be informed about begin or continue with the flight, passenger boarding, aircraft airworthiness, etc. The steps below are the initial actions to apply before the qualified personnel take control of the situation.

1.- For FUEL spillage:

Apply specific procedures from your Operation Manual

2.- For spillage of other Dangerous Goods that represents a Clear and Present Danger (affect people producing nausea, burning, etc., react with the surfaces as the plane, produce fire or emit toxic or flammable gases, large spills exceeding 3 m. of diameter or 5 m<sup>2</sup>, leaks or damage package containing radioactive material or infectious substances).

- **NOTIFY:** Contact airport emergency responders and ask for assistance.
- **SECURE:** Keep people away from the affected area.
- **ASSESSMENT:** Gather documents of cargo, NOTOC, loading sheet, Airwaybill, etc.
- **RESPONSE:** In coordination with responders, verify that all staff and passengers are in a safe zone, if necessary evacuate the airplane;
  - Deliver the NOTOC and/or all available information to emergency responders and Airline personnel;
  - The emergency procedures must be applied by emergency responders or other qualified staff.
- **REPORT:** Notify to dangerous goods department and perform the corresponding reports, if the airplane was affected report in the maintenance log.

3.- For other situations:

- **SECURE:** Keep people away from the affected area.
- **ASSESSMENT:** Try to identify the substance, gather the appropriate information, NOTOC, details of the spill and other nearby cargo using the corresponding documentation or other method available, determine the magnitude of the problem;
- **RESPONSE:** Ask the right help, contact the Ground Coordinator, DG Department, Maintenance, and if necessary the emergency responders, having on hand all the information. It will be up to them to apply the cleaning procedures, neutralization, disposal and first aid if necessary. If help is not available, apply the Emergency Response procedures.
- **REPORT:** Notify to dangerous goods department and perform the corresponding reports, if the airplane was affected report in the maintenance log.

**General Aspects to Consider:** All spills of unknown origin should be treated as Dangerous Goods. A 'safe zone' is that which is not affected by the spill nor the emergency procedures. Avoid interaction with spilled substance, if a visual check is necessary, use protective equipment from the Emergency Response Kit. If you had contact with substance, immediately wash thoroughly with water and remove clothing that has been contaminated. If symptoms develop like persistent cough, shortness of breath, swelling of the mucous membranes, etc., get medical assistance immediately. Do not eat if you have had any contact with the substance. Isolate people who have been affected by the incident and find first aid assistance for them.

## IN CASE OF DECLARE EMERGENCY (any) with DG on-board MUST NOTIFY (in addition to fuel and people on-board):

**WHAT?** (United Nation Number U.N.)  
**HOW MUCH?** (Total quantity by substance)  
**WHERE?** (Loading Position)

OR

**Phone Number** where a NOTOC's copy can be obtained

## IN CASE OF AN INCIDENT WITH DANGEROUS GOODS DURING FLIGHT

- Follow the appropriate aircraft emergency procedures for fire or smoke removal (QRH)
- Consider landing as soon as possible
- Consider turning off non-essential electrical power
- Determine source of smoke / fumes / fire
- In case of Fire in Portable Electronic Equipment (PED) or Batteries, see check list for those fires
- For dangerous goods incidents in the passenger cabin, see the cabin crew checklist and coordinate cockpit / cabin crew actions
- Determine emergency response drill code (in the NOTOC, ICAO Doc. 9481 or in IATA DGR)
- Use guidance from aircraft emergency response drills chart to help deal with the incident
- If the situation permits, notify ATC of the dangerous goods being carried, at least the quantity and class or division of dangerous goods in each cargo compartment or a phone number where a NOTOC's copy can be obtained.

### AFTER LANDING

- Disembark passengers and crew before opening any cargo compartment doors
- Inform ground personnel / emergency services of the nature of the item and where is stowed
- Make an appropriate entry in the maintenance log.

