



NOTA DE ESTUDIO

GRUPO EXPERTO EN MERCANCÍAS PELIGROSAS (DGP)

TRIGÉSIMA REUNIÓN

Montreal, 6 - 10 de octubre de 2025

Cuestión 6: Disposiciones sobre mercancías peligrosas para las operaciones con RPAS
(Ref.: *Ficha de trabajo DGP.007.02*)

DISPOSICIONES SOBRE MERCANCÍAS PELIGROSAS PARA LAS OPERACIONES CON SISTEMAS DE AERONAVES PILOTADAS A DISTANCIA

(Nota presentada por la relatoría del Grupo de Trabajo sobre Sistemas de
Aeronaves Pilotadas a Distancia del DGP)

RESUMEN

En esta nota de estudio se propone la incorporación de nuevas disposiciones en las Instrucciones Técnicas para las operaciones internacionales de los sistemas de aeronaves pilotadas a distancia.

Las nuevas disposiciones propuestas son el resultado de la labor del Grupo de Trabajo sobre Sistemas de Aeronaves Pilotadas a Distancia del DGP (DGP-WG/RPAS) en consonancia con la ficha de trabajo DGP.007.02 de la ANC para la elaboración de disposiciones sobre mercancías peligrosas para las operaciones con sistemas de aeronaves pilotadas a distancia.

Medidas propuestas al DGP: Se invita al DGP a:

- a) examinar los cambios propuestos que figuran en los apéndices B y C de esta nota de estudio para su incorporación en la edición 2027-2028 de las Instrucciones Técnicas y su Suplemento; y
- b) analizar los textos de orientación propuestos que figuran en el apéndice D de esta nota de estudio y aprobar su publicación como orientación para uso de los Estados en las operaciones interiores.

* Solo se han traducido el resumen y el apéndice.

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).

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 from 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:

- a) 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.

- b) 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.
- c) 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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DGP/30-WP/29
Apéndice A
En inglés únicamente

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								

APÉNDICE B

NUEVAS DISPOSICIONES SOBRE MERCANCÍAS PELIGROSAS PROPUESTAS PARA SU INCLUSIÓN EN LAS INSTRUCCIONES TÉCNICAS EN APOYO DE LAS OPERACIONES DE LOS SISTEMAS DE AERONAVES PILOTADAS A DISTANCIA

Parte 1

GENERALIDADES

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Capítulo 1

ALCANCE Y CAMPO DE APLICACIÓN

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1.1.4 Si no resulta pertinente ninguno de los criterios expuestos para otorgar una exención, el Estado de sobrevuelo puede otorgarla basándose exclusivamente en la convicción de que se ha logrado un nivel equivalente de seguridad en el transporte aéreo.

Nota 1.— Para los fines de las aprobaciones, “Estados interesados” son los Estados de origen y del explotador, salvo cuando se especifica de otro modo en las presentes Instrucciones.

Nota 2.— Para los fines de las exenciones, “Estados interesados” son los Estados de origen, del explotador, de tránsito, de sobrevuelo y de destino. Para las operaciones de los sistemas de aeronaves pilotadas a distancia (RPAS), también deben obtenerse exenciones de otros Estados, como el Estado de la estación a distancia o el Estado del piloto/a a distancia, si dichos Estados han informado de ello a la OACI presentando una discrepancia estatal.

Nota 3.— El Suplemento de las Instrucciones Técnicas (parte S-1;1.2 y 1.3) contiene orientaciones para la tramitación de las exenciones, incluyendo ejemplos de extrema urgencia.

Nota 4.— Consúltese 1;2.1 respecto a las mercancías peligrosas cuyo transporte por vía aérea está absolutamente prohibido cualesquiera que sean las circunstancias.

Note 5.— Atendiendo a las diferencias en el tipo de operaciones que llevan a cabo los helicópteros en comparación con los aviones, es necesario tener en cuenta algunas consideraciones adicionales cuando se transportan mercancías peligrosas por helicóptero, conforme a lo descrito en 7;7.

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Capítulo 3

INFORMACIÓN GENERAL

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3.1 DEFINICIONES

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Transporte exterior. Transporte de una carga suspendida desde un helicóptero o una aeronave pilotada a distancia (RPA) o en equipo acoplado al helicóptero o a la RPA.

Miembro de la tripulación a distancia. Persona a quien el explotador asigna obligaciones relacionadas con la operación de un sistema de aeronave pilotada a distancia durante un período de servicio de vuelo.

