International Civil Aviation Organization

DGP-WG/22-WP/22
25/11/22

WORKING PAPER

DANGEROUS GOODS PANEL (DGP)
WORKING GROUP MEETING (DGP-WG/22)

Montréal, 21 to 25 November 2022

REPORT OF THE MEETING

(Presented by the Secretary)

1. INTRODUCTION

1.1 The Dangerous Goods Panel Working Group Meeting (DGP-WG/22) convened from 21 to 25 November 2022 in Montréal. Mr. T. Muller chaired and Mr. L. Cascardo vice-chaired the meeting.

2. ATTENDANCE

2.1 The meeting was attended by the following panel members, advisers and observers:

Members	Advisers	State/International Organization
S. Bitossi		Australia
L. Cascardo		Brazil
	D. Bolton D. Sylvestre	Canada
	Tai Feng Yang Qiang	China
P. Tatin	T. Chrupek	France
	G. Closhen	Germany
P. Privitera	A. Pellas	Italy
T. Tabata	Y. Hara N. Iki K. Nakano T. Tanaka A. Uchizawa	Japan

Members	Advisers	State/International Organization
T. Muller	R. Dardenne E. Boon K. Vermeersch	Netherlands
E. Gillett		Qatar
S. Kang	S. Yoo	Republic of Korea
	D. Kurdchenko	Russian Federation
	B. Ngiba	South Africa
M. de Castro		Spain
H. Almheiri	K. Al Belooshi A. Wagih T. Howard	United Arab Emirates
	M. Ranito	United Kingdom
D. Pfund	M. Givens K. Ranck K. Leary	United States
D. Brennan	C. Chan	International Air Transport Association (IATA)
D. Ferguson	M.-L. Moulard	International Coordinating Council of Aerospace Industries Associations (ICCAIA)
S. Schwartz		International Federation of Air Line Pilots' Associations (IFALPA)

Advisers

G. Leach	Dangerous Goods Advisory Council (DGAC)	

Observers

J. Wiren Bengtsson		Denmark
L. Calleja Barcena		European Aviation Safety Agency (EASA)

E. Remy C. Litus-Koza	North Atlantic Treaty Organization (NATO)
A. McCulloch T. Rogers	Global Express Association (GEA)

3. SUMMARY OF DISCUSSIONS

3.1 A summarized outcome of discussions is provided in Appendix G to this report. The report of discussions is provided in paragraph 4.

4. REPORT OF DISCUSSIONS

4.1 Agenda Item 1: Harmonizing ICAO dangerous goods provisions with UN Recommendations on the Transport of Dangerous Goods

4.1.1 Agenda Item 1.1: Develop proposals, if necessary, for amendments to Annex 18 — *The Safe Transport of Dangerous Goods by Air*

4.1.1.1 There were no amendments to Annex 18 proposed under this agenda item.

4.1.2 Agenda Item 1.2: Develop proposals, if necessary, for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2025-2026 Edition

4.1.2.1 Consolidated Amendments to the Technical Instructions and the Supplement to the Technical Instructions to Address Identified Errors (DGP-WG/22-WP/2)

4.1.2.1.1 Amendments to the Technical Instructions and the Supplement were proposed to correct the following errors:

a) removal of the forbidden under any circumstance status in Table 3-1 for tert-Amylperoxy-3,5,5-trimethylhexanoate and the addition of a cross reference to **Organic peroxide type D, liquid** (UN 3105) from the entry. The organic peroxide was reassigned from a forbidden under any circumstance entry (UN 3101 — **Organic peroxide type B, liquid**) to UN 3105 in Table 2-7 of the 2023-2024 Edition for the sake of alignment with the UN Model Regulations. UN 3105 is permitted on both passenger and cargo aircraft, but the corresponding amendment to Table 3-1 had not been made;

b) amendment to an erroneous proper shipping name for UN 3474 — **1-Hydroxybenzotriazole monohydrate** in Packing Instruction 451 in the Technical Instructions and the Supplement; and

c) the addition of UN 3549 — **Medical waste, Category A, affecting animals** only, solid and UN 3549 — **Medical waste, Category A, affecting humans**, solid as specific entries under Division 6.2 in the list of n.o.s. and generic proper shipping names contained in Attachment 1;2 of the Technical Instructions.

4.1.2.1.2 The amendments were agreed (see Appendices A and B to this report), subject to the removal of the entry for tert-Amylperoxy-3,5,5-trimethylhexanoate in Table 3-1. Specific organic peroxides were only included in Table 3-1 when they were forbidden under any circumstance. The entry was no longer needed now that the forbidden under any circumstance status was removed

4.1.2.2 Revision to Dangerous Goods List in the Chinese Version of the Technical Instructions (DGP-WG/22-WP/7)

4.1.2.2.1 Amendments to proper shipping names in the dangerous goods list in the Chinese version of the Technical Instructions were proposed to address inconsistencies with those in the English version and the dangerous goods list in the UN Model Regulations (see Appendix C to this report). The working group supported efforts to harmonize the names. A potential additional consistency was noted during the discussion. The Secretary would facilitate coordination between the panel member nominated by China and the Secretariat's Chinese Section to ensure the names were harmonized and published in the 2025-2026 Edition.

4.1.2.3 Proposed Revision to Special Provision A88 (DGP-WG/22-WP/8)

4.1.2.3.1 Inconsistencies between Special Provision A88, which contained provisions allowing certain lithium cells and batteries of a type not tested to the requirements in Part III, subsection 38.3 of the UN *Manual of Tests and Criteria* to be transported on cargo aircraft, and the associated special provision in the UN Model Regulations were identified. An amendment was proposed to remove the inconsistencies, but it was not supported as there were concerns it would have unintended consequences. Straying from the UN Model Regulations had been intentional to limit the shipment of low production runs. The provision had been in place for several years, and other panel members noted no issues raised in their States.

4.1.3 Agenda Item 1.3: Develop proposals, if necessary, for amendments to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) for incorporation in the 2025-2026 Edition

4.1.3.1.1 An amendment to Table S-3-1 was agreed under Agenda 1.2 (see paragraph 4.1.2.1.1 b) and Appendix B to this report)

4.2 Agenda Item 2: Managing air-specific safety risks and identifying anomalies

4.2.1 Agenda Item 2.1: Develop proposals, if necessary, for amendments to Annex 18 — *The Safe Transport of Dangerous Goods by Air*

4.2.1.1 There were no proposals developed under this agenda item.

4.2.2 **Agenda Item 2.2: Develop proposals, if necessary, for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2025-2026 Edition**

4.2.2.1 **The Maximum Permitted Stacking Load Applicable for Overpack with IBCs (DGP-WG/22-WP/6)**

4.2.2.1.1 An amendment to require the maximum permitted stacking load to be marked on an overpack when used for an intermediate bulk container (IBC) was proposed.

4.2.2.1.2 The amendment was not supported. Such a mark would be inaccurate as it was the IBC that was subjected to the stacking test, not the overpack. The amendment would result in a misalignment with the UN Model Regulations and the provisions for marks on overpacks used for any other kind of packaging. Even if the amendment was supported, it would need to be considered for incorporation in the UN Model Regulations by the UN Sub-Committee first. Some members consulted operators in their States and were advised that this was not an issue for them. IBCs in air transport were extremely rare because they were forbidden, other than for solid environmentally hazardous substances. It was suggested that even if they were used, they would not be stacked.

4.2.2.2 **Revision of Exception for UN 3082 in Packing Instruction 964 (DGP-WG/22-WP/10)**

4.2.2.2.1 An amendment to the exception from the pressure differential requirements in Packing Instruction 964 for packagings containing UN 3082 — **Environmentally hazardous substance, liquid, n.o.s.** was proposed to clarify that it only applied to combination packagings and not to single or composite packagings. There was support for clarifying the provision, but there were concerns that the wording proposed could be interpreted to mean that combination packagings for UN 3082 were not subject to the packaging performance tests in Part 6;5. A revised amendment was agreed (see Appendix A).

4.2.2.3 **Revision of Packing Instruction 952 (DGP-WG/22-WP/15)**

4.2.2.3.1 The working group agreed to amendments to Packing Instruction 952, assigned to UN 3171 — **Battery-powered vehicle** and **Battery-powered equipment** which:

a) extended the provisions for vehicles to be secured in a strong, rigid outer packaging and secured to prevent a change in orientation to equipment;

b) aligned the wording of the requirement for the vehicle to be secured with the language used in other packing instructions;

c) removed references to “machine” as machines were not part of the proper shipping name to which Packing Instruction 952 was assigned;

d) removed a reference to Packing Instruction 492 from provisions for removing spillable batteries, because this packing instruction was not associated with spillable batteries. It was assigned to UN 3292 —**Batteries, containing sodium** and **Cells, containing sodium**. The provision containing the reference was intended to ensure the batteries

did not leak by requiring them to be removed and packed safely. Special Provision A94, assigned to UN 3292, achieved this same intent.

The amendment, subject to some editorial revisions, was agreed (see Appendix A). It was noted that there were also erroneous references to Packing Instruction 492 in relation to spillable batteries in Packing Instructions 220, 378, 950, 951 and 972. The reference to Packing Instruction 492 would be removed from these packing instructions as well (see Appendix A).

4.2.2.4 **Mishandled baggage (DGP-WG/22-WP/21)**

4.2.2.4.1 DGP-WG/Annex 18 discovered that the definition for "Cargo" in the Technical Instructions referred to "mishandled baggage", but the term did not appear anywhere else in the document. The terms "lost baggage" and "improperly routed baggage", which were examples of mishandled baggage, did appear in the passenger provisions (Part 8;1.1.2 and 1.1.9). DGP-WG/22 agreed to refer to the term "mishandled baggage" in these provisions by identifying "lost" and "improperly routed" baggage as examples (see Appendix A).

4.2.3 **Agenda Item 2.3: Develop proposals, if necessary, for amendments to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) for incorporation in the 2025-2026 Edition**

4.2.3.1 **Draft Amendments to Attachment I to Chapter 1 of the Supplement to the Technical Instructions (DGP-WG/22-WP/12)**

4.2.3.1.1 The DGP Working Group on the Supplement (DGP-WG/Supp) developed draft amendments to the guidance on processing approvals and exemptions contained in the Supplement. It expected to make further amendments over the next biennium, but invited the working group to provide feedback on the ones already made.