## BATTERY / PORTABLE ELECTRONIC DEVICE (PED) FIRE

- 1) Apply fire-fighting procedure / Obtain and use the appropriate fire extinguisher; (Flight Crew must use Oxygen mask at 100% when halon fire extinguisher is used in the cockpit)
- 2) Disconnect the device from the power supply, if applicable;
- 3) Douse the device with water (or other non-flammable liquid) to cool batteries and avoid ignitions in adjacent cells/batteries;
- 4) Do not move, cover or use ice or dry ice to cool the device and monitor for a re-ignition;
- 5) After the device/battery has cooled (e. g. 10-15 min), wearing protective equipment, completely submerge it in a container filled with water or other non-flammable liquid, then stow and secure to avoid spillage;
- 6) Monitor the device and the surrounding area for the remainder of the flight;
- 7) Apply operator's post-incident procedures (inform ground personnel and complete required documentation).

## DANGEROUS GOODS LOADING IN CARGO COMPARTMENTS

Packages of Dangerous Goods	Passenger Airplane		Cargo Airplane			
	Lower Compartment (Class C)		Packages Accessible or Class C Compartment (or freight container certified Class C)		Packages NO Accessible (not in Class C compartment)	
	ICAO	USA (FAA)	ICAO	USA (FAA)	ICAO	USA(FAA)
<ul style="list-style-type: none"> <li>• UN 0012, UN 0014, UN 0055, UN 3528 or UN 3529;</li> <li>• Class 9;</li> <li>• Limited Quantities (Y);</li> <li>• Excepted Quantities;</li> <li>• Aircraft batteries for replacement.</li> </ul>	For NO CAO packages there is No Limit (*)		No Limit (*)			
<ul style="list-style-type: none"> <li>• Class 3 Packing Group III without secondary risk 8;</li> <li>• Class 6 (Div. 6.1 without secondary risk other than 3; and Div. 6.2);</li> <li>• Class 7 with no other risk.</li> </ul>	No Limit (*)	Max 25 kg. and in addition 75 kg. of non-flammable gas may be loaded in a compartment or container.	No Limit (*)		No Limit (*)	Max 25 kg. and in addition 75 kg. of non-flammable gas may be loaded in a compartment or container.
<b>Other Dangerous Goods NO CAO</b>					No Limit (*)	No Limit (*)
<b>Other Dangerous Goods CAO</b>	<b>FORBIDDEN</b>				<b>FORBIDDEN</b>	
































## CLASSES AND LABELS OF DANGEROUS GOODS

The dangerous goods' labels are diamond shaped of 10 cm x 10 cm (with exceptions), (see DGR 7.2.2)

The test in the labels is optional (except for risk labels "Radioactive" and "Fissile"). (See DGR 7.3)

When after acceptance a label has become detached or worn, the Operator must replace them in accordance with the Shipper's Declaration. (See DGR 9.3.7)

Dangerous Goods Labels not required by regulations or attached to non-dangerous goods articles are not permitted on-board.

