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ICAO ESAF/WACAF Regional Office UAS/RPAS Workshop

Nairobi, Kenya
June, 2025

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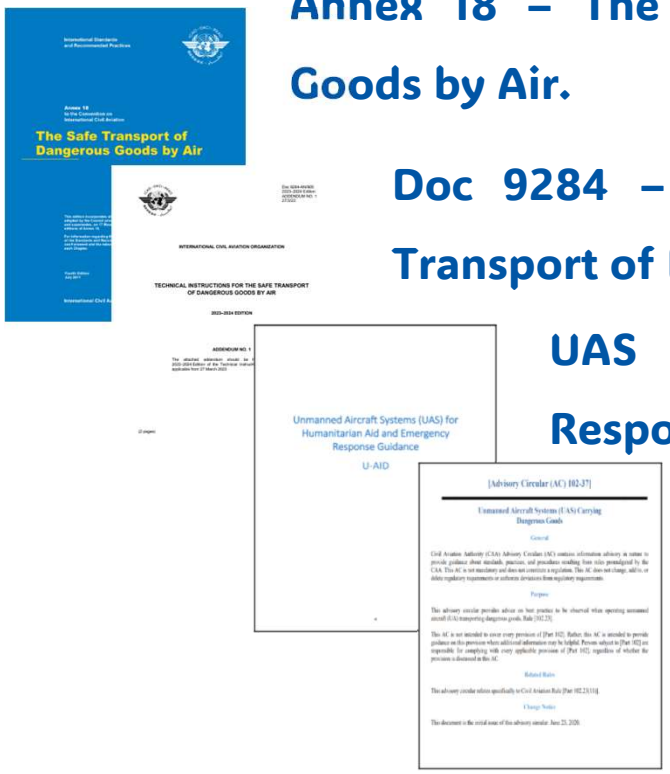
ICAO UAS
DANGEROUS GOODS

Objectives

- Provide an overview of how DG regulations apply to UAS humanitarian operations;
- Highlight ICAO's Guidance Material;
- Explain roles and responsibilities for States and operators; &
- Share real-world examples.

Reference Material



Annex 18 – The Safe Transport of Dangerous Goods by Air.

Doc 9284 – Technical Instructions For The Safe Transport of Dangerous Goods by Air.

UAS for Humanitarian Aid and Emergency Response Guidance (U-AID)

AC 102-37 -Unmanned Aircraft Systems (UAS) Carrying Dangerous Goods

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What Are Dangerous Goods (DG)?

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.

Annex 18 – The Safe Transport of Dangerous Goods by Air

Dangerous Goods are Divided in 9 Classes

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What Are Dangerous Goods (DG)?

Class 1 - Explosives

Class 1.1 – Mass Explosion Hazard

Class 1.2 – Projection Hazard

Class 1.3 – Fire Hazard

Class 1.4 – No significant Hazard

Class 1.5 – Very Insensitive Substances – Mass Explosion Hazard

Class 1.6 – Extremely Insensitive Articles – No Mass Explosion Hazard

Class 2 - Gases

Class 2.1 – Flammable Gases

Class 2.2 – Non-Flammable & Non-Toxic Gases

Class 2.3 – Toxic Gases

Anhydrous Ammonia

Oxidizing Gases

Class 3 – Flammable Liquids

What Are Dangerous Goods (DG)?

Class 4 – Flammable Solids

Class 4.1 – Flammable Solids

Class 4.2 – Substances Liable to Spontaneous Combustion

Class 4.3 – Water Reactive Substances

Class 5 – Oxidizing Substances & Organic Peroxides

Class 5.1 – Oxidizing Substances

Class 5.2 – Organic Peroxides

Class 6 – Toxic & Infectious Substances

Class 6.1 – Toxic Substances

Class 6.2 – Infectious Substances

Class 7 – Radioactive Materials

Class 8 – Corrosive Substances

Class 9 – Miscellaneous Products, Substances or Organisms.

E.g. Lithium Batteries

What Are Dangerous Goods (DG)?

