DGP/30-WP/29*
12/9/25

منظمة الطيران المدني الدولي

ورقة عمل

فريق خبراء البضائع الخطرة

الاجتماع الثلاثون

مونتريال، ٦ إلى ٢٠٢٥/١٠/١٠

البند رقم 6 من جدول الأعمال: الأحكام الخاصة بالبضائع الخطرة والمستخدمة في عمليات نُظم الطائرات الموجهة عن بُعد (المرجع: بطاقة الأعمال رقم DGP.007.02)

الأحكام الخاصة بالبضائع الخطرة لأغراض نظم الطائرات الموجهة عن بُعد

(ورقة مقدَّمة من مقرر مجموعة العمل التابعة لفريق خبراء البضائع الخطرة والمعنية بنظم الطائرات الموجهة عن بعد)

الموجز التنفيذي

يُقترح في ورقة العمل هذه اعتماد أحكام جديدة في التعليمات الفنية لأغراض العمليات الدولية لنظم الطائرات الموجهة عن بعد.

والأحكام المقترحة الجديدة هي نتيجة الجهود التي قامت بها مجموعة العمل التابعة لفريق خبراء البضائع الخطرة والمعنية بنظم الطائرات الموجهة عن بعد (DGP-WG/RPAS)، بما يتماشى مع بطاقة عمل لجنة الملاحة الجوية رقم DGP.007.0 لوضع أحكام خاصة بالبضائع الخطرة لأغراض العمليات في نظم الطائرات الموجهة عن بعد.

الإجراءات الذي يتخذها فريق خبراء البضائع الخطرة: فريق البضائع الخطرة مدعو إلى:

أ) النظر في التغييرات المقترحة الواردة في المرفقين (B) و(C) بورقة العمل هذه لإدراجها في طبعتي ٢٠٢٧–٢٠٢٨ من وثيقة التعليمات الفنية والإضافة الملحقة بها؛

ب) النظر في المواد الإرشادية المقترحة الواردة في المرفق (D) بورقة العمل هذه والمصادقة على نشرها كمواد إرشادية لكي تستخدمها الدول في العمليات الداخلية.

1. INTRODUCTION

1.1 This working paper reflects the discussions held, and feedback obtained from panel members at the 2025 Dangerous Goods Panel Working Group Meeting (DGP-WG/25, 21 to 25 April 2025, Delhi, India) on the work carried out by the DGP Working Group on Remotely Piloted Aircraft Systems (DGP-WG/RPAS), which was established at the 2022 DGP Working Group Meeting (DGP-WG/22, 21 to 25 November 2022, Montreal) (see paragraph 4.6.1 of the DGP-WG/22 Report and 4.6.2 of the DGP-WG/25 Report).

* لم يُترجم سوى موجز ورقة العمل.

1.2 These discussions and feedback were focussed on the following papers:

a) DGP-WG/25-WP26, which presented information on the efforts of DGP-WG/RPAS in the development of new dangerous goods provisions to support operations in remotely piloted aircraft systems.

b) DGP-WG/25-IP/1, containing guidance for the carriage of dangerous goods transported by unmanned aircraft (UA) extracted from ICAO Advisory Circular AC-102-37 associated with Part 102 of the ICAO Model UAS Regulations;

c) DGP-WG/25-IP/2, containing a presentation given by the Remotely Piloted Aircraft Systems Panel (RPASP) to inform DGP-WG/RPAS, at its second meeting held in April 2023, of some assumptions for the decision making on how the work should be progressed; and

d) DGPWG/25-IP/3, containing the recommendations made to the DGP Working Group on Annex 18 (DGP-WG/Annex 18) (Appendix A to DGPWG/25-IP/3), a working document developed by DGP-WG/RPAS to review the Technical Instructions including questions directed to the panel (Appendix B to DGPWG/25-IP/3) and recommendations from DGP-WG/RPAS for changes to the Technical Instructions and guidance material to be adopted in the Supplement to the Technical Instructions (or a separate document as preferred by the panel) (Appendix C to DGPWG/25-IP/3).

2. QUESTIONS, COMMENTS AND FEEDBACK

2.1 For guidance on how to proceed with the work, DGP-WG/RPAS was seeking initial responses to the following questions during DGP-WG/25:

a) does DGP-WG/25 agree with the view taken by DGP-WG/25 that Parts 2, 3, 4, 6 and 8 of the Technical Instructions do not need to be changed to support RPAS operations?

b) does DGP-WG/25 agree that there is a need for a new Chapter 8 in Part 7 of the Technical Instructions to support and address the specific conditions in which RPAS operations may be conducted in the near future?

c) does DGP-WG/25 agree that the Technical Instructions should include provisions to enable the applicability of the Technical Instructions to RPAS other than certified RPAS, and for these to be adopted by States in domestic operations?

d) does DGP-WG/25 agree that the Technical Instructions should apply to all UAS, which includes RPAS, or should it only apply to RPAS?