4.2.3.1.2 DGP-WG/22 expressed its appreciation for the work already achieved, noting that States needed guidance. The following feedback was provided:

a) Much of the material involved operators' responsibilities, with little for the shipper. The shipper was the entity that needed the approval or exemption, so there needed to be more guidance in that respect.

b) Responsibilities for safety risk assessments needed clarification. There were several States involved in the approval or exemption process, but the degree of involvement from each would be different. The State of the Operator should play a major role in evaluating the safety risk assessment.

c) There needed to be an emphasis on shared responsibilities and establishing a relationship between the entity wanting to ship and the operator who would accept. Communication among the various entities involved was vital.

d) Guidance on how States should publish requirements for specific approvals and exemptions should be considered.

4.2.3.1.3 The Rapporteur of DGP-WG/Supp expressed her appreciation for the feedback provided. DGP-WG/Supp would incorporate it in a formal amendment proposal during the biennium.

4.2.3.2 **Report of the Working Group of the Supplement ((DGP-WG/22-IP/6)**

4.2.3.2.1 The rapporteur of DGP-WG/Supp provided a summary of its activities and planned work, which focused on two priorities:

a) Developing a process for future maintenance and amendment of the Supplement for inclusion in the *Guidance for the Panel to Aid in Preparation of the Technical Instructions.* A new template for members to use when preparing working papers proposing amendments to the Supplement was developed. It prompted members to consider consequential amendments to other documents that may be necessary; and

b) Reviewing and updating guidance material for processing exemptions and approvals in Part S-1 (General), Chapter 1 (Scope and applicability), Attachment I (Guidance for processing exemptions and approvals for the safe transport of dangerous goods by air) (see paragraph 4.2.3.1 of this report).

4.2.3.2.2 The Rapporteur advised DGP-WG/22 that she was taking a leave of absence in 2023 and had handed her position to the working group's co-rapporteur. She expressed her appreciation to the members of DGP-WG/Supp for their ongoing commitment. The chair expressed his appreciation, on behalf of the panel, for her excellent work leading the group through its vital work.

4.2.4 **Agenda Item 2.4: Development of proposals, if necessary, for amendments to the *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481) for incorporation in the 2025-2026 Edition**

4.2.4.1 No papers were submitted under this item.

4.3 **Agenda Item 3: Facilitating safe transport of dangerous goods by air (*Ref: REC-A-DGS-2025*)**

4.3.1 **Extension of the Concept of "Exclusive Use" to Aircraft Containers (ULDs) *(*DGP-WG/22-WP/1)**

4.3.1.1 An amendment to the definition for "exclusive use" intended to allow large aircraft containers to transport exclusive use shipments of radioactive material by air was proposed. The existing definition for "exclusive use" limited the transport to the sole use of an aircraft or of a large freight container. As the large freight container was a multi-modal container, this limited the carriage to large cargo aircraft that were capable of these being loaded on the main deck cargo compartment or to the use of the entire aircraft to carry the exclusive use shipment, which was extremely expensive. It was suggested that in most cases there would be no valid safety reason to not allow an aircraft container. The amendment also included a proposed new definition for aircraft container, and a requirement to clearly communicate it contained Class 7, exclusive use material through a mark on its identification tag. A similar amendment had been proposed to the International Atomic Energy Agency (IAEA) Transport Safety Standards Committee (TRANSSC) for incorporation in the IAEA Safety Standards Series No. SSR-6 (Rev. 1), but

TRANSCC concluded that DGP needed to consider it as a first step as it applied only to the air mode. The working group was invited to endorse the amendment for onward submission to TRANSCC.

4.3.1.2 The working group did not support the proposal, but did provide feedback. It was not convinced there was a need, and even if there would be an agreement on the concept, there would be a lot more to consider. The proposed amendment applied to all radioactive material subject to exclusive use, and some radioactive material had very high dose rates. A unit load device (ULD) might not be sufficient for such material, so a more targeted amendment might be more appropriate. There was a big difference between using a freight container for exclusive use, for which the shipper had responsibility, versus using a ULD, which was the operator's property. Airline and ground handling personnel were not trained to deal with containers containing radioactive material subject to exclusive use, and conversely, ULDs were not meant to be handled by shippers.

4.3.1.3 The proposer thanked the working group for the feedback and would consider a revised proposal for the 2023 working group meeting (DGP-WG/23).

4.3.2 Proposed Special Provision for UN 3530 (DGP-WG/22-WP/3 Rev)

4.3.2.1 Special Provision A70 made internal combustion and fuel cell engines or machinery shipped separately or incorporated into a vehicle, machine or other apparatus, without batteries or other dangerous goods, not subject to the Technical Instructions provided certain conditions were met. It was not assigned to UN 3530 — **Engine, internal combustion** or UN 3530 — **Machinery, internal combustion**, but was assigned to them when all engines and machinery were assigned to UN 3166. There was a suggestion that the assignment was inadvertently lost when engines and machinery were assigned new UN numbers based on their specific hazards. There was also a suggestion that Special Provision A208, which specified which UN numbers to consign to engines or machinery, did except UN 3530 from the Technical Instructions.

4.3.2.2 The working group agreed to assign Special Provision A70 to UN 3530. It also agreed to amend Special Provision A70 by replacing a reference to "flammable fuel" with "liquid fuel" to align with the terminology used in Special Provision A208 (see Appendix A).

4.3.3 Removal of Special Provision A185 from UN 3481 and UN 3091 (DGP-WG/22-WP/4)

4.3.3.1 An amendment to remove the assignment of Special Provision A185 from UN 3481 — **Lithium ion batteries packed with equipment** and UN 3091 — **Lithium metal batteries packed with equipment** was proposed. Special Provision A185 required vehicles only powered by lithium metal or lithium ion batteries to be consigned to UN 3171 — **Battery-powered vehicle**. It was suggested that the special provision conflicted with a provision in Packing Instruction 952, assigned to UN 3171, because it required lithium batteries that were removed from the vehicle and packed separately from the vehicle in the same outer packaging to be assigned to UN 3481 — **Lithium ion batteries packed with equipment** or UN 3091 — **Lithium metal batteries packed with equipment**.

4.3.3.2 The working group did not support removing the assignment of the special provision, because it considered both provisions accurate. UN 3171 was assigned to the vehicle when it was only powered by lithium metal or lithium ion batteries, unless the batteries were removed from the vehicle and packed separately from the vehicle in the same outer packaging. In this case the batteries were classified as UN 3481 or UN 3091. There was some sympathy for revising the special provision so that it included the

provision from Packing Instruction 952, but that would be a different proposal. It was noted that the special provision aligned with the UN Model Regulations. This needed to be taken into account if an amendment was to be made.

4.3.4 Revisions to Special Provision A123 and A199 (DGP-WG/22-WP/5)

4.3.4.1 Provisions allowing dry or nickel-metal hydride battery powered devices to be transported when active were proposed for inclusion in Special Provisions A123 and A199. The provisions were based on the ones in Section II of Packing Instructions 967 and 970 that allowed for active lithium battery-powered devices. The amendment was eventually agreed, but there were discussions on their value given that they provided mitigation measures against electromagnetic interference, which was beyond the scope of the Technical Instructions. The panel requested input from the Airworthiness Panel (AIRP) on the subject several years prior, and was still awaiting a response. There were also discussions on whether a more general provision in the Technical Instructions should be developed, so that it did not need to be repeated in multiple locations. There was inconsistency in that the provision was in a packing instruction for lithium battery powered devices but in special provisions for dry battery or nickel-metal hydride battery powered devices. The working group agreed to add the provision (see Appendix A) while also recognizing the need for a more holistic solution in the future.

4.3.5 Dangerous Goods Training and Assessment Records (DGP-WG/22-WP/11)

4.3.5.1 Part 1;4 included a requirement for the record of training and assessment to include the address of the organization providing the training and assessment. This was sometimes impossible to achieve in some States, and the value of the information was sometimes questioned. It was suggested that the requirement was overly prescriptive and that it should be left up to the State approving the training to determine the most appropriate contact information. An amendment intended to provide more flexibility was therefore proposed.

4.3.5.2 Not all agreed an amendment was necessary. They believed the provision already provided flexibility. The proposed amendment maintained the term “organization”, which was not used anywhere else in the Technical Instructions and was not defined. This implied that an organization was required to provide the training, which was not the case. Some thought the entire section needed to be reviewed and potentially revised to be more objective driven. This could be a task assigned to the DGP Working Group on Training. The proposer supported this while also wanting to address an immediate problem. A revised proposal was agreed (see Appendix A).

4.3.6 Pressure Differential Requirements in Part 4;1.1.6 and Part 6;4.3.5 (DGP-WG/22-WP/14)

4.3.6.1 Part 4;1.1.6 of the Technical Instructions required inner packagings for liquids to be capable of withstanding, without leakage, an internal pressure differential of not less than 95 kPa or, for liquids in Packing Group III of Class 3 or Division 6.1, not less than 75 kPa. A similar provision was included in the provisions for an internal pressure (hydraulic) packaging performance test required by Part 6;4.5. The lower pressure differential was provided because these substances were less hazardous. An amendment was proposed to extend the relaxation of 75 kPa to liquids of Class 9. The amendment was agreed (see Appendix A), with the recognition that the few liquids in Class 9 for which the relaxation would apply were no more hazardous than liquids for which the relaxation already applied.

4.3.7 **Proposed Revision to the Packing Instruction 967 (DGP-WG/22-IP/1)**

4.3.7.1 The working group was asked for its opinion on potentially adjusting the upper Watt-hour rating limit for lithium ion cells packed in accordance with Section II of Packing Instruction 967 from 20 Wh to 30 Wh. There was no formal proposal, only a request for feedback. The justification provided was the fact that innovation and development had resulted in new types of portable electronic devices powered by lithium batteries coupled with an increase in energy capacity. The current limit meant that these devices could not benefit from the exceptions from full regulation that Section II provided.

4.3.7.2 The working group could not support raising the upper Watt-hour limit. The justification for it was a facilitation need without any safety data to demonstrate that an increased limit was safe or that the current limit was unjustified. Raising the limit would create a misalignment with the UN Model Regulations, so even if there was a change it would need to be made by the UN Committee as a first step. The safety impact on mail would need to be taken into account if ever an increase were to be considered.