<p style="text-align: center;"><b>Class 1 Explosives</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">   <b>1 RGX</b> </div> <div style="text-align: center;">   <b>1 RXS</b> </div> </div>	<p style="text-align: center;"><b>Class 2 - Gasses</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>2.1 Flammable Gas</p>   <b>2 RFG</b> </div> <div style="width: 30%;"> <p>2.2 Non-flammable Non-Toxic Gas</p>   <b>2 RNG</b> </div> <div style="width: 30%;"> <p>2.3 Toxic Gas</p>   <b>2 RPG</b> </div> </div>	<p style="text-align: center;"><b>Class 3 Flammable Liquid</b></p> <div style="text-align: center;">   <b>3 RFL</b> </div>	
<p style="text-align: center;"><b>Class 4 - Solids</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>4.1 Flammable Solid</p>   <b>4 RFS</b> </div> <div style="width: 30%;"> <p>4.2 Spontaneously Combustible</p>   <b>4 RSC</b> </div> <div style="width: 30%;"> <p>4.3 Dangerous When Wet</p>   <b>4 RFW</b> </div> </div>	<p style="text-align: center;"><b>Class 5</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>5.1 Oxidizing Agent</p>   <b>5.1 ROX</b> </div> <div style="width: 45%;"> <p>5.2 Organic Peroxide</p>   <b>5.2 ROP</b> </div> </div>	<p style="text-align: center;"><b>Class 6</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>6.1 Toxic</p>   <b>6 RPB</b> </div> <div style="width: 45%;"> <p>6.2 Infectious Substance</p>   <b>6 RIS</b> </div> </div>	
<p style="text-align: center;"><b>Class 7 - Radioactive</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Category I</p>   <b>7 RRW</b> </div> <div style="text-align: center;"> <p>Category II</p>   <b>7 RRY</b> </div> <div style="text-align: center;"> <p>Category III</p>   <b>7 RRY</b> </div> </div>	<p style="text-align: center;"><b>Class 8 Corrosives</b></p> <div style="text-align: center;">   <b>8 RCM</b> </div>	<p style="text-align: center;"><b>Class 9 Miscellaneous</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">   <b>9 RMD</b> </div> <div style="text-align: center;">   <b>9 RLI RLM</b> </div> </div>	
<p>Mark for packages shipped under the "Limited Quantity" provisions.</p> <div style="text-align: center;">   <b>Y</b> </div>	<p><b>Radioactive in Excepted Package</b> No loading restrictions. NOTOC is not required</p> <div style="border: 2px dashed orange; padding: 5px; text-align: center;"> <p style="font-size: 8px;">This package contains radioactive material, excepted package and is in all aspects in compliance with the applicable international and national governmental regulations.</p> <p style="font-size: 10px; font-weight: bold;">UN _____</p> <p style="font-size: 8px;">The information for this package need not appear on the Notification to Captain (NOTOC)</p> </div>	<p><b>Mark for Dangerous Goods in Excepted Quantities</b></p> <div style="border: 2px dashed red; padding: 5px; text-align: center;">   <b>E</b> </div> <p>No loading restrictions. NOTOC is not required.</p>	<p><b>Critically Safety Index Label</b></p> <div style="text-align: center;">   <b>FISSILE</b> </div> <p>Is used to control this index during loading and storage.</p>
<p><b>Cargo Aircraft Only</b></p> <div style="text-align: center;">   <b>CAO</b> </div> <p>Indicate when a dangerous good is only permitted in Cargo Airplanes. These packages cannot be loaded in Passenger airplanes.</p> <p>Except of packages Class 1.4S UN 0012, UN 0014, UN 0055, Class 3 without secondary risk 8, div.6.1 without sec. risk other than 3, div. 6.2, 7 y 9, CAO must be loaded in Class C compartments or accessible to the Crew during an emergency.</p>	<p><b>Magnetized Material</b></p> <div style="text-align: center;">   <b>MAG</b> </div> <p>Must be loaded without cause interference to the airplane's magnetic compass or navigations systems.</p>	<p><b>Cryogenic Liquid</b></p> <div style="text-align: center;">   <b>RCL</b> </div> <p>Must not be loaded near live animals (AVI, HEG). At least away from each other or with general cargo in between.</p>	
<p><b>Package Orientation</b></p> <div style="text-align: center;">   <b>↑ ↑</b> </div> <p>Package must be secure in this vertical position to prevent spillages.</p>	<p><b>CAUTION!</b></p> <div style="text-align: center;">   <b>LITHIUM BATTERIES</b> </div> <p><b>Handling Labels for Lithium Batteries</b></p> <p>Allow packages identification in case of fire and for handling with care.</p>	<p><b>Keep away from heat</b></p> <div style="text-align: center;">   <b>Keep away from heat</b> </div> <p>Organic Peroxides or Self-Reactive Substances, must be protected from direct sunlight and all sources of heat and be placed in adequately ventilated areas.</p>	<p><b>Environmentally Hazardous Substance Mark</b> - Allow easy packages identification for corrective actions in case of spillages</p> <div style="text-align: center;">   <b>Environmentally Hazardous Substance Mark</b> </div>