2.2 Panel members were further invited to provide formal comments, feedback and suggestions to all the remaining questions contained in DGP-WG/25-IP/3 by 30 June 2025.

2.3 Based on the responses, feedback and suggestions, DGP-WG/RPAS would continue to work on the draft provisions with the objective of submitting a proposal of new provisions to be brought to DGP/30, for consideration and possible inclusion in Edition 2027-2028 of the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284), in support of the Standards and Recommended

Practices (SARPs) contained in Annex 6 - *Operation of Aircraft*, *Part IV - International Operations - Remotely Piloted Aircraft Systems*, due to become applicable in November 2026.

2.4 In respect to the specific questions asked by the DGP-WG/RPAS, the following comments and feedback were collected form the panel members:

a) The panel members agreed that Parts 2, 3, 4, 6 and 8 do not need to be changed to support RPAS operations.

b) With regards to the introduction of a new Chapter in Part 7 for RPAS operations, most saw a need to introduce a new chapter to address RPAS-specific needs, although there were some panel members that debated on whether this was necessary, given that RPA certified in accordance with Annex 8 — *Airworthiness of Aircraft* would be no different to manned aircraft certified in accordance with Annex 8. DGP-WG/25 concluded one should be developed with high-level provisions that would not have an adverse effect on safety should a State choose to use them domestically for unmanned aircraft other than RPA.

c) During the discussions it was highlighted that helicopters were certified under Annex 8, however due to the differences in type of operations there was a need to establish specific provisions that required a separate chapter, similarly to what was suggested for RPAS. It was also highlighted that whilst aeroplanes and helicopters were treated under separate parts of Annex 6 (respectively Part I and Part III), Annex 6 Part IV includes both types of aircraft for RPAS Operations.

d) With regard to whether the Technical Instructions should include provisions to enable the applicability of the provisions to RPAS operations other than certified RPAS and for these to be adopted by States in domestic operations, it was deemed that it could not be done because it would extend the scope of the Technical Instructions beyond that of Annex 6, Part IV. However, guidance for transporting dangerous goods on such aircraft could be developed for inclusion in a separate document.

e) In relation to extending the provisions of the Technical Instructions to the specific category of operations. The Secretary clarified, that based on feedback from technical experts within the ICAO Secretariat, Annex 6, Part IV was applicable to the operation of RPAS certificated in accordance with Annex 8 by operators authorized to conduct international RPAS operations. The Foreword to Annex 6, Part IV clearly states that the provisions in the Annex did not apply to open and specific category operations.

f) The scope of the Technical Instructions could therefore not be extended to the specific category, but guidance material for the specific category could be developed for inclusion in a separate document.

g) Regarding the possibility of including provisions in the Technical Instructions, to enable its applicability to unmanned aircraft (UAS) other than for RPA. Similar to paragraph e) and f) above, in the context of international operations, the Technical Instructions could only be applicable to the operation of RPAS certificated in accordance with Annex 8 by operators authorized to conduct international RPAS operations. However, guidance for transporting dangerous goods in unmanned aircraft other than an RPA, could be developed for inclusion in a separate document.

h) On the possibility of considering the use the ICAO Model Unmanned Aircraft Systems (UAS) Regulations 102 and its related Advisory Circular 102-37 as a starting point for developing provisions in the Technical Instructions, the Secretary clarified that based on feedback from technical experts within the ICAO Secretariat, all provisions in the Technical Instructions needed to be based on the provisions in Annex 6, Part IV and not on this document.

i) Finally, whether the normal conditions of transport outlined in the Introductory Chapter to Part 4 would apply to remotely piloted aircraft (RPA) operations was discussed. DGP-WG/25 concluded that they would for aircraft certified in accordance with Annex 8, noting that the cargo compartment safety provisions of Annex 6, Part IV, Chapter 15, which required that the operator take the capabilities of the aircraft into account, would also apply.

j) DGP-WG/25 emphasized the need for coordination with RPASP before recommending any final conclusions on this or any amendments proposed.

2.5 Appendix D of this working paper proposes guidance material to be considered by the panel, developed in alignment with the feedback mentioned in paragraphs 2.4 d), f) and g), to be included in a separate document.

3. ADDITIONAL FEEDBACK ON DGPWG/25-IP/3

3.1 A face-to-face meeting of DGP-WG/RPAS was held during DGP-WG/25 and further feedback was collected on the questions raised in DGPWG/25-IP/3 which further informed DGP-WG/RPAS on the drafting of the proposed new provisions for the Technical Instructions contained in Appendix B to this working paper and for the Supplement to the Technical Instructions contained in Appendix C to this working paper.