4.4 **Agenda Item 4: Managing safety risks posed by the carriage of lithium batteries by air (*Ref: Job Card DGP.003.04*)**

4.4.1 **Report of the Dangerous Goods Panel Working Group on Energy Storage Devices (DGP-WG/Energy storage devices) (DGP-WG/22-IP/5), Transport airplane cargo compartment fire suppression capabilities, requirements and dangerous goods assessment in three parts (DGP-WG/22-IP/9), Thermal Incident Data related to Cargo Operations reported through the Voluntary Thermal Runaway Incident Program (TRIP): Summary Of Data (DGP-WG/22-IP/10) and Import-export data on UN 3480/UN 3481/UN 3090 based on harmonized tariff system (HTS) and harmonized tariff schedule of the United States (DGP-WG/22-IP/14)**

4.4.1.1 A proposal to extend the existing state of charge limit for UN 3480 — **Lithium batteries** to UN 3481 — **Lithium batteries packed with equipment**, UN 3481 — **Lithium batteries contained with equipment**, UN 3171 — **Battery-powered equipment** and UN 3171 — **Battery-powered vehicle** was considered at DGP/28. The panel could not reach consensus on mandating such a requirement without first conducting a thorough safety risk assessment and tasked the DGP Working Group on Energy Storage Devices (DGP-WG/Electronic Storage Devices) with conducting it. DGP-WG/22 was updated on progress made by DGP-WG/Electronic Storage Devices.

4.4.1.2 DGP-WG/Electronic Storage Devices was utilizing the bowtie method as a tool to visualize what could cause thermal runaway (top event, middle of bowtie), what controls could prevent it (proactive, left side of bowtie), and what measures could prevent unwanted consequences if it did occur (reactive, right side of bowtie). The working group was focusing on thermal runway from lithium batteries packed with and contained in equipment because the controls were similar and because changes to the provisions for vehicles by the UN Sub-Committee were anticipated, which might invalidate any work done. It identified damaged batteries as a potential cause, or threat, of thermal runaway.

4.4.1.3 **Preventative controls**

4.4.1.3.1 DGP-WG/Electronic Storage Devices mapped out controls aimed at preventing thermal runaway, which were requirements already in place in the Technical Instructions. It mapped out one set of controls for damaged lithium batteries contained in equipment and another for damaged lithium batteries packed with equipment, although many were the same. It also mapped out escalation factors that could weaken the controls. The controls mitigated against damage that could occur any time prior to loading.

4.4.1.4 **Reactive controls**

4.4.1.4.1 The working group had not yet mapped out reactive controls to mitigate against unacceptable consequences resulting from a thermal runaway event during transport (right side of bowtie).

4.4.1.5 **Evaluating the effectiveness of controls**

4.4.1.5.1 DGP-WG/ Electronic Storage Devices would be evaluating the criticality and effectiveness of specific controls based on available information. It requested panel members to provide any data or information they might have. Information on cargo compartment capabilities, incident data, and shipment volume was presented to DGP-WG/22.

Cargo compartment capabilities

4.4.1.5.2 Cargo compartment protection features provided reactive controls against thermal runaway. Information on the capabilities of fire suppression systems for cargo compartments and the regulatory requirements for them was presented to DGP-WG/22 to help with evaluating their effectiveness. Key points were:

a) Aircraft fire suppression systems were designed to address fires likely to occur. There was a correlation between fires likely to occur and what was being carried, but this was not static. Maintaining compatibility between fire protection systems, procedures, and equipment with the type of fire that could occur was critical. If changes resulted in diminished compatibility, either what was being carried needed to change or there needed to be a change at the aircraft level, the unit load device level, or the package level to protect against fires likely to occur;

b) There was a risk of an uncontrollable fire involving lithium batteries in a Class C compartment because Halon 1301 could not stop the thermal runaway cell-to-cell propagation and could not prevent the ignition of hydrogen gas. A fire could therefore self-propagate, release combustible gas that could ignite and cause an overpressure leading to damage and negatively impact the ability of the suppression system to control a fire; and

c) There was a risk of an uncontrollable fire involving lithium batteries in a Class E compartment because oxygen starvation could not stop thermal runaway cell-to-cell propagation or the rapid release of combustible and explosive gas. This could produce a fire with a greater intensity than what the compartment was designed to control. This could cause cargo compartment, flight controls and structural damage and an overpressure that could cause smoke to enter the flight deck.

Incident data

4.4.1.5.3 Underwriters Laboratories Inc. ("UL") had collected data through its voluntary Thermal Runaway Incident Program (TRIP). A summary of data collected between 2017 and 2022 was presented to DGP-WG/22. Eighteen air operators, mostly American, along with the United States Postal Inspection Service participated in the programme by voluntarily providing data to the system. The presentation included data from 429 thermal incidents reported from sixty-five operators and the Unites States Transport Security Administration (TSA). There were more operators reporting than the number of TRIP participants, because additional operators were included from data extracted from FAA incident reports and news reports between 2017 and 2019. Out of 429 incidents, 73 occurred on cargo aircraft and 356 occurred on passenger aircraft. Of the 356 on passenger aircraft, 273 occurred in carry-on baggage, 10 in cargo (or mail), 65 in checked baggage, and 8 were unknown. The focus of the presentation was on the 83 thermal incidents in cargo (or mail). Key points were:

a) The events were at locations other than on board the aircraft, including baggage unloading areas, acceptance locations, sorting facilities, and cargo facilities. One hypothesis for this was that the events were not discovered until the device or battery was removed from the aircraft;

b) Seven of the ten cargo incidents on passenger aircraft involved mail;

c) Cargo mishandling resulted in a large number of incidents;

d) At least 28 per cent of the events involved UN 3481;

e) Incident rates for UN 3480 had been declining since 2017. One hypothesis for this was that the ban on the transport on passenger aircraft and the requirement for batteries to be at 30 per cent state of charge in order to be transported on cargo aircraft was having a positive effect; and

f) There was no clear trend for UN 3481.

Shipment volume data

4.4.1.5.4 Data related to shipment volume of UN 3480, UN 3090 and UN 3481 was presented to DGP-WG/22. The data was based on imports and exports to and from the United States that was extracted from United States Bureau of the Census trade data. The census data identified shipment value, weight and number of products that cross a United States' point via air from or to a foreign point. From this data it was estimated that the number of shipments of UN 3481 by air to and from the Unites States, excluding domestic shipments, increased from 1,853,000 to 2,929,000 between 2015 and 2021.

Next steps

4.4.1.6 DGP-WG/22 expressed its appreciation for the work already done and supported the next steps that DGP-WG/Energy Storage Devices would take moving forward, which were to:

a) evaluate the criticality and effectiveness of each preventative control based on available information;

b) populate the right side of the bowtie with reactive controls to prevent unwanted consequences;

c) consider data sources that could be used to assess the effectiveness of preventative controls;

d) develop a scoring mechanism to quantify the safety risk probability based on the effectiveness of each;

e) document the risk assessment in a narrative report.

4.4.1.7 An update would be presented at DGP-WG/23. The Secretary would submit the documented risk assessment to DGP/29 as a tool for the panel to decide whether amendments to the Technical Instructions, including the extension of the 30 per cent state of charge limit to UN 3481, were necessary.

4.4.2 Exception for Lithium Battery Powered Data Loggers / Cargo Tracking Devices (DGP-WG/22-WP/16)

4.4.2.1 The panel, at its twenty-seventh meeting (DGP/27, 16 to 20 September 2019), developed an exception for in-use data loggers and cargo-tracking devices powered by lithium batteries attached to, or placed in packages, overpacks or unit-load devices. The exception was based on an exception included in the UN Model Regulations (DGP/27 Report, paragraph 1.2.1.3 and Appendix C to the Report on Agenda Item 1 refers). The panel recommended including it as a new item under the general exceptions contained in Part 1;1.1.5.1 of the Technical Instructions. DGP/27 added additional criteria for the application of the UN exception to address concerns related to the hazards posed by lithium batteries, particularly since the devices would remain active during transport and might be more vulnerable to damage when attached to the package or ULD. It also added a general requirement for data loggers or cargo tracking devices to meet defined standards for electromagnetic radiation, based on existing text in the packing instructions for lithium batteries contained in equipment (Packing Instructions 967 and 970). This was an interim measure in anticipation of output from the Airworthiness Panel (AIRP) on the subject. DGP/27 agreed to recommend incorporating the exception in the Technical Instructions despite concerns from some members that the additional criteria for the application of it did not provide an adequate safety margin. There were concerns related to the established energy capacity limits of the lithium batteries and cells that powered the devices. The limits were based on the limits provided by Section II of Packing Instructions 967 and 970. The Air Navigation Commission (ANC) shared these concerns during its review of the DGP/27 Report. It appreciated that the lack of known incidents involving devices commonly used could be evidence that these did not pose an unacceptable risk, but wanted data to demonstrate the proposed upper limits were safe. It requested the DGP to establish lower limits to reflect the energy capacity of data loggers and tracking devices that were already in use. The ANC also requested that a revised exception and existing guidance material contained in in *Guidance for Safe Operations Involving Aeroplane Cargo Compartments* (Doc 10102) be passed on to the Flight Operations Panel (FLTOPSP) Specific Working Group on the Carriage of Goods (FLTOPSP-SCG/SWG) for further review.

4.4.2.2 The provisions were not yet developed, and the lack of an exception meant that shippers had to apply the lithium battery mark, even though there might be multiple packages, with each containing or being attached with only one device, something that was considered unnecessarily excessive. DGP-WG/22 was invited to review the provisions developed at DGP/27, particularly the lithium metal content and Watt-hour rating established for the cells and batteries. It was also invited to engage with industry within their States in order to gain an understanding of the size of cells and batteries being used, what was

expected to be used in the future, and whether there were any existing standards in place. An exception that could be included in the Technical Instructions could then be developed based on this feedback. Finally, it was invited to consider the merit of developing guidance material, even if some of it might be beyond the scope of the DGP, so that it could be reviewed and enhanced by the FLTOPSP-SCG/SWG.

4.4.2.3 DGP-WG/22 supported moving forward with developing provisions for exceptions from the Technical Instructions and guidance material. There were some specific comments related to standards referred to in the basic guidance provided in the working paper. Some had been updated, which needed to be taken into account. There were other comments related to the need to think of a more performance-based approach to establishing safety that might not be limited to the battery size. Some reported already having data from operators who had approved devices for carriage. Data might also be acquired based on the application of the exception from the marking and documentation requirements of Section II of Packing Instruction 967 and 970 for packages containing COVID-19 pharmaceuticals accompanied by data loggers and/or cargo tracking devices containing lithium batteries. The specific guidance developed on safety risk assessments related to such consignments might also be helpful.