Miembro de la tripulación de vuelo a distancia. Miembro de la tripulación titular de una licencia, a quien se asignan obligaciones esenciales para la operación de un sistema de aeronave pilotada a distancia durante un período de servicio de vuelo.

Piloto a distancia. Persona designada por el explotador para desempeñar funciones esenciales para la operación de una aeronave pilotada a distancia y para operar los mandos de vuelo, según corresponda, durante el tiempo de vuelo.

Piloto al mando a distancia. Piloto a distancia designado por el explotador para estar al mando y encargarse de la realización segura de un vuelo.

Estación de pilotaje a distancia (RPS). Componente del sistema de aeronave pilotada a distancia que contiene el equipo que se utiliza para pilotar una aeronave a distancia.

Certificado de explotador de RPAS (ROC). Certificado por el que se autoriza a un explotador de RPAS a realizar determinadas operaciones de RPAS (AOC).

Aeronave pilotada a distancia (RPA). Aeronave no tripulada que es pilotada desde una estación de pilotaje a distancia. Es un tipo de aeronave no tripulada.

Sistema de aeronave pilotada a distancia (RPAS). Aeronave pilotada a distancia, sus estaciones conexas de pilotaje a distancia, los enlaces requeridos de mando y control y cualquier otro componente según lo especificado en el diseño de tipo.

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Parte 7

OBLIGACIONES DEL EXPLOTADOR

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Capítulo 1

PROCEDIMIENTOS DE ACEPTACIÓN

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1.7 EVALUACIONES DE RIESGOS DE SEGURIDAD OPERACIONAL

Los explotadores deben incluir el transporte de mercancías peligrosas, comprendidas las baterías y pilas de litio como carga, en el marco de:

- a) su sistema de gestión de la seguridad operacional (SMS) de conformidad con el Anexo 19; y
- b) su evaluación de los riesgos de seguridad operacional específicos del transporte de artículos en el compartimiento de carga de conformidad con el Anexo 6 – Operación de aeronaves, parte I – Transporte aéreo comercial internacional – Aviones y parte IV – Operaciones internacionales – Sistemas de aeronaves pilotadas a distancia.

Nota 1.— En el Manual de gestión de la seguridad operacional (SMM) (Doc 9859) figura orientación para realizar una evaluación de riesgos de seguridad operacional específicos.

Nota 2.— En el Manual de seguridad operacional del compartimiento de carga (Doc 10102) figura orientación para realizar una evaluación sobre los riesgos de seguridad operacional específicos del transporte de artículos en el compartimiento de carga.

Nota 3.— Se proporciona orientación específica sobre las evaluaciones de riesgos de seguridad operacional relativas a los envíos que contengan productos farmacéuticos contra la COVID-19 en www.icao.int/safety/OPS/OPS-Normal/Pages/Safety-transport-vaccines.aspx.

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Capítulo 2

ALMACENAMIENTO Y CARGA

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2.1 RESTRICCIONES APLICABLES A LA CARGA EN EL PUESTO DE PILOTAJE Y EN AERONAVES DE PASAJEROS

2.1.1 Las mercancías peligrosas no deben acarrear en la cabina de ninguna aeronave ocupada por pasajeros ni tampoco en el puesto de pilotaje, salvo que lo permita 1;2.2.1 y 8;1 y en lo que atañe a material radiactivo, los bultos exceptuados en 2;7.2.4.1.1. Las mercancías peligrosas pueden acarrear en el compartimiento de carga de la cubierta principal de las aeronaves de pasajeros, siempre y cuando el compartimiento en cuestión satisfaga todas las condiciones de certificación aplicables a los compartimientos de carga de la Clase B o de la Clase C. No se deben transportar en aeronaves de pasajeros mercancías peligrosas que lleven la etiqueta "Exclusivamente en aeronaves de carga".

2.1.2 Conforme a las condiciones prescritas en S-7;2.2 del Suplemento, el Estado de origen y el Estado del explotador pueden aprobar el transporte de mercancías peligrosas en los compartimientos de carga de la cubierta principal de las aeronaves de pasajeros que no satisfacen las condiciones de 2.1.1.

Nota.— La clasificación de los compartimientos de carga se describe en el documento de la OACI titulado Orientación sobre respuesta de emergencia para afrontar incidentes aéreos relacionados con mercancías peligrosas (Doc 9481).

2.1.3 Con respecto a las condiciones adicionales relativas a la carga de mercancías peligrosas para transporte por helicóptero, véase la parte 7;7.