3.2 The following specific feedback was considered in the proposed new provisions:

a) **Part 1;3 – Definitions.** Any proposed references to UA or UAS operations needed to be removed.

b) **Part 3 - Table 3-1.** It was agreed that no specific changes were necessary to the structure of the table and that the structure of the table provided for flexibility in the operation of RPAS where packaging requirements and quantities limits are concerned.

c) **Part 5 - Shipper responsibilities.** It was agreed that there was no need to consider any further provisions related to the offering of dangerous goods for carriage in an aircraft which did not meet the requirements for normal conditions of transport. Additionally, feedback from panel members deemed that the development of specific marking and/or labelling to differentiate between conventional aircraft and RPAS was not necessary.

d) **Part 7;8**. Whilst most agreed that a new Chapter 8 should be developed, it was highlighted that it should only reflect RPAS operations that specifically comply with the certification requirements of Annex 8, hence a review of the proposed provision was necessary to remove any provision not aligned with these principles.

4. OTHER CONSIDERATIONS SINCE DGPWG/25

4.1 With panel members having expressed their intention to align in so far as possible the transport of dangerous goods on RPA, with the existing provisions applicable to manned aircraft, consideration has been given to the cargo compartment classifications which should apply to RPA. The Technical Instructions specifies cargo compartment certification requirements for the internal carriage of dangerous goods. Some of the certification requirements are reliant on the aircraft design enabling a crew member to detect or respond to a fire which are irrelevant to unmanned RPA operations. Whilst this would not affect passengers or crew members for RPA operations (as there aren't any on board) there remains the possibility that a fire on board an RPA which does not have effective fire detection and or suppression capability presents an unacceptable risk to persons on the ground. Accordingly, it is proposed to specify that an RPA may only transport dangerous goods either in a cargo compartment that meets all the certification requirements for a Class C, Class D or Class E aircraft cargo compartment or as external carriage. It is also proposed to provide for an approval by the State of the Operator for the carriage of the dangerous goods listed in Part S-7;2.2.2 and S-7;2.2.3 of the Supplement in a cargo compartment that does not meet all the applicable certification requirements.

4.2 Some working group members saw value in establishing a note under Technical Instructions Part 7;2 (Loading Restrictions on the Flight Deck and for Passenger Aircraft) pointing to the proposed Part 7;8 for RPA. An alternative view was that the note was inappropriate as RPA do not have a flight deck and are not currently permitted to transport passengers. Accordingly, the proposal shows the note in square brackets to prompt further discussion by the panel.

4.3 Consideration was also given to excepting RPA that do not transport live animals from the requirement of Part 7;4 of the Technical Instructions to establish the maximum quantity of dry ice permitted in each compartment in its operations manual. However, it was concluded that as an RPA operator would still need to inform ground personnel that dry ice was onboard, it was appropriate to establish limits for each compartment or state 'no limit' within its operations manual.

4.4 For the purposes of the drafting process, the working group included all the definitions that might be relevant within the proposal for Part 1;3.1 - Definitions. It may now be appropriate to delete those that are not specifically referenced in the proposal.

5. FUTURE WORK REQUIRED TO BE CONDUCTED

5.1 In accordance with Job Card 007.01 (see Appendix A of this WP) further work needs to be completed as follows:

Similarly to what was conducted for the Technical Instructions, a detailed review of the Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284SU) has yet to be completed. Part S-7; Chapter 2 in particular, may need to be reviewed to broaden specific provisions such as those contained in Parts S-7; 2.2, to include radioactive materials in category II – Yellow and category III – Yellow or gases in Div 2.3 when applied to RPAS operations.

a) A review of *Guidance for Safe Operations Involving Aeroplane Cargo Compartments* (Doc 10102), which incorporates the cargo compartment safety risk assessment needs to be conducted for RPAS operations, because Annex 6, Part IV captures both helicopter and aeroplane (aircraft) operations.

b) A review of *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481) has yet to be conducted; however, there may be a need to draft a completely new document or alternatively, include a separate chapter for RPAS operations.

6. ACTION BY THE DGP

6.1 The DGP is invited to:

a) consider the proposed changes contained in Appendices B and C of this working paper for inclusion in the 2027-2028 Editions of the Technical Instructions and its Supplement.

b) consider the proposed guidance material contained in Appendix D of this working paper and to endorse publishing it as guidance material for use by States in domestic operations. This may be achieved either by publishing this guidance material as a separate document under the purview of the DGP, or by incorporating its content in a revised version of ICAO Advisory Circular 102-37.