4.4.2.4 Feedback to D. Brennan was requested by the end of February 2023 so that proposed provisions could be developed and submitted to DGP-WG/23 for consideration.

4.4.3 Lithium Battery Powered Tracking Devices Carried by Passengers or Crew (DGP-WG/22-WP/18)

4.4.3.1 The working group was invited to consider permitting portable electronic devices containing very small lithium batteries in checked baggage when active. This would allow passengers to carry active tracking devices in checked baggage, which the current Technical Instructions prohibited because of the requirement to have devices containing lithium cells or batteries in checked baggage switched off. The devices had become increasingly popular as a way for passengers to track lost luggage. Some operators concluded, based on safety risk assessments, that carrying them on their aircraft did not pose an unacceptable risk, but they would not be compliant with the Technical Instructions if they did. Some States had approved operators to carry them.

4.4.3.2 Switching off all devices powered by lithium batteries in checked baggage was introduced as a requirement in the 2017-2018 Edition of the Technical Instructions to address an increased safety risk caused by temporary security restrictions that prohibited the carriage of large portable electronic devices in the cabin on certain flights. The panel recommended the requirement as a measure to reduce the risk of heat generated by active devices powered by large batteries in the cargo compartment to cause thermal runaway (see paragraph 3.5.1.1 of the DGP-WG/17 Report and Addendum No. 2 to the 2017-2018 Edition of the ICAO Technical Instructions (1 July 2017)). A requirement to switch off all devices powered by batteries or cells, regardless of their size and level of risk, simplified the regulations and facilitated implementation. The panel did not anticipate the need for passengers to carry active devices powered by small cells in checked baggage.

4.4.3.3 The amendment proposed to DGP-WG/22 permitted devices to be active if the batteries did not exceed a lithium content of 0.3 grams for lithium metal or a Watt-hour rating of 2.7 Wh for lithium ion batteries. These limits were based on existing limits permitting baggage equipped with lithium batteries to be checked, which could be active. The limits were meant to represent the energy density of button or coin cells (see Addendum No. 1 to the DGP/26 Report). The main question for DGP-WG/22 was to assess if portable electronic devices powered by cells or batteries limited in energy density (i.e. 0.3 grams or less or 2.7 Wh or less) generated any significant heat while switched on or active. Typically, any portable electronic device powered by such a small cell or battery would not create any significant heat while active,

based on the premise that the device would be designed to utilize minimal battery energy to increase the time that the device would function before it needed to be recharged or the cell or battery needed to be replaced.

4.4.3.4 While the impetus of the proposal was to permit passengers to carry active tracking devices in checked baggage, the amendment itself was generic and could apply to other lithium battery powered devices. Some questioned whether the wording should specifically allow only tracking devices, but the working group concluded it should be generic so that the provision did not stray from the panel's decision to base the passenger provisions on hazards rather than end use.

4.4.3.5 Data on tracking devices from testing conducted at the Federal Aviation Administration (FAA) William J. Hughes Technical Center was presented during the discussion. The tests were conducted to observe the consequences of thermal runaway from several lithium battery powered tracking devices to determine the consequences of a worst-case scenario, i.e. thermal runaway. Some did not see a direct relation between the testing and the limits established given that the testing did not assess whether there was an increased likelihood of thermal runaway due to the devices being active. This, however, was not the intent of testing. The intent was to observe and document a worst-case scenario, i.e. the consequences of thermal runaway. Data from the testing did not demonstrate any unacceptable consequences for tracking devices within the limits established, although testing on larger lithium metal coin cells on their own, i.e. those with a lithium metal content of 0.3 g, did demonstrate fire and flame from some cells. It was questioned whether there was rationale for this limit, recognizing that other lithium battery powered devices with cells of this size could remain active in checked baggage under the new provision. The working group was comfortable with the limits in the proposal, given that portable electronic devices containing much larger batteries were already permitted in checked baggage, albeit when switched off.

4.4.3.6 DGP-WG/22 agreed to the amendment as proposed. It considered the existing requirement to completely switch off lithium battery powered devices in checked baggage in the Technical Instructions unnecessary for portable electronic devices powered by such small cells or batteries. The working group came to this conclusion based on the experience with the lack of generation of heat in devices containing small cells or batteries while active, the existing experience with cell or battery limitations for checked baggage equipped with cells or batteries, and the test data from the relevant representative tracking devices. The existing provision led to additional but unnecessary administrative work and other avoidable operational challenges for States, operators, and the travelling public, so the working group recommended incorporating the amendment in the 2023-2024 Edition of the Technical Instructions through an addendum. Accordingly, the Secretary was asked to bring the recommendation for an addendum to the ANC.

4.4.3.7 The amendment was further revised subsequent to DGP-WG/22 through correspondence. While the intent of the agreed amendment was to permit active tracking devices in checked damage, it also introduced a requirement for all devices to be protected from damage and inadvertent activation when carried in the cabin. DGP concluded that it was premature to introduce this requirement with the provision for active devices through an addendum, given that the panel had not thoroughly discussed the potential impact on States and industry. It would be considered through the regular biennial amendment process cumulating in recommendations from DGP/29. The amendment recommended for incorporation in an addendum to the Technical Instructions is provided in Appendix F. The amendment requiring all devices to be protected from damage and inadvertent activation when carried in the cabin is provided in Appendix A.

4.4.4 Fire Safety Testing Lithium Cell Powered Tracking Devices (DGP-WG/22-IP/8)

4.4.4.1 Data from tests conducted on lithium cell powered tracking devices and lithium metal coin cells at the FAA William J. Hughes Technical Center was presented to the working group. A total of six devices were tested three times each by heating the cells contained in them into thermal runaway and documenting the consequences. Three were Bluetooth tracking devices powered by a CR2032 coin cell containing 0.1 gram of lithium metal and three were GPS/cellular tracking devices powered by lithium ion pouch cells with Watt hour ratings of 2.2 Wh, 5.5 Wh, 17.2 Wh respectively.

4.4.4.2 There was no fire or flame resulting from thermal runaway involving any of the Bluetooth tracking devices. One test involving a GPS/cellular tracking device powered by a 2.2 Wh lithium ion pouch cell resulted in a cell being ejected from the device, and one test involving the GPS/cellular tracking devices powered by a 17.2 Wh lithium ion pouch cell resulted in a large flame and fire.

4.4.4.3 Two different CR2477 coin cells containing 0.3 grams of lithium metal were also tested on their own without any devices. Thermal runaway resulted in flame and fire in one out of five tests for one brand and two out of four tests for the other. Both brands were also tested for thermal runaway propagation by placing six cells side by side and inducing one into thermal runaway. Both tests resulted in flame and fire and complete propagation of the cells.

4.4.5 Development of Provisions for Sodium Ion Batteries (DGP-WG/22-WP/13)

4.4.5.1 The UN Sub-Committee of Experts on the Transport of Dangerous Goods developed provisions for sodium ion batteries and provisionally adopted them for incorporation in the 23rd edition of the UN Model Regulations. The Rapporteur of the DGP Working Group on UN Harmonization (DGP-WG/UN Harmonization) presented the provisions as they might appear in the Technical Instructions for the working group to review prior to official adoption by the UN Committee of Experts. Members were invited to provide feedback. The feedback would be used to develop a draft proposal for DGP-WG/23 and allow sufficient time for review before DGP/29 considers whether they should be incorporated in the 2025-2026 Edition of the Technical Instructions.

4.4.5.2 The UN Subcommittee agreed that sodium ion batteries would be subject to the same provisions as applied to lithium ion batteries, including the requirement for design type testing in accordance with Part III, subsection 38.3 of the UN *Manual of Tests and Criteria.* It developed two new UN numbers and three new proper shipping names for sodium ion batteries categorized the same way as lithium ion batteries, i.e. sodium ion batteries on their own, sodium ion batteries contained in equipment, and sodium ion batteries packed with equipment.

4.4.5.3 One major difference between lithium ion batteries and sodium ion batteries was that shipping the latter at a zero per cent state of charge was possible. The Sub-Committee therefore incorporated a special provision making sodium ion batteries not subject to other parts of the regulations if the battery did not contain electrical energy, provided certain other conditions were met. One of the conditions was that the dangerous goods contained in the cells were permitted for transport in accordance with the limited quantity provisions. This would be challenging from a harmonization point of view, because many substances permitted in limited quantities by the UN Model Regulations were not by the Technical Instructions and the quantity limits were different.

4.4.5.4 Potential revisions to the Technical Instructions were consolidated for the panel to review. Members were encouraged to engage with industry within their States to identify potential issues and challenges associated with adopting the provisions for air transport so that they could be reviewed robustly at DGP-WG/23. Members were encouraged to specifically consider:

a) how to address the challenge of harmonizing the condition that only cells containing dangerous goods permitted in limited quantities could be subject to the exception from full regulation in the new special provision;

b) whether there should be separate packing instructions for each proper shipping name, as was done for lithium ion batteries, or if there should be one packing instruction for all as was done in the UN Model Regulations;

c) whether provisions for passengers and crew to carry sodium ion batteries should be added to Part 8.

