



危险物品专家组 (DGP)

第三十次会议

2025 年 10 月 6 日至 10 日，蒙特利尔

议程项目 6：支持遥控驾驶航空器系统 (RPAS) 运行的危险物品规定 (编号：工作卡 DGP.007.02)

支持遥控驾驶航空器系统的危险物品规定

(由危险物品专家组遥控驾驶航空器系统工作组 (DGP-WG/RPAS) 提交)

摘要

本工作文件建议通过技术细则的新规定，以支持遥控驾驶航空器系统的国际运行。

新的拟议规定源于危险物品专家组遥控驾驶航空器系统工作组 (DGP-WG/RPAS) 的工作，与为了支持遥控驾驶航空器系统运行而编制危险物品规定的 ANC 工作卡 DGP.007.02 保持一致。

危险物品专家组的行动：请危险物品专家组：

- a) 审议本工作文件附录 B 和 C 所载的拟议修改，以纳入 2027-2028 年版的技术细则及其补篇；
- b) 审议本工作文件附录 D 所载的拟议指导材料，并核可将其作为各国国内行动的指导材料予以发布。

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),

* 仅提供了摘要和附录的翻译。

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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附录A

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

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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 FLTOSP- SCGSWG	Completed	Q4 2022	-	Dec 2022
✓	10280	Annex 18	Consequential amendments to Annex 18 to accommodate RPAS operations	FLTOSP 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									

附录B

支持遥控驾驶航空器系统运行的技术细则危险物品拟议新规定

第1部分

概论

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第1章

范围和适用

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1.1.4 对于被飞越国，如果没有相应的予以豁免标准，可依据认为是否已达到同等的航空运输安全水平予以豁免。

注1：为批准之目的，“有关国家”系指始发国和运营人所属国，除非本细则另有规定。

注2：为豁免之目的，“有关国家”系指始发国、运营人所属国、过境国、飞越国和目的地国家。对于遥控驾驶航空器系统（RPAS）的运行，其他国家，如遥控站所在国或遥控驾驶员所在国等，若已通过国家差异条款就此通知国际民航组织，则也必须获得此类国家的豁免。

注3：关于处理豁免的指南，包括极端紧急情况的例子，载于技术细则补篇（S-1；1.2和1.3段）。

注4：关于在任何情况下均禁止航空运输的危险物品，参见1；2.1。

注5：由于直升机与定翼飞机所从事的运行种类不同，在用直升机运载危险物品时需要考虑某些额外因素，如7.7所述。

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第3章

一般说明

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3.1 定义

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外部运载 直升机或遥控驾驶航空器（RPA）所悬挂的任何负载，或与直升机或遥控驾驶航空器相连设备中的任何负载。

遥控机组成员 由运营人指派在飞行值勤期间承担遥控驾驶航空器系统运行相关职责的人。

遥控飞行机组成员 在飞行值勤期间负责遥控驾驶航空器系统运行基本职责的持照飞行机组成员。

遥控驾驶员 由运营人指派对遥控驾驶航空器的运行负有基本职责并在飞行时间适时操纵飞行控件的人。

遥控机长 由运营人指派指挥和负责进行安全飞行的遥控驾驶员。

遥控站（RPS） 装有遥控驾驶航空器操纵设备的遥控驾驶航空器系统组成部分。

遥控运行许可证（ROC） 授权遥控驾驶航空器系统运营人进行特定遥控驾驶航空器系统运行的证书（AOC）。

遥控驾驶航空器（RPA） 从遥控站操纵的无人航空器。它们属于无人航空器的一种类型。

遥控驾驶航空器系统（RPAS） 一架遥控驾驶航空器、其相关遥控站、所需的指挥和控制链路以及型号设计规定的任何其他部件。

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第7部分

运营人的责任

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第1章

收运程序

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1.7 开展安全风险评估

运营人必须将锂电池和电池芯等危险物品的货运：

a) 根据附件19纳入其安全管理体系（SMS）中；和

b) 根据附件6 — 《航空器的运行》第I部分 — 《国际商业航空运输 — 飞机》和第IV部分 — 国际运行 — 遥控驾驶航空器系统，纳入到针对物品货运的具体安全风险评估中。

注1：安全管理体系的实施指南，见《安全管理手册》（SMM）（Doc 9859号文件）。

注2：关于就物品货运进行具体安全风险评估的指导，见《货舱操作安全手册》（Doc 10102号文件）。

注3：有关就含有 COVID-19 医药用品的托运货物进行安全风险评估的具体指南，载于 www.icao.int/safety/OPS/OPS-Normal/Pages/Safety-transport-vaccines.aspx。

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第2章

仓储和装载

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2.1 驾驶舱和客机的装载限制

2.1.1 危险物品不得装入驾驶舱或载有旅客的航空器客舱，1;2.2.1 和 8;1 所允许的危险物品及 2;7.2.4.1.1 所述的放射性物质例外包装件除外。客机的上货舱如果符合 B 级或 C 级航空器货舱的全部认证要求，可以载运危险物品。粘贴“Cargo aircraft only”（仅限货机）标签的危险物品不得装入客机。

2.1.2 在补篇 S-7;2.2 规定的条件下，始发国和运营人所属国可以批准危险物品在不符合 2.1.1 中要求的客机上货舱中载运。

注：货舱分类说明载于国际民航组织文件《与危险物品有关的航空器事故征候应急响应指南》（Doc 9481 号文件）。

2.1.3 关于用直升机运载的危险物品的补充装载要求，参见 7;7。

[2.1.4 关于用遥控驾驶航空器运载危险物品的补充装载要求，参见 7;8。]