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APPENDIX A

ANC JOB CARD FOR DANGEROUS GOODS PROVISIONS TO SUPPORT REMOTELY PILOTED AIRCRAFT SYSTEM OPERATIONS

DGP.007.02	Dangerous goods provisions to support RPAS operations
Source	DGP/28 Recommendation 6/2
Problem Statement	The Technical Instructions were developed before the introduction of RPAS and do not support draft Standards and Recommended Practices (SARPs) on the operation of remotely piloted aircraft currently proposed for Annex 6 — Operation of Aircraft as a new Part IV — International Operations — Remotely Piloted Aircraft Systems.
Specific Details	Draft SARPs endorsed by the eighteenth meeting of the Remotely Piloted Aircraft Systems Panel (RPASP/18) (25 to 29 October 2021) on the operation of remotely piloted aircraft developed for inclusion in Annex 6 — Operation of Aircraft as a new Part IV — International Operations — Remotely Piloted Aircraft Systems include provisions allowing for the transport of dangerous goods, but the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284) do not. The Technical Instructions include specific requirements and recommendations for the carriage of dangerous goods based on whether an aircraft is a passenger or cargo aircraft, as defined in that document. A remotely piloted aircraft could be a cargo aircraft based on this definition, but the requirements for cargo aircraft established in the Technical Instructions may not be appropriate. A thorough review of the Technical Instructions is necessary to determine how the document can safely accommodate the transport of dangerous goods on remotely piloted aircraft. This will result in consequential amendments to the Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284SU) and may result in consequential amendments to Annex 18.
GANP/GASP Link	GASP 3.3: Operational safety risks
Expected Benefits	Clarify States' responsibilities with respect to evaluating an operator's ability to manage the risks associated with dangerous goods on remotely piloted aircraft and provide operators with tools to manage the risks
Reference Documents	DGP-WG/20 Report, paragraph 3.6.4.1 DGP/28 Report, paragraph 6.4.1 Doc 9284SU, Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air Doc 9481, Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods
Primary Expert Group:	Dangerous Goods Panel (DGP)

	WPE No.	Document Affected or Actions Needed	Description of Amendment proposal or Action	Supporting Expert Group	Status	Expected dates:		
						Delivery	Effective	Applicability
✓	10277	Actions	Identify need for amending dangerous goods provisions in the Technical Instructions and associated documents to accommodate dangerous goods operations on remotely piloted aircraft in alignment with Annex 6	RPASP FLTOPSP-SCGSWG	Completed	Q4 2022	-	Dec 2022
✓	10280	Annex 18	Consequential amendments to Annex 18 to accommodate RPAS operations	FLTOPSP RPASP AIGP ADOP AIRP SMP AVSECP FALP	Re-scheduled	Q4 2025	Jun 2026	Nov 2026

	WPE No.	Document Affected or Actions Needed	Description of Amendment proposal or Action	Supporting Expert Group	Status	Expected dates:		
						Delivery	Effective	Applicability
✓	10278	Tech Ins for the ST of DG by Air (Doc 9284)	Recommendation for amendments to the Technical Instructions to accommodate RPAS operations	FLTOPSP RPASP AIGP ADOP AIRP SMP AVSECP FALP	Re-scheduled	Q4 2025	Jan 2027	Jan 2027
✓	10279	Supplement to the Tech Instructions (Doc 9284SU)	Consequential amendments to the Supplement to the Technical Instructions to accommodate RPAS operations	FLTOPSP RPASP AIGP ADOP AIRP SMP AVSECP FALP	Re-scheduled	Q4 2025	Jan 2027	Jan 2027

Status:	Priority:	Initial Issue Date:	Date Approved by ANC:	Session / Meeting:
Approved	Medium	02 February 2022	20 February 2024	225-3

RATIONALE

- AN-WP/9722
- AN-WP/9635 (AN Min 220-15): Minor update to priority as approved by the ANC
- AN-WP/9561

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APPENDIX B

PROPOSED NEW DANGEROUS GOODS PROVISIONS FOR THE TECHNICAL INSTRUCTIONS TO SUPPORT REMOTELY PILOTED AIRCRAFT SYSTEM OPERATIONS

Part 1

GENERAL

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Chapter 1

SCOPE AND APPLICABILITY

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1.1.4 For the State of overflight, if none of the criteria for granting an exemption are relevant, an exemption may be granted based solely on whether it is believed that an equivalent level of safety in air transport has been achieved.

Note 1.— For the purpose of approvals, "States concerned" are the States of Origin and the Operator, unless otherwise specified in these Instructions.

Note 2.— For the purpose of exemptions, "States concerned" are the States of Origin, Operator, Transit, Overflight and Destination. For Remotely Piloted Aircraft System (RPAS) *operations, exemptions from other States such as the State of the Remote Station or the State of the Remote Pilot are also required where such States have informed ICAO of this through a State Variation.*

Note 3.— Guidance for the processing of exemptions, including examples of extreme urgency, may be found in the Supplement to the Technical Instructions *(Part S-1;1.2 and 1.3).*

Note 4.— Refer to 1;2.1 for dangerous goods forbidden for transport by air under any circumstance.