4.4.5.5 The meeting expressed appreciation for the work done. The following initial feedback was provided:

a) The chairman of the UN Sub-Commitee provided some background information. The technology for sodium ion batteries was relatively new, with roughly five companies involved in manufacturing. There were different chemical compositions, and reaction from each varied slightly. The Sub-Committee based the provisions on the ones for lithium ion because testing had demonstrated similar but much less aggressive reactions for sodium ion when subjected to Part III, subsection 38.3 of the UN *Manual of Tests and Criteria.* He noted that the condition that only cells containing dangerous goods permitted in limited quantities could be subject to an exception from full regulation was not necessarily going to be adopted. It was added as a safety barrier for road transport to allow early movement of the batteries, and a decision on whether or not to include the criteria in the Model Regulations had not been made;

b) There was not an immediate need to incorporate provisions for passengers to carry sodium ion batteries because the batteries were intended for stationary use and not consumer products;

c) There was much support for three packing instructions to cover sodium ion batteries on their own, packed with equipment, and contained in equipment. Although this would result in duplication of provisions, it would simplify usage;

d) The Subcommittee's provisions replaced the lithium battery mark with a battery mark that would be required for both lithium and sodium ion batteries. There was support for maintaining specificity, as simply referring to a battery mark could imply that it was required for all batteries;

e) Sodium ion batteries needed drill codes assigned;

f) The exception from full regulation required short-circuiting the cell or battery in a way that it did not contain electrical energy. It was suggested that zero state of charge, or something else other than short-circuiting to achieve the same intent, should be the

requirement. This would make the intent clearer to the average user who would consider short-circuiting an unsafe event;

g) The lithium battery provisions in the Technical Instructions strayed significantly from the UN Model Regulations because of the added risk to air transport. Whether or not the sodium ion batteries needed to stray as significantly needed to be considered, given that they reacted less aggressively to thermal runaway;

h) Section II of the lithium battery packing instructions was created to address small batteries for consumer products, but caused difficulties. The section may not be needed for sodium ion given that they were not intended for consumer products;

i) The 35 kg limit for lithium batteries on cargo aircraft that applied to lithium batteries needed consideration. The limit for lithium ion was likely based on handling needs rather than safety. Sodium ion batteries were heavier with a lower energy density ratio. Given that they reacted less aggressively, a higher limit might be appropriate;

j) A UN working group was developing a new hazard-based classification system for lithium batteries. The group was not expanding its work to include sodium ion. However, the system was a performance-based system based on reaction and not chemistry so would likely accommodate them.

4.4.5.6 The working group was encouraged to continue reviewing the provisions and to engage with industry within their States. Additional feedback would be taken into account when developing a mature proposal for DGP-WG/23.

4.4.6 Classification of lithium battery-powered mobility aids (DGP-WG/22-IP/2)

4.4.6.1 The working group was advised of a practice where manufacturers were connecting single wheel devices with a battery holder and handle to manual wheelchairs thereby converting the chairs into a lithium ion battery-powered mobile aid. Some operators questioned whether they could be accepted in accordance with the provisions for passengers to carry mobility aids, given potential safety concerns. The working group was asked for feedback on whether these wheelchairs should be considered mobility aids or portable electronic devices.

4.4.6.2 Panel members considered the devices described were clearly mobility aids, but whether or not they should be accepted for transport was not so black and white and was really based on the judgment of the person accepting them. This might depend on the needs of the person carrying them, recognizing that Part 8 required that they be for use by passengers whose mobility was restricted by either a disability, their health or age, or a temporary mobility problem. The key consideration would be protecting the battery from damage.

4.4.6.3 It was noted that the need for guidance on the carriage of mobility aids had been raised during the last biennium. This issue could be addressed as part of that work.

4.4.7 **Status of SAE G27 Lithium Battery Packaging Performance Committee (DGP-WG/22-IP/11)**

4.4.7.1 The co-chair of the SAE G27 Lithium Battery Packaging Performance Committee provided an update on the progress of its work to develop a minimum performance package standard to support the safe transport of lithium batteries as cargo on aircraft. The committee was established in 2016 at the request of ICAO. Over 200 individuals were on the committee, 40 of which were voting members and approximately 75 of whom actively participated. Individuals were from industries, international organizations and government entities including airframe manufacturers, regulators, cell manufacturers, battery manufacturers, battery users, operators, packaging manufacturers, and testing facilities. The committee held one two-hour meeting each month virtually and an average of three four-day meetings each year. The four-day meetings were face-to-face prior to 2020, virtual in 2020 and 2021 because of COVID-19, and hybrid in 2022. An overview of the standard is provided in Appendix D to this working paper.

4.5 **Agenda Item 5: Clarifying State oversight responsibilities in Annex 18** ***(Ref: Job Card DGP.005.04)***

4.5.1 **Report from DGP-WG/Annex 18 (DGP-WG/22-IP/7), Progress on clarifying State responsibilities in Annex 18 (DGP-WG/22-IP/12) and Briefing on the State safety programme (SSP) and safety management systems (SMS) (DGP-WG/22-IP/13)**

4.5.1.1 The working group was provided a summary of progress made on ANC Job Card DGP.005.03: Clarifying State oversight responsibilities in Annex 18 by DGP Working Group on Annex 18 (DGP-WG/Annex 18). The last update given was at DGP/28 (see paragraph 5.2 of the DGP/28 Report). DGP-WG/Annex 18 held three face-to-face meetings since DGP/28. The first was hosted by the United Arab Emirates from 7 to 11 March 2022 at the Emirates Aviation College in Dubai, the second by the International Air Transport Association (IATA) from 25 to 29 July 2022 in Singapore and the third by ICAO from 14 to 18 November 2022 in Montréal. The working group had developed a draft new structure for Annex 18. The material was not yet mature, but a timeline of steps needed in order to present a mature amendment to DGP/29 was presented. A large part of the work involved clearly outlining States' dangerous goods safety management responsibilities within the State safety programme (SSP). Accordingly, a briefing from a safety management expert from the Safety Management Unit on SSP and SMS was given to DGP-WG/22.

4.5.1.2 DGP-WG/22 was invited to review the draft structure and to provide feedback to DGP-WG/Annex 18 through the Secretary by 17 February 2023. Specific comments in response to questions shown in Appendix C to the information paper were requested.

4.6 **Agenda Item 6: Dangerous goods provisions to support RPAS operations** ***(Ref: Job Card DGP.007.01)***

4.6.1 **Dangerous Goods Provisions to Support Remotely Piloted Aircraft Systems (DGP-WG/22-WP/20)**

4.6.1.1 The working group agreed to establish a small working group to review Annex 18 and the Technical Instructions to determine amendments necessary to accommodate the safe transport of dangerous goods on remotely piloted aircraft. Mr. M. Ranito, adviser to the DGP member nominated by the United

Kingdom, was appointed rapporteur. The group met during DGP-WG/22 and developed draft terms of reference (see Appendix E). Those interested in participating were invited to advise the Secretary.

4.7 Agenda Item 7: Review of Annex 6 provisions having an impact on dangerous goods (REC-A-DGS-2025)

4.7.1 Review of Annex 6 Provisions Having an Impact on Dangerous Goods (DGP-WG/22-WP/19)

4.7.1.1 The working group agreed to establish a small ad hoc working group to review Annex 6 provisions having an impact on dangerous goods for potential inconsistencies with Annex 18. The Secretariat would lead the ad hoc group. The ad hoc group was assigned two other tasks during DGP-WG/22:

a) develop provisions to address how operators not approved to carry dangerous goods as cargo should deal with packages containing dangerous goods not required to be formally identified by way of marks, labels or documentation (see paragraph 4.9.1.1 of this report); and

b) address inconsistencies with how the definition for passenger aircraft was applied internationally when determining who could be on board a cargo aircraft carrying "cargo aircraft only" dangerous goods (see paragraph 4.9.1.2 of this report).

4.7.1.2 Those interested in participating on the ad hoc working group were invited to advise the Secretary.

4.8 Agenda Item 8: Aviation Security/Dangerous Goods Coordination (REC-A-DGS-2025)

4.8.1 There were no proposals developed under this agenda item.

4.9 Agenda Item 9: Coordination with other panels

4.9.1 Agenda Item 9.1: Flight Operations Panels (FLTOPSP)

4.9.1.1 Carriage of "Not Regulated" Dangerous Goods by "No-Carry" Operators (DGP-WG/22-WP/9)

4.9.1.1.1 The working group considered the need to develop provisions to address how operators not approved to carry dangerous goods as cargo should deal with packages containing dangerous goods that do not require marks, labels or documentation to identify them. This included cargo containing dangerous goods that were not subject to all or parts of the Technical Instructions and mail containing dangerous goods. Annex 6 — *Operation of Aircraft*, Parts I — *International Commercial Air Transport — Aeroplanes* and III — *International Operations — Helicopters* made it clear that operators needed a specific approval to transport dangerous goods as cargo, but did not address the carriage of dangerous goods not subject to the Technical Instructions or dangerous goods in mail. It was therefore questioned whether provisions should be added to Annex 6, the *Procedures for Air Navigation Services — Aircraft Operations* (Doc 8168), or another appropriate document, through coordination with the Flight Operations Panel (FLTOPSP).

4.9.1.1.2 The working group agreed that there was a need to develop guidance and, if necessary, amendments to Standards and Recommended Practices (SARPs) to clarify the issues raised. However, a common understanding on whether or not operators without specific approval to transport dangerous goods as cargo could accept dangerous goods not subject to the Technical Instructions would need to be in place before developing any material. The discussions revealed that there were in fact different opinions on the panel in this regard. One view was that operators had no choice but to carry them, because there were no marks or labels or documentation to identify the packages contained dangerous goods and consequently no way of knowing to reject them. The other view was that operators without a specific approval to transport dangerous goods could not carry them even if the dangerous goods were not subject to the Technical Instructions, because they were still dangerous goods, which posed risk. Therefore, operators needed to have processes and procedures in place to prevent dangerous goods from being loaded on the aircraft. States could consider approving the operator to perform limited dangerous goods operations, such as accepting dangerous goods not subject to the Technical Instructions, but would then be obligated to review the operator's processes and procedures to manage the risks associated with this as part of the certification process. Mail was recognized to be a more complex matter. However, the operator was not obliged to accept it, and the new cargo compartment safety SARPs in Annex 6 made this especially clear.

4.9.1.1.3 Section headings in Annex 6, Part I, Chapter 14 and Part III, Chapter 12 referred specifically to operators with or without specific approval to transport of dangerous goods *as cargo*, but the provisions themselves did not specifically refer to cargo. There was a suggestion that the headings were unintentionally narrow in scope by referring only to cargo and that the specific approval applied to mail and baggage in addition to cargo. The cargo compartment safety SARPs in Part I, Chapter 15 of Annex 6 made it clear that the State of the Operator needed to ensure that the operator established policies and procedures for the transport of *items* in the cargo compartment, which included the conduct of a specific safety risk assessment. *Items* covered cargo, baggage and mail, so there was a view that addressing risks associated with baggage and mail fell within this scope. Another point of view was that the title was intentional, and that the specific approval only applied to cargo. Panel members cautioned that requiring the same kind of specific approval given for cargo to mail and baggage would have a significant impact on the State and needed careful consideration before making any recommendations.