[2.1.4 Con respecto a las condiciones adicionales relativas a la carga de mercancías peligrosas para su transporte por RPA, véase la parte 7;8].

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2.4 CARGA Y SUJECCIÓN DE LAS MERCANCÍAS PELIGROSAS

2.4.1 Carga a bordo de las aeronaves cargueras

2.4.1.1 Los bultos o sobreembalajes de mercancías peligrosas que lleven la etiqueta "Exclusivamente en aeronaves de carga" deben cargarse para su transporte por aeronaves de carga ajustándose a una de las disposiciones siguientes:

- a) en un compartimiento de carga de Clase C; o
- b) en un dispositivo de carga unitarizada con sistema de detección/supresión de incendios equivalente a aquel que se especifica en los requisitos de certificación de los compartimientos de carga de Clase C, según lo determine la autoridad nacional que corresponda (debe indicarse "Compartimiento de Clase C" en la etiqueta del dispositivo de carga unitarizada cuando la autoridad nacional que corresponda determine que ese dispositivo de carga unitarizada se ajusta a las normas relativas a los compartimientos de carga de Clase C); o
- c) de manera tal que en el caso de una emergencia relacionada con estos bultos o sobreembalajes, un miembro de la tripulación u otra persona autorizada pueda tener acceso a ellos y pueda manipularlos y, cuando la dimensión y la masa lo permitan, pueda separarlos de otra carga; o
- d) en transporte exterior por helicóptero o RPA; o
- e) con la aprobación del Estado del explotador, en el caso de operaciones de helicópteros, en la cabina (véase la parte S-7;2.4 del Suplemento).

Nota.— La clasificación de los compartimientos de carga se describe en el documento de la OACI titulado Orientación sobre respuesta de emergencia para afrontar incidentes aéreos relacionados con mercancías peligrosas (Doc 9481).

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2.9.6 Separación

2.9.6.1 Distancias de separación con respecto a las personas

Los bultos, sobreembalajes o contenedores de las Categorías II-Amarilla y III-Amarilla deberán separarse de las personas. Las distancias mínimas de separación que se aplicarán figuran en las tablas 7-3 y 7-4 y se trata de las distancias que van desde la superficie de los bultos, embalajes o contenedores hasta la superficie interior más próxima de las paredes o pisos de la cabina de pasajeros o del puesto de pilotaje, independientemente de la duración del transporte del material radiactivo. La tabla 7-4 solo se aplica cuando el material radiactivo se transporta en aeronaves de carga y, en esas circunstancias, las distancias mínimas deberán aplicarse según lo antedicho también a cualesquiera otras áreas ocupadas por personas.

Nota.— Las disposiciones de las tablas 7-3 y 7-4 no se aplican al transporte de materiales radiactivos en RPA.

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Capítulo 4

SUMINISTRO DE INFORMACIÓN

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4.1 INFORMACIÓN PROPORCIONADA AL PILOTO AL MANDO O AL PILOTO AL MANDO A DISTANCIA

Nota editorial.— El término “piloto al mando” se utiliza más de cincuenta veces en las Instrucciones Técnicas. Todas esas referencias deberán sustituirse por “piloto al mando o piloto al mando a distancia”, salvo en aquellas disposiciones relacionadas con el transporte de ayudas motrices eléctricas de pasajeros, que no son aplicables a las operaciones de RPAS.

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4.1.1.1 Excepto cuando se dispone de otro modo, la información que se requiere en virtud de 4.1.1 debe incluir lo siguiente:

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- j) el aeródromo o el lugar en el cual haya que descargar el bulto o bultos;

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Capítulo 8

OPERACIONES DE RPAS

Nota 1.— Los requisitos que figuran en este capítulo son adicionales a las demás disposiciones de estas Instrucciones que se aplican a todos los explotadores (como las establecidas en la parte 1:4 y la parte 7).

Nota 2.— A los fines de este capítulo, además del Estado del explotador, el Estado interesado puede ser el Estado en el que se realizan las operaciones, el Estado de un piloto a distancia o el Estado de la estación a distancia (cuando sea diferente del Estado del explotador).

8.1 Una RPA solo puede transportar mercancías peligrosas:

- a) -en un compartimento de carga que cumpla todas las condiciones de certificación de los compartimentos de carga de aeronaves de la Clase C, la Clase D o la Clase E; o

- b) en transporte exterior.

Nota. — Véase la parte 7:2.4.1 para consultar las condiciones adicionales para cargar a bordo bultos o sobreembalajes de mercancías peligrosas que lleven la etiqueta "Exclusivamente en aeronaves de carga".