Note 5.— Due to the differences in the type of operations carried out by helicopters compared with aeroplanes, some additional considerations need to be made when dangerous goods are carried by helicopter, as described in 7;7.

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Chapter 3

GENERAL INFORMATION

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3.1 DEFINITIONS

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External carriage. Any load suspended from a helicopter or a remotely piloted aircraft (RPA) or in equipment attached to a helicopter or an RPA.

Remote crew member. A person assigned by an operator with duties connected to the operation of a remotely piloted aircraft system during a flight duty period.

Remote flight crew member. A licensed flight crew member charged with duties essential to the operation of a remotely piloted aircraft system during a flight duty period.

Remote pilot. A person charged by the operator with duties essential to the operation of a remotely piloted aircraft and who manipulates the flight controls, as appropriate, during flight time.

Remote pilot-in-command. The remote pilot designated by the operator as being in command and charged with the safe conduct of a flight.

Remote pilot station (RPS). The component of the remotely piloted aircraft system containing the equipment used to pilot the remotely piloted aircraft.

Remote Operating Certificate (ROC). A certificate authorizing an RPAS operator to conduct specified RPAS operations (AOC).

Remotely Piloted Aircraft (RPA). An unmanned aircraft that is piloted from a remote pilot station. They are one type of unmanned aircraft.

Remotely Piloted Aircraft System (RPAS). A remotely piloted aircraft, its associated remote pilot stations, the required command and control links and any other components as specified in the type design.

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Part 7

OPERATOR'S RESPONSIBILITIES

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Chapter 1

ACCEPTANCE PROCEDURES

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1.7 CONDUCTING SAFETY RISK ASSESSMENTS

Operators must include the transport of dangerous goods, including lithium batteries and cells as cargo, in the scope of their:

a) safety management system (SMS) in accordance with Annex 19; and

b) specific safety risk assessment on the transport of items in the cargo compartment in accordance with Annex 6 – *Operation of Aircraft*, Part I – *International Commercial Air Transport – Aeroplanes* *and Part IV – International Operations – Remotely Piloted Aircraft Systems* .

Note 1.— Guidance on implementation of an SMS is contained in the Safety Management Manual (SMM) *(Doc 9859).*

Note 2.— Guidance on the conduct of a specific safety risk assessment on the transport of items in the cargo compartment is contained in the Cargo Compartment Operational Safety Manual *(Doc 10102).*

Note 3.— Specific guidance on safety risk assessments related to consignments containing COVID-19 pharmaceuticals is provided at www.icao.int/safety/OPS/OPS-Normal/Pages/Safety-transport-vaccines.aspx.

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Chapter 2

STORAGE AND LOADING

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2.1 LOADING RESTRICTIONS ON THE FLIGHT DECK AND FOR PASSENGER AIRCRAFT

2.1.1 Dangerous goods must not be carried in an aircraft cabin occupied by passengers or on the flight deck of an aircraft, except as permitted by 1;2.2.1 and 8;1 and for radioactive material, excepted packages under 2;7.2.4.1.1. Dangerous goods may be carried in a main deck cargo compartment of a passenger aircraft provided that compartment meets all the certification requirements for a Class B or a Class C aircraft cargo compartment. Dangerous goods bearing the "Cargo aircraft only" label must not be carried on a passenger aircraft.

2.1.2 Under the conditions specified in S-7;2.2 of the Supplement, the State of Origin and the State of the Operator may

approve the transport of dangerous goods in main deck cargo compartments of passenger aircraft that do not meet the requirements in 2.1.1.

Note.— Cargo compartment classification is described in the ICAO document Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods (Doc 9481).

2.1.3 For additional requirements concerning the loading of dangerous goods for carriage by helicopters, see Part 7;7.

[2.1.4 For additional requirements concerning the loading of dangerous goods for carriage by RPA, see Part 7;8.]

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2.4 LOADING AND SECURING OF DANGEROUS GOODS

2.4.1 Loading of cargo aircraft

2.4.1.1 Packages or overpacks of dangerous goods bearing the "Cargo aircraft only" label must be loaded for carriage by a cargo aircraft in accordance with one of the following provisions:

a) in a Class C aircraft cargo compartment; or

b) in a unit load device equipped with a fire detection/suppression system equivalent to that required by the certification requirements of a Class C aircraft cargo compartment as determined by the appropriate national authority (a ULD that is determined by the appropriate national authority to meet the Class C aircraft cargo compartment standards must include "Class C compartment" on the ULD tag); or

c) in such a manner that in the event of an emergency involving such packages or overpacks, a crew member or other authorized person can access those packages or overpacks, and can handle and, where size and mass permit, separate such packages or overpacks from other cargo; or

d) external carriage by a helicopter or an RPA; or

e) with the approval of the State of the Operator, for helicopter operations, in the cabin (see Part S-7;2.4 of the Supplement).