4.9.1.1.4 The working group agreed on the need to clarify the provisions despite opposing views on their intent. It was important to ensure consistent global interpretation. The first step would be for the DGP to harmonize their views, and then to consider how best to communicate them. This would be through guidance material, but potentially also through revised SARPs. The ad hoc working group on Annex 6 would be populated with both dangerous goods and operations expertise. It was therefore agreed that this group would undertake the work. The group would develop recommendations for submission to DGP/29.

4.9.1.2 Revision to the Definition of "Passenger Aircraft" (DGP-WG/22-WP/17) and Guidance on the Application of the Definition of Passenger Aircraft (DGP-WG/22-WP/4)

4.9.1.2.1 The panel recommended an amendment to the definition for "passenger aircraft" at its twenty-seventh meeting (DGP/27, Montréal, 16 to 20 September 2019) (see paragraph 8.1.1 of the DGP/27 Report) to address inconsistencies with how the definition was applied internationally when determining who could be on board a cargo aircraft carrying "cargo aircraft only" dangerous goods. However, the ANC did not support the amendment because of concerns raised by flight operations experts. They opposed determining who could be on board an aircraft through a definition in Annex 18 because this was an operational issue under Annex 6. They also raised concerns that permitting certain dangerous goods on cargo aircraft and not on passenger aircraft implied that a higher level of safety was required for passenger aircraft, and amending the definition reinforced this notion. They proposed that a more logical approach

would be to determine whether dangerous goods could be safely carried on an aircraft based on its capabilities rather than on the type of operation, which would align with Annex 6 while making the definition irrelevant.

4.9.1.2.2 The ANC did recognize a problem existed, so it requested the Secretariat to develop a short-term solution to address the inaccurate interpretation and use of the definition and tasked the Flight Operations Panel Safe Carriage of Goods Specific Working Group (FLTOPSP-SCG-SWG) with addressing the broader issue. The Secretariat published guidance on the ICAO operations normal public website, but DGP-WG/22 did not see the guidance as a solution. The issue was not yet on the work programme of the FLTOPSPS-SCG-SWG, so the problem remained.

4.9.1.2.3 DGP-WG/22 agreed there was a problem that needed an urgent solution. It recognized the need for input from flight operations experts. It concluded that the newly established Secretariat ad hoc working group tasked with removing inconsistencies between Annex 6 provisions having an impact on Annex 18 would develop a proposed solution for consideration at DGP-WG/23.

4.9.1.3 Provisions for the Use of Electronic Data to the Pilot-In-Command (DGP-WG/22-IP/3)

4.9.1.3.1 An amendment to allow electronic information to be provided to the pilot-in-command in accordance with Part 7;4.1.1 of the Technical Instructions was considered at the twenty-seventh meeting of the DGP (DGP/27, Montréal, 16 to 20 September 2019) (see paragraph 2.2.9 of the DGP/27 Report). The member nominated by the International Federation of Air Line Pilots' Associations (IFALPA) supported provision of information electronically, but not as a sole source. He could only support allowing electronic information if making a paper copy available was also required, because electronic information might not always be obtainable by the flight crew or emergency responders during an emergency. Some panel members believed the current provisions did not preclude the transmission of information electronically, so considered an amendment to be unnecessary. Regardless, the panel felt it was premature to revise the provisions until a study on the emergency response information needs of relevant stakeholders underway was complete.

4.9.1.3.2 The International Air Transport Association (IATA) conducted a survey of approximately 100 airline operators to collect data to help determine whether they shared IFALPA's concerns. The data collected from twenty-two operators that responded was shared with DGP-WG/22. Key points were:

a) Twenty-one were considering transmitting the information electronically in lieu of a printed NOTOC;

b) Six had experience in transmitting the information electronically, and five of these transmitted data to the cockpit through the aircraft communications addressing and reporting system (ACARS). A paper NOTOC was printed in the cockpit;

c) All twenty-two operators provided information to aircraft rescue and fire-fighting (ARFF) personnel in English only. Some indicated potential barriers at areas where English was not spoken, but work around solutions were in place including communication through the local contractor, airport or airline staff;

d) None had any experience with being unable to communicate at a diversion airport, but this could be attributed to there being no diversions, diversions to English-speaking States, or States able to communicate in English;

e) Emergency response procedures for sixteen of the twenty-two operators ensured system operation control had dangerous goods information at all times and that they provided information to air traffic control of the airport involved by e-mail or fax for onward submission to ARFF. The other six operators either did not respond or indicated that the pilot, who may not speak the local language, provided the information to ARFF.

4.9.1.3.3 The author of the information paper reiterated the wish to allow electronic information as a sole source for the same reasons raised at previous meetings. Additional reasons included the ability of electronic information to support environmental sustainability and the ability to enhance safety and efficiency by providing a mechanism to extract specific information necessary for emergency response. Requiring both electronic and paper-based information would remove any incentive for operators to invest in enhanced systems. A proposed amendment would be developed for DGP-WG/23 if the working group indicated support for electronic information as a sole source.

4.9.1.3.4 The chair emphasized that the working group could not make any decisions related to an information paper. He also noted that it was pilots who objected to sole source, but none were present for the discussion. Any conclusion made by the working group would need to be offset by this.

4.9.1.3.5 There was support for the development of provisions to clearly support electronic submission of the notification to the pilot in command, with many of the points made during previous discussions reiterated. There was also support for including provisions that addressed the need for measures to be in place to ensure information could be provided if the electronic system failed. The need for more performance-based provisions was reiterated, as was the need to ensure the needs of rescue and firefighting services were considered.

4.9.2 **Agenda Item 9.2: Airworthiness Panel (AIRP)**

4.9.2.1 There were no discussions under this agenda sub-item.

4.9.3 **Agenda Item 9.3: Safety Management Panel (SMP)**

4.9.3.1 There were no discussions under this agenda sub-item.

4.9.4 **Agenda Item 9.4: Remotely Piloted Aircraft Systems Panel (RPASP)**

4.9.4.1 There were no discussions under this agenda sub-item.

4.9.5 **Agenda Item 9.5: Any other panels**

4.9.5.1 There were no discussions under this agenda sub-item.

4.10 **Agenda Item 10: Harmonization of *Guidance Material for the Dangerous Goods Panel (DGP) to Aid in the Preparation of the Technical Instructions and Supporting Documents* with revised dangerous goods provisions**

4.10.1 There were no discussions under this agenda sub-item.

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APPENDIX A

PROPOSED AMENDMENTS TO THE TECHNICAL INSTRUCTIONS

Part 1

GENERAL

. . .

Chapter 4

DANGEROUS GOODS TRAINING

. . .

See paragraph 4.3.5 of the DGP-WG/22 report:

4.4 TRAINING AND ASSESSMENT RECORDS

4.4.1 The employer must maintain a record of training and assessment for personnel.

4.4.2 The record of training and assessment must include:

a) the individual's name;

b) the month of completion of the most recent training and assessment;

c) a description, copy or reference to training and assessment materials used to meet the training and assessment requirements;

d) the name and ~~address of the organization providing~~ other information that identifies the organization providing the training and assessment (e.g. registered address); and

e) evidence which shows that the personnel have been assessed as competent.

. . .

Part 3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND LIMITED AND EXCEPTED QUANTITIES

. . .

Chapter 2

ARRANGEMENT OF THE DANGEROUS GOODS LIST (TABLE 3-1)

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Table 3-1. Dangerous Goods List

Name	*UN No.*	*Class or division*	*Subsidiary risk*	*Labels*	*State variations*	*Special provisions*	*UN packing group*	*Excepted quantity*	*Passenger aircraft*		*Cargo aircraft*	
									Packing instruction	*Max. net quantity per package*	*Packing instruction*	*Max. net quantity per package*
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
See paragraph 4.3.2 of the DGP-WG/22 report:												
Engine, internal combustion	3530	9		Miscellaneous		A70 A87 A154 A208		E0	972	No limit	972	No limit
Machinery, internal combustion	3530	9		Miscellaneous		A70 A87 A154 A208		E0	972	No limit	972	No limit

. . .

Chapter 3

SPECIAL PROVISIONS

. . .

Table 3-2. Special provisions

TIs	*UN*

. . .

See paragraph 4.3.2 of the DGP-WG/22 report:

A70 Internal combustion or fuel cell engines or machinery being shipped either separately or incorporated into a vehicle, machine or other apparatus, without batteries or other dangerous goods, are not subject to these Instructions when carried as cargo provided that:

a) for ~~flammable~~ liquid fuel powered engines:

1) the engine is powered by a liquid fuel that does not meet the classification criteria for any class or division; or

2) the fuel tank of the vehicle, machine or other apparatus has never contained any fuel or the fuel tank has been flushed and purged of vapours and adequate measures taken to nullify the hazard; and

3) the entire fuel system of the engine has no free liquid and all fuel lines are sealed or capped or securely connected to the engine and vehicle, machinery or apparatus.

b) for flammable gas powered internal combustion or fuel cell engines:

1) the entire fuel system must have been flushed, purged and filled with a non-flammable gas or fluid to nullify the hazard;

2) the final pressure of the non-flammable gas used to fill the system does not exceed 200 kPa at 20°C;

3) the shipper has made prior arrangements with the operator; and

4) the shipper has provided the operator with written or electronic documentation stating that the flushing, purging and filling procedure has been followed and that the final contents of the engine(s) have been tested and verified to be non-flammable.

Multiple engines may be shipped in a unit load device provided that the shipper has made prior arrangements with the operator(s) for each shipment.

When this special provision is used, the words “not restricted” and the special provision number A70 must be provided on the air waybill when an air waybill is issued.

. . .

See paragraph 4.3.4 of the DGP-WG/22 report:

A123 This entry applies to Batteries, electric storage, not otherwise listed in Table 3-1. Examples of such batteries are: alkali-manganese, zinc-carbon and nickel-cadmium batteries. Any electrical battery or battery-powered device, equipment or vehicle having the potential of a dangerous evolution of heat must be prepared for transport so as to prevent:

a) a short circuit (e.g. in the case of batteries, by the effective insulation of exposed terminals; or, in the case of equipment, by disconnection of the battery and protection of exposed terminals); and

b) unintentional activation.

The words “not restricted” and the special provision number A123 must be provided on the air waybill when an air waybill is issued.

Devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be transported when intentionally active. When active, these devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems. The devices must not be capable of emitting disturbing signals (such as buzzing alarms, strobe lights, etc.) during transport.

. . .

See paragraph 4.3.4 of the DGP-WG/22 report:

A199 Nickel-metal hydride batteries or nickel-metal hydride battery-powered devices, equipment or vehicles having the potential of a dangerous evolution of heat are not subject to these Instructions provided they are prepared for transport so as to prevent:

a) a short circuit (e.g. in the case of batteries, by the effective insulation of exposed terminals, or, in the case of equipment, by disconnection of the battery and protection of exposed terminals); and

b) unintentional activation.

The words “not restricted” and the special provision number A199 must be provided on the air waybill when an air waybill is issued.

Devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be transported when intentionally active. When active, these devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems. The devices must not be capable of emitting disturbing signals (such as buzzing alarms, strobe lights, etc.) during transport.

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Part 4

PACKING INSTRUCTIONS

Chapter 1

GENERAL PACKING REQUIREMENTS

. . .

1.1.3 Compatibility requirements

. . .

See paragraph 4.3.6 of the DGP-WG/22 report:

1.1.6 Packagings for which retention of liquid is a basic function must be capable of withstanding without leakage an internal pressure which produces a pressure differential of not less than 95 kPa (not less than 75 kPa for liquids in Packing Group III of Class 3, ~~or~~ Division 6.1 or Class 9), or a pressure related to the vapour pressure of the liquid to be conveyed, whichever is the greater. The pressure related to the vapour pressure must be determined as either:

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Chapter 4

CLASS 2 — GASES

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Packing Instruction 220

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Batteries

All batteries must be installed and securely fastened in the battery holder of the machine or equipment and must be protected in such a manner so as to prevent damage and short circuits. In addition:

See paragraph 4.2.2.3 of the DGP-WG/22 report:

1) If spillable batteries are installed, and it is possible for the machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction ~~492 or~~ 870 ~~as applicable~~.

2) If lithium batteries are installed:

   i) lithium batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport; and

   ii) lithium batteries must meet the provisions of Part 2;9.3, except that pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low production runs of lithium batteries or cells that have not been tested to the requirements in Part III, subsection 38.3 of the UN Manual of Tests and Criteria may be transported aboard cargo aircraft if approved by the appropriate authority of the State of Origin and the State of the Operator. A copy of the document of approval must accompany the consignment.

3) If sodium batteries are installed, they must conform to the requirements of Special Provision A94.

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Chapter 5

CLASS 3 — FLAMMABLE LIQUIDS

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Packing Instruction 378

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Batteries

All batteries must be installed and securely fastened in the battery holder of the machine or equipment and must be protected in such a manner so as to prevent damage and short circuits. In addition:

See paragraph 4.2.2.3 of the DGP-WG/22 report:

1) If spillable batteries are installed, and it is possible for the machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction ~~492 or~~ 870 ~~as applicable~~.

2) If lithium batteries are installed:

   i) lithium batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport; and

   ii) lithium batteries must meet the provisions of Part 2;9.3, except that pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low production runs of lithium batteries or cells that have not been tested to the requirements in Part III, subsection 38.3 of the UN *Manual of Tests and Criteria* may be transported aboard cargo aircraft if approved by the appropriate authority of the State of Origin and the State of the Operator. A copy of the document of approval must accompany the consignment.

3) If sodium batteries are installed, they must conform to the requirements of Special Provision A94.

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Chapter 6

CLASS 4 — FLAMMABLE SOLIDS; SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION; SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES

6.2 PACKING INSTRUCTIONS

. . .

See paragraph 4.1.2.1 of the DGP-WG/22 report:

Packing Instruction 451

Passenger and cargo aircraft — wetted explosives (Packing Group I)

. . .

COMBINATION PACKAGINGS					
UN number and proper shipping name	*Inner packaging (see 6;3.2)*	*Inner packaging quantity (per receptacle)*	*Total quantity per package — passenger*	*Total quantity per package — cargo*	**SINGLE PACKAGINGS**
. . .					
UN 3474 **1-Hydroxybenzotriazole~~, anhydrous, wetted~~** **monohydrate**	Glass Plastics	0.5 kg	0.5 kg	0.5 kg	No

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Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

Packing Instruction 950

Batteries

All batteries must be installed and securely fastened in the battery holder of the vehicle and must be protected in such a manner so as to prevent damage and short circuits. In addition:

See paragraph 4.2.2.3 of the DGP-WG/22 report:

1) If spillable batteries are installed, and it is possible for the vehicle to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction ~~492 or~~ 870 ~~as applicable~~.

2) If lithium batteries are installed:

   i) lithium batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport; and

   ii) lithium batteries must meet the provisions of Part 2;9.3, except that pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low production runs of lithium batteries or cells that have not been tested to the requirements in Part III, subsection 38.3 of the UN *Manual of Tests and Criteria* may be transported aboard cargo aircraft if approved by the appropriate authority of the State of Origin and the State of the Operator. A copy of the document of approval must accompany the consignment.

3) If sodium batteries are installed, they must conform to the requirements of Special Provision A94.

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. . .

Packing Instruction 951

. . .

Batteries

All batteries must be installed and securely fastened in the battery holder of the vehicle and must be protected in such a manner so as to prevent damage and short circuits. In addition:

See paragraph 4.2.2.3 of the DGP-WG/22 report:

1) If spillable batteries are installed, and it is possible for the vehicle to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction ~~492 or~~ 870 ~~as applicable~~.

2) If lithium batteries are installed:

   i) lithium batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport; and

   ii) lithium batteries must meet the provisions of Part 2;9.3, except that pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low production runs of lithium batteries or cells that have not been tested to the requirements in Part III, subsection 38.3 of the UN *Manual of Tests and Criteria* may be transported aboard cargo aircraft if approved by the appropriate authority of the State of Origin and the State of the Operator. A copy of the document of approval must accompany the consignment.

3) If sodium batteries are installed, they must conform to the requirements of Special Provision A94.

. . .

. . .

See paragraph 4.2.2.3 of the DGP-WG/22 report:

Packing Instruction 952

Passenger and cargo aircraft for UN 3171 only
(See Packing Instruction 220 for flammable gas-powered engines and machinery, Packing Instruction 378 for flammable liquid-powered engines and machinery, Packing Instruction 950 for flammable liquid-powered vehicles, Packing Instruction 951 for flammable gas-powered vehicles or Packing Instruction 972 for engines or machinery containing only environmentally hazardous fuels)

. . .

ADDITIONAL PACKING REQUIREMENTS

This entry applies to vehicles and equipment, including machinery which are powered by wet batteries, sodium batteries or lithium batteries and which are transported with these batteries installed. Examples of such vehicles and equipment are electrically-powered cars, lawn mowers, wheelchairs and other mobility aids. Vehicles that also contain an internal combustion engine must be consigned under the entry UN 3166 Vehicle (flammable gas powered) (See Packing Instruction 951) or Vehicle (flammable liquid powered) (See Packing Instruction 950), as appropriate.

Where vehicles or equipment could possibly be handled in other than an upright position, the vehicle or equipment must be secured in a strong, rigid outer packaging of the type below. The vehicle or equipment must be secured and restrained in the outer packaging to prevent any movement during transport which could change the orientation or cause the vehicle or equipment to be damaged. ~~The vehicle must be secured by means capable of restraining the vehicle in the outer packaging to prevent any movement during transport which would change the orientation or cause the vehicle to be damaged.~~

BATTERY-POWERED VEHICLES~~, MACHINES~~ OR EQUIPMENT MUST MEET THE FOLLOWING REQUIREMENTS:

Batteries

All batteries must be installed and securely fastened in the battery holder of the vehicle~~, machine~~ or equipment and must be protected in such a manner so as to prevent damage and short circuits. In addition:

1) If spillable batteries are installed, and it is possible for the vehicle~~, machine~~ or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction ~~492 or~~ 870 ~~as applicable~~.

2) If lithium batteries are installed:

   i) lithium batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport; and

   ii) lithium batteries must meet the provisions of Part 2;9.3, unless otherwise approved by the appropriate authority of the State of Origin, except that pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low production runs of lithium batteries or cells that have not been tested to the requirements in Part III, subsection 38.3 of the UN *Manual of Tests and Criteria* may be transported aboard cargo aircraft if approved by the appropriate authority of the State of Origin and the State of the Operator. A copy of the document of approval must accompany the consignment.

iii) Where the lithium battery is removed from the vehicle and is packed separate from the vehicle in the same outer packaging, the package must be consigned as UN 3481— **Lithium ion batteries packed with equipment** or UN 3091 — **Lithium metal batteries packed with equipment** and packed according to Packing Instruction 966 or 969, as applicable.

3) If sodium batteries are installed, they must conform to the requirements of Special Provision A94.

Other operational equipment

1) Dangerous goods required for the operation or safety of the vehicle~~, machine~~ or equipment, such as fire extinguishers, tire inflation canisters or safety devices, must be securely mounted in the vehicle~~, machine~~ or equipment. Aircraft may also contain other articles and substances which would otherwise be classified as dangerous goods but which are installed in that aircraft in accordance with the pertinent airworthiness requirements and operating regulations. If fitted, life-rafts, emergency escape slides and other inflation devices must be protected such that they cannot be activated accidentally. Vehicles or equipment containing dangerous goods identified in Table 3-1 as forbidden on passenger aircraft may only be transported on cargo aircraft. Replacements for the dangerous goods permitted must not be carried under this packing instruction.

2) Vehicles equipped with theft-protection devices, installed radio communications equipment or navigational systems must have such devices, equipment or systems disabled.

Strong outer packagings — vehicles and equipment

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

. . .

Packing Instruction 964

Passenger and cargo aircraft for UN 1941, UN 1990, UN 2315, UN 3151, UN 3082 and UN 3334 only

See paragraph 4.2.2.2 of the DGP-WG/22 report:

General requirements

Part 4, Chapter 1 requirements must be met (with the exception that for UN 3082 packed in combination packagings, the requirements of 4;1.1.6 do not apply).

These requirements include:

. . .

. . .

Packing Instruction 972

Batteries

All batteries must be installed and securely fastened in the battery holder of the machine or equipment and must be protected in such a manner so as to prevent damage and short circuits. In addition:

See paragraph 4.2.2.3 of the DGP-WG/22 report:

1) If spillable batteries are installed, and it is possible for the machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction ~~492 or~~ 870 ~~as applicable~~.