## EMERGENCY RESPONSE TABLE

DRILL	INHERENT RISK	RISK TO AIRCRAFT	RISK TO OCCUPANTS	SPILL OR LEAK PROCEDURE	FIREFIGHTING PROCEDURE	ADDITIONAL CONSIDERATIONS
1	Explosion may cause structural failure	Fire and/or explosion	As indicated by the drill letter(s)	Use 100% oxygen; no smoking	All agents according to availability; use standard fire procedure	Possible abrupt loss of pressurization
2	Gas, non- flammable, pressure may create hazard in fire	Minimal	As indicated by the drill letter(s)	Use 100% oxygen; establish and maintain maximum ventilation for "A", "I" or "P" drill letter	All agents according to availability; use standard fire procedure	Possible abrupt loss of pressurization
3	Flammable liquid or solid	Fire and/or explosion	Smoke, fumes and heat, and as indicated by the drill letter(s)	Use 100% oxygen; establish and maintain maximum ventilation; no smoking; minimum electrics	All agents according to availability; no water on "W" drill letter	Possible abrupt loss of pressurization
4	Spontaneously combustible or pyrophoric when exposed to air	Fire and/or explosion	Smoke, fumes and heat, and as indicated by the drill letter(s)	Use 100% oxygen; establish and maintain maximum ventilation	All agents according to availability; no water on "W" drill letter	Possible abrupt loss of pressurization; minimum electrics if "F" or "H" drill letter
5	Oxidizer, may ignite other materials, may explode in heat of a fire	Fire and/or explosion, possible corrosion damage	Eye, nose and throat irritation; skin damage on contact	Use 100% oxygen; establish and maintain maximum ventilation	All agents according to availability; no water on "W" drill letter	Possible abrupt loss of pressurization
6	Toxic, may be fatal if inhaled, ingested, or absorbed by skin	Contamination with toxic liquid or solid	Acute toxicity, effects may be delayed	Use 100% oxygen; establish and maintain maximum ventilation; do not touch without gloves	All agents according to availability; no water on "W" drill letter	Possible abrupt loss of pressurization; minimum electrics if "F" or "H" drill letter
7	Radiation from broken/unshielded packages	Contamination with spilled radioactive material	Exposure to radiation, and personnel contamination	Do not move packages; avoid contact	All agents according to availability	Call for a qualified person to meet the aircraft
8	Corrosive, fumes disabling if inhaled or in contact with skin	Possible corrosion damage	Eye, nose and throat irritation; skin damage on contact	Use 100% oxygen; establish and maintain maximum ventilation; do not touch without gloves	All agents according to availability; no water on "W" drill letter	Possible abrupt loss of pressurization; minimum electrics if "F" or "H" drill letter
9	No general inherent risk	As indicated by the drill letter	As indicated by the drill letter(s)	Use 100% oxygen; establish and maintain maximum ventilation if "A" drill letter	All agents according to availability; Use water on "Z" drill letter. No water on "W" drill letter	None If "Z" drill letter, consider landing immediately.
10	Gas, flammable, high fire risk if any ignition source present	Fire and/or explosion	Smoke, fumes and heat, and as indicated by the drill letter(s)	Use 100% oxygen; establish and maintain maximum ventilation; no smoking; minimum electrics	All agents according to availability.	Possible abrupt loss of pressurization
11	Infectious substances may affect humans or animals if inhaled, ingested or absorbed through the mucous membrane or an open wound	Contamination with Infectious substances	Delayed infection to humans or animals	Do not touch. Minimum recirculation and ventilation in affected area	All agents according to availability. No water on "Y" drill letter	Call for a qualified person to meet the aircraft

### DRILL LETTER: ADDITIONAL RISK

<b>A</b> : ANAESTHETIC	<b>C</b> : CORROSIVE	<b>E</b> : EXPLOSIVE	<b>F</b> : FLAMMABLE
<b>H</b> : HIGHLY IGNITABLE	<b>I</b> : IRRITANT / TEAR PRODUCING	<b>L</b> : OTHER RISK LOW OR NONE	<b>M</b> : MAGNETIC
<b>N</b> : NOXIOUS	<b>P</b> : TOXIC (POISON)	<b>S</b> : SPONTANEOUSLY COMBUSTIBLE OR PYROPHORIC	<b>W</b> : IF WET GIVES OFF POISONOUS OR FLAMMABLE GAS
<b>X</b> : OXIDIZER	<b>Y</b> : DEPENDING ON THE TYPE OF INFECTIOUS SUBSTANCE, THE APPROPRIATE NATIONAL AUTHORITY MAY BE REQUIRED TO QUARANTINE INDIVIDUALS, ANIMALS, CARGO AND THE AIRCRAFT		<b>Z</b> : AIRCRAFT CARGO FIRE SUPPRESSION SYSTEM MAY NOT EXTINGUISH OR CONTAIN THE FIRE. CONSIDER LANDING IMMEDIATELY.