Note.— Cargo compartment classification is described in the ICAO document Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods *(Doc 9481).*

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2.9.6 Separation

2.9.6.1 *Separation from persons*

Categories II – Yellow and III – Yellow packages, overpacks or freight containers must be separated from persons. The minimum separation distances to be applied are shown in Tables 7-3 and 7-4 and these distances are from the surface of the packages, overpacks or freight containers to the nearest inside surface of the passenger cabin or flight deck partitions or floors, irrespective of the duration of the carriage of the radioactive material. Table 7-4 applies only when radioactive material is being carried by a cargo aircraft, and in those circumstances the minimum distances must be applied as above and also to any other areas occupied by persons.

Note.— The provisions of Tables 7-3 and 7-4 do not apply to the carriage of radioactive materials in an RPA.

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Chapter 4

PROVISION OF INFORMATION

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4.1 INFORMATION TO THE PILOT-IN-COMMAND OR REMOTE PILOT IN COMMAND

Editorial Note.— The term 'pilot in command' is used more than fifty times in the Technical Instructions. All of these would require editorial amendment to 'pilot in command or remote pilot in command' except those related to the carriage of passenger electric mobility aids which are inapplicable to RPAS operations.

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4.1.1.1 Except as otherwise provided, the information required by 4.1.1 must include the following:

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j) the aerodrome or location at which the package(s) is to be unloaded;

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Chapter 8

RPAS OPERATIONS

Note 1.— The requirements in this chapter are in addition to the other provisions of these Instructions that apply to all operators (such as Part 1;4 and Part 7).

Note 2. — For the purpose of this chapter, in addition to the State of the Operator, a State concerned may be the State where the operations are being conducted, the State of a Remote Pilot, or the State of the Remote Station (when different form the State of the Operator).

8.1 An RPA may only transport dangerous goods either:

a) in a cargo compartment that meets all the certification requirements for a Class C, Class D or Class E aircraft cargo compartment; or

b) as external carriage.

Note.— See 7;2.4.1 for additional restrictions for packages or overpacks of dangerous goods bearing the "Cargo aircraft only" label.

8.2 Where the cargo compartment of the RPA does not meet all the certification requirements for a Class C, Class D or Class E aircraft cargo compartment, the State of the Operator and the State of Origin may grant an approval for the transport of those dangerous goods in accordance with part S-7;2.3 of the Supplement. The associated hazards must be addressed by the operator through a specific safety risk assessment.

8.3 Due to the nature or type of operations carried out by an RPA, there may be circumstances when the full provisions of the Technical Instructions are not appropriate or necessary. These circumstances include instances such as when no persons are carried on board an RPA, the RPA operations are conducted to and from unmanned sites and operations are conducted in remote locations or in mountainous areas. In such circumstances and when deemed appropriate, the State of the Operator may grant an approval to permit the carriage of dangerous goods without all of the normal requirements of the Technical Instructions being fulfilled. When States other than the State of the Operator have notified ICAO that they require prior approval of such operations, approval must also be obtained from the States of Origin and destination, as appropriate, or from any other states concerned.

Note 1.— Doc 9859 contains general guidance on implementation of Annex 19, including the conduct of safety risk assessments.

Note 2.— Doc 10102 provides guidance on specific safety risk assessments on the transport of items in the cargo compartment of an RPA, including dangerous goods.

8.4 When loading dangerous goods for open external carriage by an RPA, consideration should also be given to the type of packaging used and to the protection of those packagings, where necessary, from the effects of airflow and weather (such as by damage from rain or extreme temperatures), in addition to the general loading provisions of 7;2. If such loads include dangerous goods suspended from an RPA, the operator must ensure that consideration is given to the dangers of static discharge upon landing or release of the load.

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APPENDIX C

PROPOSED NEW DANGEROUS GOODS PROVISIONS FOR THE SUPPLEMENT TO THE TECHNICAL INSTRUCTIONS TO SUPPORT REMOTELY PILOTED AIRCRAFT SYSTEM OPERATIONS

Part S-7

STATE'S RESPONSIBILITIES WITH RESPECT TO OPERATORS

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Chapter 2

STORAGE AND LOADING

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2.2 LOADING ON PASSENGER AIRCRAFT

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2.3 LOADING ON REMOTELY PILOTED AIRCRAFT (RPA)

2.3.1 Part 7;8.1 of the Technical Instructions provides that an RPA may only transport dangerous goods either:

a) in a cargo compartment that meets all the certification requirements for a Class C, Class D of Class E aircraft cargo compartment; or

b) as external carriage.

