Guidance on the Carriage of Dangerous Goods as Cargo for UAS/RPAS Operators in the Specific Category

CAP2555

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Civil Aviation Authority
Aviation House
Beehive Ring Road
Crawley
West Sussex
RH6 0YR

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Enquiries regarding the content of this publication should be addressed to: dgo@caa.co.uk

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Foreword

This document provides policy and guidance to the operation of UAS/RPAS in the Specific Category when carrying dangerous goods (DG).

Whilst this document does not constitute regulation, it is intended to provide guidance to UAS/RPAS operators regarding best practice for the carriage of DG by air with a UAS/RPAS. It summarises and references regulations throughout, that are applicable to the carriage of DG by air for all other aircraft types. It is the CAA's intention to update the relevant regulations so that they are also applicable to the carriage of DG by air with UAS/RPAS with due regard to proportionality.

This guide is to enable UAS/RPAS operators to identify the relevant regulatory references that are applicable and to ensure compliance before applying for an approval to carry DG. In doing so, the operator is far more likely to gain the approval sought in a more efficient manner. This will benefit both the operator and the regulator.

The regulations should be complied by the operator and any agent thereof, or any organisation to which the operator has discharged any of its responsibilities as well as, all other entities involved in the transport of the DG, including but not limited to, those entities acting as a Shipper or any agent thereof acting on its behalf, or a Freight Forwarder.

Each application will be independently assessed by the CAA Dangerous Goods Flight Operations Inspectorate, who will determine whether to grant such an approval or not, based on the appropriateness of the means of transport and on the facts and circumstances submitted by the operator.

An additional benefit of UAS/RPAS operators and others voluntary compliance with this guidance will mean that when the regulations are updated, there will be no detrimental business impact for those who are already demonstrating compliance

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Chapter 1

Scope

1.1 This guidance applies to UAS/RPAS operators in the Specific Category wishing to apply for an approval to carry DG.

1.2 It will enable the carriage of DG, in addition to UN3373 Biological Substances, Category B by UAS/RPAS by expanding the scope and content of CAP 2248 - Carriage of Dangerous Goods by Remotely Piloted Aircraft Systems (CAP 2248) which was created by CAA Innovation to support carriage of UN3373, Biological Substances, Category B, during COVID relief efforts.

Chapter 2

General principles

2.1 DG can be carried safely by air transport providing certain principles are adopted and complied with. These principles have been used in developing the provisions contained in the ICAO Doc-9284, Technical Instructions for the Safe transport of Dangerous Goods (Technical Instructions) and are intended to facilitate the transport of articles and substances classified as DG, while giving a level of safety such that, providing all the requirements are fulfilled, they can be carried without placing an aircraft at risk.

2.2 The principles contained in the Technical Instructions are in place to ensure that these DG (DG) may be carried safely so that in the event of an incident occur during flight, it will not lead to an accident.

2.3 In providing protection for the aircraft from incidents and accidents the CAA can meet its statutory obligation to protect 3rd parties on the ground and in the air.

Chapter 3

Definition of Dangerous Goods

3.1 Dangerous goods are articles or substances which are capable of posing a hazard to health, safety, property, or the environment and which are shown in the list of DG in the Technical Instructions, or which are classified according to the Technical Instructions.

Chapter 4

Multi-modal transport

4.1 The United Kingdom has adopted the United Nations system that ensures compatibility between the different modes of transport so a consignment may be carried by more than one transport mode without intermediate reclassification and repacking. The system includes regulations for the carriage of DG carried by road, by rail and sea, and where applicable, considers the peculiarities of air transport while keeping in mind the need to ensure modal compatibility.

4.2 Where the CAA has determined that the use of UAS/RPAS operations to transport DG is appropriate, it is necessary that the delivery of DG to or from the location of the UAS/RPAS by other modes of transport are taken into consideration. Therefore, all appropriate provisions of the national regulations for each of those modes of transport should also be applied.