8.2 Cuando el compartimento de carga de la RPA no cumpla todas las condiciones de certificación de los compartimentos de carga de aeronaves de la Clase C, la Clase D o la Clase E, el Estado del explotador y el Estado de origen podrán otorgar una aprobación para transportar mercancías peligrosas de conformidad con lo dispuesto en la parte S-7.2.3 del Suplemento. El explotador debe responder a los peligros conexos mediante una evaluación específica de riesgos de seguridad operacional.

8.3 Debido a la naturaleza o el tipo de operaciones realizadas por una RPA, es posible que en determinadas circunstancias no todas las disposiciones de las presentes Instrucciones resulten apropiadas o necesarias, como, por ejemplo, cuando no se transportan personas a bordo de la RPA y las operaciones de RPA se efectúan hacia y desde sitios no tripulados o en lugares lejanos o zonas montañosas. En estas circunstancias, y cuando sea apropiado, el Estado del explotador puede otorgar una aprobación para permitir el transporte de mercancías peligrosas sin que se cumplan todos los requisitos habituales de las presentes Instrucciones. Si los Estados, que no sean el Estado del explotador, han notificado a la OACI que requieren aprobación previa para estas operaciones, debe obtenerse además la aprobación de los Estados de origen y de destino, según corresponda, o de cualquier otro Estado interesado.

Nota 1.— El Doc 9859 contiene orientaciones generales sobre la implementación del Anexo 19, incluida la realización de evaluaciones de los riesgos de seguridad operacional.

Nota 2.— El Doc 10102 proporciona orientaciones sobre evaluaciones específicas de los riesgos de seguridad operacional en el transporte de artículos en el compartimento de carga de una RPA, incluidas las mercancías peligrosas.

8.4 Cuando se carguen mercancías peligrosas para transporte exterior abierto por RPA, debería considerarse también el tipo de embalaje utilizado y la protección de dichos embalajes contra los efectos del flujo del aire y las condiciones meteorológicas, cuando sea necesario (p. ej., daños por lluvia o temperaturas extremas), además de las disposiciones generales de carga de 7.2. Si la carga con mercancías peligrosas se transporta suspendida desde una RPA, el explotador debe asegurarse de que se consideren los peligros que plantea la descarga de electricidad estática al aterrizar o liberar la carga.

APÉNDICE C

NUEVAS DISPOSICIONES SOBRE MERCANCÍAS PELIGROSAS PROPUESTAS PARA SU INCLUSIÓN EN EL SUPLEMENTO DE LAS INSTRUCCIONES TÉCNICAS EN APOYO DE LAS OPERACIONES DE LOS SISTEMAS DE AERONAVES PILOTADAS A DISTANCIA

Parte S-7

OBLIGACIONES DEL ESTADO CON RESPECTO A LOS EXPLOTADORES

...

Capítulo 2

ALMACENAMIENTO Y CARGA

...

2.2 CARGA EN AERONAVES DE PASAJEROS

...

2.3 CARGA EN AERONAVES PILOTADAS A DISTANCIA (RPA)

2.3.1 En la parte 7;8.1 de las Instrucciones Técnicas se establece que una RPA solo puede transportar mercancías peligrosas:

- a) en un compartimento de carga que cumpla todos los requisitos de certificación de los compartimentos de carga de aeronaves de Clase C, Clase D o Clase E; o
- b) en transporte exterior.

Para las operaciones de RPA, el Estado del explotador puede aprobar el transporte de las mercancías peligrosas que se consideran en 2.2.2 y 2.2.3 en un compartimento de carga que no cumpla todos los requisitos de certificación aplicables de conformidad con 2.2.5, 2.2.6, 2.2.7 y 2.2.8. Para otorgar dicha aprobación, los Estados deberían considerar los factores por los que puede ser necesario transportar las mercancías peligrosas en bodega, o preferentemente deberían considerar:

- la dimensión/masa de los bultos para determinar si es posible o no transportarlos como carga externa;
- los tipos y la cantidad de las mercancías peligrosas en cuestión;
- los tipos de embalajes utilizados;
- la duración del vuelo (vuelos);
- los tipos de operación; y
- la capacidad de aterrizar rápidamente en el caso de una emergencia.

2.3.2 Si los Estados, que no sean el Estado del explotador, han notificado a la OACI que requieren aprobación previa para estas operaciones, debe obtenerse además la aprobación de los Estados de origen y de destino, según corresponda.

Vuélvanse a numerar los párrafos siguientes en consecuencia

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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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