For RPA operations, the State of the Operator may approve the carriage of the dangerous goods listed in 2.2.2 and 2.2.3 in a cargo compartment that does not meet all the applicable certification requirements, in accordance with 2.2.5, 2.2.6, 2.2.7 and 2.2.8. When such an approval is to be granted, States should consider the factors that may mean internal carriage is required or preferable, such as:

— the size/mass of packages making it impractical to carry them as an external load;

— the types and quantity of dangerous goods involved;

— the types of packaging used;

— the duration of the flight(s);

— the types of operation; and

— the ability to land quickly in the event of an emergency.

2.3.2 When States other than the State of the Operator have notified ICAO that they require prior approval of such operations, approval must also be obtained from the States of Origin and Destination, as appropriate.

Renumber subsequent paragraphs accordingly

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APPENDIX D

PROPOSED GUIDANCE MATERIAL TO SUPPORT UAS OPERATIONS IN DOMESTIC OPERATIONS

1. INTRODUCTION

1.1 This guidance material applies to circumstances when a State has determined that the use of unmanned aircraft (UA) to transport dangerous goods in domestic operations is appropriate. It is aimed at assisting States in issuing approvals for the carriage of dangerous goods in unmanned aircraft systems (UAS) operations, when the full compliance with the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284, "Technical Instructions") is not appropriate or necessary.

1.2 Such circumstances may include instances when it is of public interest or in support of medical services. However, it should be noted that there may be hazards unique to UAS operations that are not addressed by the Technical Instructions.

1.3 To the extent possible, the full scope of Annex 18 — *The Safe Transport of Dangerous Goods by Air* and the Technical Instructions should be complied with when transporting dangerous goods.

1.4 The following are examples of articles and substances which may be considered as dangerous goods that may be carried by a UA:

a) compressed gases such as aerosols and gas cartridges;

b) flammable liquids, such as ethanol and ether;

c) sterilization materials such as ethylene oxide;

d) infectious substances such as samples for analysis;

e) toxic substances such as certain medicines;

f) first aid kits;

g) medical or clinical waste such as used needles and blood samples;

h) pharmaceutical products;

i) safety devices;

j) devices containing lithium batteries offered for transport under Section II of the applicable packing instructions in the Technical Instructions for lithium batteries;

k) dry ice; and

l) radiopharmaceuticals.

2. UAS OPERATOR'S STANDARD OPERATING PROCEDURES FOR CARRIAGE OF DANGEROUS GOODS

2.1 This guidance provides recommended elements to be included in the UA operator's standard operating procedures (SOP) manual for the transport of dangerous goods. The SOP manual should contain the following information:

a) The operator's policy for the safe transport of dangerous goods on UA. The policy should include procedures for conducting a safety risk assessment, definition of responsibilities for safety risk management, and identified measures to mitigate hazards;

b) An identified person responsible for ensuring compliance with dangerous goods approvals and for continued compliance with the applicable regulations;

c) Detailed assignments of responsibilities associated with the carriage of dangerous goods;

d) Identification of training needs for the operator's staff and/or staff of other entities carrying out responsibilities on behalf of the operator who are involved with activities related to the transport of dangerous goods;

e) A training programme for all relevant staff, commensurate with their responsibilities and in accordance with the Technical Instructions, Part 1;4;

f) Instructions and procedures defined by the operator to ensure safe transport of dangerous goods and to ensure compliance with the responsibilities of the operator detailed in Part 7 of the Technical Instructions by all persons involved in the operation;

g) Procedures for communicating information about the dangerous goods being transported to relevant persons in case of an accident or incident. The procedures should include measures for effectively communicating hazards to those not familiar with dangerous goods marks and labels, and ensure that instructions are attached to the shipment for informing the operator and appropriate authorities such as public health authorities;

Note.— Whilst the Technical Instructions include provisions for communicating hazards of dangerous goods through marks and labels applied to the package, and documentation, which are well-known to those involved in their transport, individuals not involved in the operation who may be exposed to an UAS involved in an incident or accident may not be aware of these hazard communication methods.

h) Procedures to mitigate hazards unique to UAS operations to ensure the dangerous goods are capable of withstanding the conditions of transport involving the type of UA being used;

i) Procedures and instructions for the collection and reporting of safety data related to dangerous goods accidents, dangerous goods incidents and occurrence reporting on undeclared or misdeclared dangerous goods in cargo in accordance with Part 7;4 of the TI; and

j) Document retention policy.

2.2 The State of the Operator should determine that the operator's SOPs are suitable and ensure that the hazards have been adequately mitigated.

3. RISK ASSESSMENT

3.1 To obtain an approval to carry dangerous goods, operators should establish that intended operations do not pose a hazard to health, safety, property or the environment. Through a safety 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.