Chapter 5

Carriage of Dangerous Goods by Air in UK Law

5.1 The Air Navigation Order (2016) and the Air Navigation (Dangerous Goods) Regulations (AN(DG)Rs) (The Civil Aviation (Air Navigation) Order 2016 (the ANO) and the Regulations made under it | Civil Aviation Authority (caa.co.uk) provide the regulations made under the powers of the Civil Aviation Act 1982, for the carriage of DG in the UK. The AN(DG)Rs enact the ICAO Technical instructions as the regulations applicable to the transport of DG by air.

5.2 The ICAO Technical Instructions, contain the detailed provisions for the safe transport of DG by air and are aimed at all entities involved in the logistics and transport chains as detailed in Reg. 5 of the AN(DG)R.

5.3 To the extent possible, the full scope of Technical Instructions should be complied with. However, considering the differences in the type of operations carried out by UAS\RPAS and the type/s of aircraft involved, there may be circumstances when the full provisions of the Technical Instructions are not appropriate or necessary.

5.4 In such circumstances and when appropriate, the CAA may grant an alleviation in the Operational Authorisation to permit the carriage of DG without all the requirements of the Technical Instructions being fulfilled, provided an equivalent level of safety can be achieved. The applicable conditions will be described in the approval document (Operational Authorisation).

Chapter 6

Approval to carry Dangerous Goods

6.1 UAS/RPAS in the Specific Category carrying DG, require a Dangerous Goods approval granted by the CAA with the conditions specified in the Operational Authorisation as defined by UK Regulation (EU) 2019/947, Article 12.

6.2 There may be hazards unique to UAS/RPAS operations that are not addressed in the Technical Instructions, For example: when an UAS/RPAS operating in the Specific Category is carrying DG and where there is a high risk to third parties in the event of an accident, a crash-protected container must be used. A Crash-Protected Container (CPC) is a containment device that is designed and tested to be capable of falling from an operational height and preventing the leakage / dispersion of its contents (DG) after impacting terrain in case of an accident.

6.3 The Vehicle Certification Agency (VCA) in conjunction with the CAA, have developed test procedures pursuant to the approval of crash-protected containers. The Procedure may be found through the following email: dgenquiries@vca.gov.uk

6.4 Generally, DG carried in excepted quantities and those in Division 6.2, Category B as defined by the Technical Instructions, will not be required to be carried in a crash-protected container.

Information required from the Operator

6.5 Operators should submit Application form SRG2807 (Transport of dangerous goods and munitions of war | Civil Aviation Authority (caa.co.uk) along with the proof of payment of the associated fee in accordance with Official Record Series 5 – Scheme of Charges. for Air Operators and Police Operators.

6.6 The form contains the relevant information about the identity of the operator, relevant responsible persons for the application process and outlines the required information that the operator should submit with the application.

6.7 The applicant should identify the relevant Class/es and/or Division/s of DG that the operator proposes or intends to carry on the form SRG2807.

Additional documents required

6.8 The following additional documents are required to be submitted with SRG2807 to dgo@caa.co.uk as indicated in the application form:

Dangerous Goods Procedures Manual

6.9 The CAA website provides a template with the recommended structure and content for a Dangerous Goods Procedures Manual that should be adopted by all operators.

6.10 Additionally, the template is structured in a manner that allows operators the opportunity to describe their specific operation through editorial notes that should be replaced with the operator's own text before the submission to the CAA.

6.11 The Dangerous Goods Procedures Manual should as a minimum include the following information:

- A policy statement for the safe carriage of DG.
- Identify the person responsible for the DG approval and for continued compliance with the applicable regulations.
- Identification of training needs for the operator's staff and/or staff of other entities carrying out responsibilities of the operator, which are involved with activities related to the transport of DG.
- Training policy for all relevant staff, commensurate with their responsibilities and in accordance with the Technical Instructions, Part 1;4 and the ICAO Guidance on a Competency-based Approach to Dangerous Goods Training and Assessment (Doc-10147). This policy should include the level of competency achieved once training is complete.
- Detailed assignments of responsibilities associated with the carriage of DG.
- Instructions defined by the operator in accordance with the operator's responsibilities detailed in the Technical Instructions Part 7.
- Instructions for communicating to relevant persons, information related to the DG being transported, in case of an accident or incident.
- Instructions for the collection and reporting of safety data related to dangerous goods accidents, dangerous goods incidents or the finding of undeclared or misdeclared dangerous goods in cargo in accordance with UK Regulation (EU) 376/2014.
- Document retention policy.