Examples:

- ✓ **Compressed Gases (Aerosols, Gas Cartridge,..);**
- ✓ **Flammable Liquids (Ethanol,...);**
- ✓ **Sterilization Materials (Ethylene Oxide,...);**
- ✓ **Infectious Substances (Blood Sample for Analysis,...);**
- ✓ **Medical or Clinical Waste;**
- ✓ **Lithium Batteries;**
- ✓ **Dry Ice;**
- ✓ **...**

Dangerous Goods Transport By UAS

Reduce Time-Consuming to Reach Areas with Difficult Access

Fast Relief for Disaster Zones

Auxiliary Tool in Public Health Crisis

Improve Logistic Chains in Areas with Difficult Access

Dangerous Goods Transport By UAS

⚠ **Risk associated with DG to be transported should be considered in relation to the consequences of their effect if they are released**

- ✓ **Infectious Substances that could potentially affect people and animals;**
- ✓ **Chemical with high toxicity to human, animals, and aquatic life;**
- ✓ **Chemicals High Corrosive could pose consequences to package handlers or receivers;**
- ✓ **…**

Dangerous Goods Transport By UAS (AC 102-37)

Aviation Authority

- Grant Approval to Permit the DG Transport[1];
- Approve the Operator`s Safety Risk Assessment[2]; &
- Oversight the Operation when Applicable.

UAS Operator

- Policy for the Safe Transport of DG;
- Training – DG Packaging & Transport;
- Qualified Personnel;
- Standard Operational Procedure (SOP) for DG Transport [DG-SOP]; &
- Procedures for Emergency Responses.

Receiver

- Must Be Aware of the DG Transport; &
- Must Adopt Safety Measures to Receive DG by UAS.

1 - When Appropriate;
2 - Some Hazards in UAS DG Transport, could not be addressed in the Technical Instructions. The Aviation Authority should ensure that these hazards are addressed through the **Operator`s Safety Risk Assessment**.

Dangerous Goods Transport By UAS (AC 102-37)

Operator`s Policy for DG Transport

a) Need for a Safety Risk Assessment;

b) Measures to be taken and how those measures mitigate the potential consequences of identified hazards to an acceptable level (Risk Assessment);

c) Training Policy and the Competency Level Achieved with the Training Completed;

d) Provisions for Communicating Hazards of Dangerous Goods, Through Marking and Labelling of the Package and Documentation, especially for those not familiar with DG marks and labels;

e) Contact Information and Instructions for Informing Appropriate Authorities, in case of an Accident or Incident;

f) Emergency Response Plan;

g) Instruction to Collect Data Related to UAS DG Accidents or Incidents.

Dangerous Goods Transport By UAS (AC 102-37)

DG-SOP Should Include (At a Minimum):

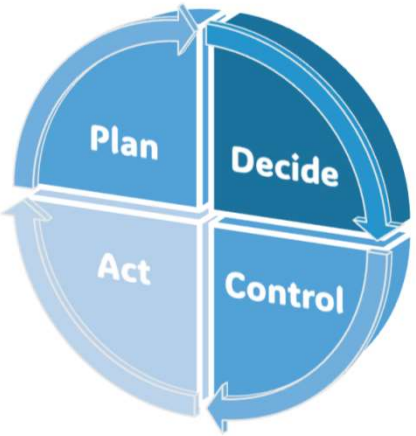
a) procedures for carrying out responsibilities, including **measures to identify hazards** and their **potential consequences** and **ensure risk can be managed** to an acceptable level through the conduct of a **safety risk assessment**;

b) a **training policy** including the level of competency achieved once training is complete;

c) instructions for **communicating to relevant persons information** related to the dangerous goods being transported, **in case of an accident or incident**;

d) **action to be taken** in the event of **emergencies involving dangerous goods**; and

e) instructions for the collection of safety data related to dangerous goods accidents and dangerous goods incidents.



Dangerous Goods Transport By UAS (AC 102-37)

Safety Risk Assessment Should Include (At Least):

a) identification of hazards associated with the dangerous goods;

b) type of operation;

c) containment characteristics of the UA;

d) packing and packaging;

e) quantity and type of dangerous goods to be transported; &

f) level of competence of those handling the dangerous goods.

Dangerous Goods Transport By UAS

- **UAS DG Transport is Feasible, Efficient and Must Be Safe Addressed;**
- **Look For Benchmarks and Guidance Materials (ICAO U-AID);**
- **National Authorities Have a Vital Role.**

Thank You

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