3.2 The operator should conduct an operational risk assessment for the carriage of dangerous goods. At a minimum, the following aspects should be included in the safety risk assessment:

a) The extent to which third parties, property or the environment, could be endangered by the operation and the dangerous goods being carried;

b) Identification of hazards associated with the dangerous goods to persons directly involved in the handling of such goods;

c) Type of operation and geographical area where the operation will be carried out;

d) Containment characteristics of the UAS or any other means of additional protection that may be put in place to protect the integrity of the package or prevent the spillage or leakage of the dangerous goods contained in the packaging;

e) Effects of the intrinsic hazard of the dangerous goods being carried, considering the capabilities of the UAS to respond to the hazards, should an incident occur during flight;

f) Packing and packaging being used for the transport of dangerous goods;

g) Quantity and type of dangerous goods to be transported;

h) Level of competence of those handling the dangerous goods; and

i) Level of confidence in the logistics chain.

3.3 Where the cargo compartment of the UA does not meet the classification criteria of Part 7;8.1 of the Technical Instructions, or where the normal conditions of transport detailed in Part 4 of the Technical Instructions are not guaranteed for the duration of the flight due to the design of the aircraft, the associated hazards should be addressed through the operator's safety risk assessment. When an operator accepts the carriage of dangerous goods in such circumstances, engagement with the shipper should be made to ensure that they are aware that the conditions encountered during transport may vary and sufficient mitigations are put in place to ensure package integrity is not compromised during transport.

3.4 Whilst the safety risks posed may be reduced through effective training and assessment, appropriate packaging, communication, handling, and stowage, the scope of dangerous goods carried onboard a UA 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.

3.5 The safety risk assessment should be periodically reviewed to ensure that it remains up to date and that no further hazards which may require re-assessment and/or mitigation have been introduced into the operation. These could be influenced by internal or external factors, or external entities in the supply chain.

3.6 The *Safety Management Manual (SMM)* (Doc 9859) contains general guidance on implementation of *Annex 19 – Safety Management*, including the conduct of safety risk assessments. *Guidance for Safe Operations Involving Aeroplane Cargo Compartments* (Doc 10102) provides guidance on specific safety risk assessments on the transport of items in the cargo compartments of an aeroplane, including dangerous goods, which may be useful for UA operations.

4. EMERGENCY RESPONSE PROCEDURES

4.1 Operators should document and implement an emergency response plan (ERP). The ERP should include procedures and actions to be taken in the event of an incident or an accident when dangerous goods are being carried, in accordance with Part 7;4.7 and 7;4.9 of the Technical Instructions.

4.2 When establishing emergency response procedures, operators should consider developing a contingency checklist(s) that details the response to an incident or accident involving dangerous goods being carried on board the UA with the objective of providing adequate information to all the operator's staff involved in the response.

4.3 At a minimum the following aspects should be included in the ERP:

a) Identification of emergency scenarios that may result from the hazards associated with the dangerous goods being carried on board;

b) Contingency procedures for dealing with an emergency involving dangerous goods in UA cargo compartments which do not have fire detection or suppression systems;

c) Identification of entities which are trained and competent to adequately respond to the incident or accident on the ground and their contacts;

d) A contact list for all entities that may be involved in any action related to the operator's ERP to ensure expeditious and effective communication during any accident or incident involving dangerous goods or any emergency that may occur when an aircraft is carrying dangerous goods.

4.4 When dangerous goods 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.

4.4 The ERP should be communicated to local entities which may be involved in emergency response to incidents and accidents involving dangerous goods.

4.5 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.

4.6 Information contained in *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.

4.7 Doc-9481 may also be used in the safety risk assessment when identifying the hazards posed to the aircraft when dangerous goods are carried.

5. ADDITIONAL CONSIDERATIONS

5.1 UAS operations may only be conducted in a State other than the State of the Operator through bilateral or multilateral agreement. The State(s) in which the operation is to be conducted should determine if the safety risk assessment and the standard operating procedures are acceptable. When States other than the State of the Operator have notified ICAO that they require prior approval of such operations, approval must also be obtained from the States of Origin and Destination, as appropriate.

5.2 Where a package containing dangerous goods is to be dropped from the UA, the height at which the package is released, should not exceed the drop height for which the package was tested for or certified. Dangerous goods should not be dropped during flight, if such action creates a hazard to persons, property or the environment.

5.3 If delivery of dangerous goods to or from the location of the UAS by other modes of transport is necessary, all appropriate provisions of the national or international regulations by those modes of transport apply.

6. DEFINITIONS

UA. an aircraft that is intended to be operated with no pilot onboard. These include all unmanned aircraft, whether remotely piloted, fully autonomous or combinations thereof.

UAS. An unmanned aircraft and its associated components.

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