6.12 The Dangerous goods Procedures Manual may be found at the following link: (Templates for dangerous goods operations for UK aircraft operators | Civil Aviation Authority (caa.co.uk))

6.13 Operators without an approval to carry DG but intending to carry general cargo without DG, should document procedures to ensure that undeclared or misdeclared DG are not carried and provide training to staff handling and loading general cargo into the aircraft, to enable them to identify hidden DG. Procedures for reporting undeclared DG should also be in place.

6.14 The Dangerous Goods Procedures Manual for operators carrying cargo without an approval to carry Dangerous may be found at: Templates for dangerous goods operations for UK aircraft operators | Civil Aviation Authority (caa.co.uk)

Safety Risk Assessment

6.15 To obtain an approval to carry DG in the Specific Category, operators should establish that intended operations do not pose a hazard to health, safety, property or the environment.

6.16 Through a risk assessment process, operators should identify the hazards and the safety risks associated with the foreseeable consequences and demonstrate that these have been mitigated to an acceptable level.

6.17 The operator should conduct an operational risk assessment for the carriage of DG in accordance with the requirements of UK Regulations (EU) 2019/947, Article 11 (UAS RPAS | Civil Aviation Authority (caa.co.uk). As a minimum, the following aspects should be included in the risk assessment:

- The extent to which third parties, property or the environment, could be endangered by the operation and the DG being carried.
- Identification of hazards associated with the DG to persons directly involved in the handling of the DG.
- Type of operation and geographical area where the operation will be carried out.
- Containment characteristics of the UAS/RPAS or crash-protected container.
- Effects of the intrinsic hazard of the DG referenced in the below table, being carried, considering the capabilities of the UAS/RPAS to respond to the hazards, should an incident occur during flight.
- Packing and packaging being used for the transport of DG.
- Quantity and type of DG to be transported.
- Level of competence of those handling the DG.
- Level of confidence on the logistics chain

6.18 DG can have two or more potential associated hazards (primary and subsidiary hazards). Correct identification and classification of DG is the first step towards safely transporting DG by air. Whilst the safety risks posed may be reduced through appropriate training, proper packaging, communication, handling, and stowage, the scope of DG carried onboard an UAS/RPAS in the specific category may be limited to specific items and classes depending on the hazard posed by the article or substance to health, safety, property or the environment.

6.19 Table 6-1 provides general guidance on intrinsic hazards related to the various Classes or Divisions of DG, which the operator should take into consideration when carrying out their risk assessment. It is not intended to cover all associated hazardous properties and additional hazards may apply.

	Class / Division including Sub-hazards							
HAZARD	**2.1**	**2.2**	**3**	**4.1**	**5.1**	**6.1**	**8**	**9**
Flammability	√		√	√				√
Chemical Explosion	√		√	√				
Physical explosion	√	√						
Physical and Chemical Explosion	√							
Explosive atmosphere	√		√					
Toxic by inhalation						√		
Toxic by skin or eye contact						√	√	
Toxic by ingestion						√		
Temperature sensitive								
Asphyxiation risk		√						
Corrosivity							√	
High Reactivity				√	√			
Cryogenic burns		√						√
Chemical instability					√			
Hazardous decomposition					√	√	√	
Environmental Pollutant						√		√

Table 6-1 Intrinsic hazards for Dangerous Goods Classes and Divisions

6.20 Additional information on the hazards and classification criteria may be found in the Technical Instructions, Parts 2; and 3.

6.21 Operators should periodically review the risk assessment to ensure that it remains up to date and that no further hazards to the operation, introduced either internally or by external factors and entities, have arisen which may need to be assessed and mitigated.

Emergency Response Procedures

6.22 Operators should document and implement and Emergency Response Plan (ERP).

6.23 The ERP should include procedures and actions to be taken in the event of an incident or an accident when DG are being carried, in accordance with Part 7; 4.7 and 7; 4.9 of the Technical Instructions.

6.24 When establishing emergency response procedures, operators should consider below guidance in the development of a contingency checklist(s) that detail the response to an incident or accident involving DG being carried on board the UAS/RPAS with the objective of providing adequate information to all of the operator's staff involved in the response.