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2.4 危险物品的装载与固定

2.4.1 货机的装载

2.4.1.1 粘贴“Cargo aircraft only”（仅限货机）标签的危险物品包装件或合成包装件，必须按照下述一条规定进行装载，以便使用货机运输：

- a) 装入 C 级航空器货舱；或
- b) 装在配有火情探测/扑灭系统的集装箱中，该系统与国家有关当局决定的 C 级航空器货舱认证要求所规定的系统相等同（凡由国家有关当局确定符合 C 级航空器货舱标准的集装箱，必须在集装箱挂牌上标明“C 级货舱（Class C compartment）”）；或
- c) 其装载方式使得在发生涉及这些包装件或合成包装件的紧急情况下，机组人员或其他经授权的人员能够接近并搬运这些包装件或合成包装件，并能在其大小及质量允许的条件下，把这样的包装件或合成包装件与其他货物隔开；或
- d) 用直升机或遥控驾驶航空器进行外部运载；或
- e) 经运营人所属国批准，如果是直升机运行，装入机舱内。（见补篇 S-7;2.4 部分）。

注：货舱分类说明载于国际民航组织文件《与危险物品有关的航空器事故征候应急响应指南》（Doc 9481 号文件）。

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2.9.6 分隔

2.9.6.1 与人员的分隔

II 级—黄色与 III 级—黄色的包装件、合成包装件或专用货箱必须与人员分隔开来。采用的最小间隔距离如表 7-3 和表 7-4 中所示。该距离从包装件、合成包装件或专用货箱的外表面算起至客舱或驾驶舱的墙板或地板的最近内表面止，不考虑载运放射性物质的持续时间。表 7-4 只适用于货机载运放射性物质的情况。在这种情况下，必须采用如上所述的最小间隔距离，这也适用于任何其他的人员所处区域。

注：表 7-3 和表 7-4 的规定对在遥控驾驶航空器中运载放射性物质的情况不适用。

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第 4 章

通报情况

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4.1 向机长或遥控机长通报的信息

编辑注：在技术细则中，“机长”一词出现逾五十次。除了旅客电动代步工具运载相关规定对遥控航空器系统运行不适用外，其余均须作编辑修订，改为“机长或遥控机长”。

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4.1.1.1 除非另有规定，否则该信息必须包括如下内容：

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j) 包装件的预定卸载机场或地点；

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第 8 章

遥控驾驶航空器系统运行

注 1：本章的要求系对适用于所有运营人的本细则其他规定（如 1；4 和第 7 部分）的补充。

注 2：就本章的目的而言，除运营人所在国外，相关国家还可指：运行所在国、遥控驾驶员所在国，或遥控站所在国（当有别于运营人所在国时）。

8.1 遥控驾驶航空器仅可在下列其一条件下运输危险物品：

a) 在满足 C 级、D 级或 E 级航空器货舱所有合格审定要求的货舱内；或

b) 作为外部负载。

注：贴有“仅限货机”标签的危险物品包装件或合成包装件，另有限制规定，详见 7.2.4.1。

8.2 若遥控驾驶航空器货舱不符合 C 级、D 级或 E 级航空器货舱的所有合格审定要求，运营人所在国和始发国可依据《补篇》S-7;2.3 为运输这些危险物品给予批准。运营人必须通过具体安全风险评估处理相关危险源。

8.3 鉴于遥控驾驶航空器（RPA）所执行运行的性质或类型，在某些情况下，可能不适于或者不必要采用技术细则的全套规定。此类情形包括：遥控驾驶航空器机上不运载人员、遥控驾驶航空器往返于无人地点进行运行、以及在偏远地区或山区进行运行等情况。在此类情形下，运营人所在国可酌情给予批准，允许在没有满足《技术细则》所有正常要求的情况下运载危险物品。如果非运营人所在国的其他国家已通知国际民航组织它们要求事先批准此类运行，则还必须视情获得始发国和目的地国家或其他相关国家的批准。

注 1：Doc 9859 号文件载有关于附件 19 的实施，包括进行安全风险评估的一般性指导。

注 2：Doc 10102 号文件针对在遥控驾驶航空器货舱内运输物品，包括危险物品等的具体安全风险评估提供了指导。

8.4 在装载危险物品以供遥控驾驶航空器外部负载时，除了 7.2 的一般装载规定外，还应考虑所用包装类型以及在必要情况下对这些包装的保护，使其免受气流和天气的影响（例如因雨水或极端温度而受损）。如果这种装载物包括吊挂于遥控驾驶航空器的危险物品，运营人则必须确保考虑在着陆或释放装载物时静电放电的危险。

附录C

支持遥控驾驶航空器系统运行的技术细则补篇危险物品拟议新规定

第S-7部分

国家对运营人的责任

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第2章

仓储和装载

.....

2.2 客机装载

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2.3 遥控驾驶航空器(RPA)装载

2.3.1 技术细则 7.8.1 规定遥控驾驶航空器仅可在下列其一条件下运输危险物品：

- a) 在满足 C 级、D 级或 E 级航空器货舱所有合格审定要求的货舱内；或
- b) 作为外部负载。

对于遥控驾驶航空器运行，运营人所在国可根据 2.2.5、2.2.6、2.2.7 和 2.2.8 的规定，批准在不符合所有适用合格审定要求的货舱内运载 2.2.2 和 2.2.3 所列的危险物品。当有待给予此类批准时，各国应考虑可能使内部运载成为必要或更为可取的因素，例如：

- 包装件的大小/质量导致无法将其作为外部负载；
- 所涉危险物品的类型和数量；
- 所用的包装类型；
- 飞行持续时间；
- 运行类型；和
- 在紧急情况下快速着陆的能力。

2.3.2 当非运营人所在国的其他国家已通知国际民航组织它们要求事先批准此类运行时，则还必须视情获得始发国和目的地国家的批准。

请对后续段落相应重新编号

附录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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