6.25 As a minimum the following aspects should be included in the ERP:

- Identification of emergency scenarios that may result from the Classes of DG being carried on board.
- Contingency procedures for dealing with an emergency involving DG for UAS/RPAS cargo compartments which do not have fire detection or suppression systems.
- Identification of entities which are trained and competent to adequately respond to the incident or accident on the ground and their contacts.
- When DG are being carried, operators should identify entities which may, at short notice, search for and secure an accident site before the arrival of the operator's emergency responders.
- Communicating the ERP to local entities which may be involved in the emergency response to incidents and accidents involving DG.
- Where emergency response kits are used, the operator should ensure that these are deployable and available to their emergency response staff, at the location where the incident or accident has occurred.
- Information contained in ICAO Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods (Doc-9481) may be used to assist in identifying the inherent hazards of the different classes or divisions of DG, what hazards that these may pose to the aircraft, fire-fighting agents that can be used and, where applicable, any additional hazards that may need to be taken into consideration when dealing with an emergency involving DG.
- Doc-9481 may also be used in the Safety Risk assessment when identifying the hazards posed to the aircraft when DG are being carried.

6.26 The ERP should include a contact list for all entities that may be involved in any action related to the operator's ERP to ensure expeditious and effective communications during any accident or incident involving DG or any emergency that may occur when an aircraft is carrying DG.

Chapter 7

Training

7.1 Operators should submit DG training materials for approval. It is acceptable to utilise training provided by a CAA approved training organisation, provided that the operator has established that this training is suitable for their operation

Operator Responsibilities regarding training

7.2 It is the responsibility of the operator to ensure that all employees are trained using approved training materials and are competent to perform function specific responsibilities. As a minimum training should be provided to the following personnel:

- Person responsible for submitting the DG approval.
- Remote crew (Remote pilot(s) – see below in 7.2
- Staff involved in, or with responsibilities in the operation of the flight.
- Ground staff of the operator (i.e. those conducting acceptance checks/handling of DG and the loading of aircraft).
- Ground staff of external entities contracted by an operator carrying any responsibilities of the operator detailed in Part 7 of the Technical Instructions.
- Any operations staff responsible for communications with the Remote Pilot(s) or any entity involved in the Emergency Response to an incident or accident.
- The operator should ensure that any staff who work on its behalf (e.g. NHS staff) have received the appropriate training in accordance with 1;4 of the Technical Instructions and aligned with the following principles:
- Training and assessment of personnel involved in the transport of DG should be commensurate with the functions for which they are responsible and be delivered prior to performing any of those functions.
- Training should include aspects related to the operator's emergency response procedures where the carriage of DG is concerned.
- Competency-based Training and Assessment programme should be implemented. Guidance on the principles may be found in Doc-10147 and should be considered in the implementation of such a programme.

7.3 For a list of CAA approved training organisations, please use the following link: (training-organisation-s-report.pdf (caa.co.uk)

7.4 Additional Guidance on training may be accessed through the following link:

Dangerous goods training for non airline staff | Civil Aviation Authority (caa.co.uk).

Remote crew training requirements

7.5 As a minimum, training for remote pilots should ensure the following:

- Pilots demonstrate knowledge in the operator's contingency/emergency procedures in the event of failure(s).
- Pilots demonstrate knowledge in the handling and delivery of DG and perishable cargo.
- DG training in accordance with the Technical Instructions.

Chapter 8

Documents to be held

8.1 Operators should ensure that the most current versions of the following documents are held at appropriate locations and readily available to all staff involved in the operation when needed.

- The most current version of the Operator's Dangerous Goods Procedures Manual.
- The most current version of the Operator's Emergency Response Plan.
- A Current edition of either the Technical Instructions (including any amendments) or the IATA Dangerous Goods Regulations (including any amendments).
- Where information on consignments of DG is required to be provided to the Remote Pilot/s and/or DG transport document, this information should be immediately available at all times for use in emergency response to accidents and incidents.
- The information should be always available to the Remote Crew during the flight and can be provided by the following:
  - Doc-9481- Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods as applicable; or
  - Any other document which provides the appropriate information concerning the DG on board