2) If lithium batteries are installed:

   i) lithium batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport; and

   ii) they must meet the provisions of Part 2;9.3, except that pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low production runs of lithium batteries or cells that have not been tested to the requirements in Part III, subsection 38.3 of the UN *Manual of Tests and Criteria* may be transported aboard cargo aircraft if approved by the appropriate authority of the State of Origin and the State of the Operator. A copy of the document of approval must accompany the consignment.

3) If sodium batteries are installed, they must conform to the requirements of Special Provision A94.

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. . .

Part 6

PACKAGING NOMENCLATURE, MARKING, REQUIREMENTS AND TESTS

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Chapter 4

PACKAGING PERFORMANCE TESTS

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4.5 INTERNAL PRESSURE (HYDRAULIC) TEST

. . .

4.5.3 Test method and pressure to be applied: metal packagings including their closures must be subjected to the test pressure for 5 minutes. Plastic packagings and composite packagings (plastic material) including their closures must be subjected to the test pressure for 30 minutes. This pressure is the one to be included in the mark required by 2.1.1 d). The manner in which the packagings are supported must not invalidate the test. The test pressure must be applied continuously and evenly: it must be kept constant throughout the test period. The hydraulic pressure (gauge) applied, as determined by any one of the following methods, must be:

See paragraph 4.3.6 of the DGP-WG/22 report:

a) not less than the total gauge pressure measured in the packaging (i.e. the vapour pressure of the filling liquid and the partial pressure of the air or other inert gases minus 100 kPa) at 55°C, multiplied by a safety factor of 1.5. This total gauge pressure must be determined on the basis of a maximum degree of filling in accordance with Part 4;1.1.5 and a filling temperature of 15°C. The test pressure must be not less than 95 kPa (not less than 75 kPa for liquids in Packing Group III of Class 3, ~~or~~ Division 6.1 or Class 9); or

. . .

Part 8

PROVISIONS CONCERNING PASSENGERS AND CREW

Chapter 1

PROVISIONS FOR DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

1.1 DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

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1.1.2 Except for the reporting provisions of 7;4.4 and 7;4.5, the provisions of these Instructions do not apply to the dangerous goods permitted by Table 8-1 when those dangerous goods are:

a) carried by passengers or crew for personal use only;

See paragraph 4.2.2.4 of the DGP-WG/22 report:

b) contained in baggage that has been separated from its owner during transit (e.g. mishandled baggage such as lost baggage or improperly routed baggage); or

. . .

1.1.9 Except for the reporting provisions of 7;4.4 and 7;4.5, the provisions of these Instructions do not apply to the dangerous goods permitted in accordance with Table 8-2 when those dangerous goods are:

a) carried by staff members of the OPCW on official travel or government agencies listed in Table 8 2 on official travel;

See paragraph 4.2.2.4 of the DGP-WG/22 report:

b) contained in baggage that has been separated from its owner during transit (e.g. mishandled baggage such as lost baggage or improperly routed baggage); or

. . .

Table 8-1. Provisions for dangerous goods carried by passengers or crew

Dangerous Goods	*Location*		*Approval of the operator(s) is required*	*Restrictions*
	Checked baggage	*Carry-on baggage*		
Batteries				
1) Lithium batteries (including portable electronic devices)	Yes (except for g) and h))	Yes	(see c) and d))	a) each battery must be of a type which meets the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3; b) each battery must not exceed the following: — for lithium metal batteries, a lithium content of 2 grams; or — for lithium ion batteries, a Watt-hour rating of 100 Wh; c) each battery may exceed 100 Wh but not exceed 160 Wh Watt-hour rating for lithium ion with the approval of the operator; d) each battery may exceed 2 grams but not exceed 8 grams lithium content for lithium metal for portable medical electronic devices with the approval of the operator; See paragraph 4.4.3 of the DGP-WG/22 report (see also Appendix F for provisions proposed for inclusion in the 2023-2024 Edition through an addendum): e) batteries contained in portable electronic devices must be protected from damage and unintentional activation. Devices containing batteries exceeding: — for lithium metal batteries, a lithium content of 0.3 grams; or — for lithium ion batteries, a Watt-hour rating of 2.7 Wh should be carried as carry-on baggage; however, if carried as checked baggage, the devices must be completely switched off (not in sleep or hibernation mode).~~:~~ ~~— measures must be taken to prevent unintentional activation and to protect the devices from damage; and~~ ~~— the devices must be completely switched off (not in sleep or hibernation mode);~~ f) batteries and heating elements must be isolated in portable electronic devices capable of generating extreme heat, which could cause a fire if activated, by removal of the heating element, battery or other components; g) spare batteries, including power banks: — must be carried as carry-on baggage; and — must be individually protected so as to prevent short circuits (by placement in original retail packaging or by otherwise insulating terminals, e.g. by taping over exposed terminals or placing each battery in a separate plastic bag or protective pouch); h) baggage equipped with a lithium battery(ies) exceeding:

Dangerous Goods	*Location*		*Approval of the operator(s) is required*	*Restrictions*
	Checked baggage	*Carry-on baggage*		
				— for lithium metal batteries, a lithium content of 0.3 grams; or — for lithium ion batteries, a Watt-hour rating of 2.7 Wh must be carried as carry-on baggage unless the battery(ies) is removed from the baggage, in which case the battery(ies) must be carried in accordance with g); i) no more than two spare batteries meeting the requirements of c) or d) may be carried per person.

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Attachment 1

LISTS OF PROPER SHIPPING NAMES

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Chapter 2

LIST OF N.O.S. AND GENERIC PROPER SHIPPING NAMES

. . .

See paragraph 4.1.2.1 of the DGP-WG/22 report:

THE MOST SPECIFIC APPLICABLE NAME MUST ALWAYS BE USED

Class or Division	*Subsidiary hazard*	*UN No.*	*Proper shipping name*
. . .			
Division 6.2			
Specific entries			
6.2		3373	**Biological substance, Category B**
6.2		3291	**Biomedical waste, n.o.s.**
6.2		3291	**Clinical waste, unspecified, n.o.s**
6.2		3291	**Medical waste, n.o.s.**
6.2		3291	**Regulated medical waste, n.o.s.**
6.2		3549	**Medical waste, Category A, affecting animals** only, solid
6.2		3549	**Medical waste, Category A, affecting humans**, solid
. . .			

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APPENDIX B

PROPOSED AMENDMENTS TO THE SUPPLEMENT TO THE TECHNICAL INSTRUCTIONS

Part S-4

PACKING INSTRUCTIONS

(ADDITIONAL INFORMATION FOR PART 4 OF THE TECHNICAL INSTRUCTIONS)

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Chapter 6

CLASS 4 — FLAMMABLE SOLIDS; SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION; SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES

. . .

See paragraph 4.1.2.1.1 b) of the DGP-WG/22 report:

Packing Instruction 451

Passenger and cargo aircraft — wetted explosives (Packing Group I)

. . .

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
UN number and proper shipping name	*Inner packaging (see 6;3.2)*	*Inner packaging quantity (per receptacle)*	*Total quantity per package — passenger*	*Total quantity per package — cargo*	
. . .					
UN 3474 **1-Hydroxybenzotriazole~~, anhydrous, wetted~~** monohydrate	Glass Plastics	0.5 kg	0.5 kg	0.5 kg	No

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APPENDIX C

AMENDMENTS TO THE CHINESE VERSION OF TABLE 3-1

Part 3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND LIMITED AND EXCEPTED QUANTITIES

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Chapter 2

ARRANGEMENT OF THE DANGEROUS GOODS LIST (TABLE 3-1)

. . .

Table 3-1. Dangerous Goods List

See paragraph 4.1.2.2 of the DGP-WG/22 report:

									Passenger aircraft		Cargo aircraft	
Name	*UN No.*	*Class or division*	*Subsidiary risk*	*Labels*	*State variations*	*Special provisions*	*UN packing group*	*Excepted quantity*	*Packing instruction*	*Max. net quantity per package*	*Packing instruction*	*Max. net quantity per package*
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
Guanyl nitrosaminoguanylidene hydrazine, wetted with not less than 30% water, by mass **胍基·亚硝氨亚胍基肼, 湿的,** 按质量计, 含水不低于30%	0113	1.1A							FORBIDDEN 禁运		FORBIDDEN 禁运	
Ethyl methyl ketone ~~乙基·甲基~~甲乙酮	1193	3		Liquid flammable 易燃液体			II	E2	353 Y341	5 L 1 L	364	60 L
Hydrogen cyanide, aqueous solution with not more than 20% hydrogen cyanide *or* **Hydrocyanic acid, aqueous solution** with not more than	1613	6.1							FORBIDDEN 禁运		FORBIDDEN 禁运	

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger aircraft		Cargo aircraft	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12	13
20% hydrogen cyanide 氢氰酸氰化氢水溶液, 含氢化氰不超过20% 或 氢氰酸水溶液, 含氢化氰不超过20%												
Calcium hydrosulphite 连二亚硫酸氢钙	1923	4.2		Spontaneous combustion 自燃物质			II	E2	467	15 kg	470	50 kg
Dibromodifluoromethane 丙酸丁酯二溴二氟甲烷	1941	9		Miscellaneous 杂项危险物品			III	E1	964	100 L	964	220 L
Pentane-2, 4-dione 戊-2, 4-戊二酮	2310	3	6.1	Liquid flammable & Toxic 易燃液体和毒性物质			III	E1	355 Y343	60 L 2 L	366	220 L
Adsorbed gas, toxic, flammable, n.o.s.* 吸附气体, 毒性, 易燃, 未另作规定的*	3514	2.3	2.1		AU 1 CA 7 IR 3 NL 1 US 3	A2		E0	FORBIDDEN 禁运		FORBIDDEN 禁运	
Adsorbed gas, toxic, flammable, corrosive, n.o.s.* 吸附气体, 毒性, 易燃, 腐蚀性, 未另作规定的*	3517	2.3	2.1 8		AU 1 CA 7 IR 3 NL 1 US 3	A2		E0	FORBIDDEN 禁运		FORBIDDEN 禁运	
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APPENDIX D

MINIMUM PERFORMANCE PACKAGE STANDARD TO SUPPORT THE SAFE SHIPMENT OF LITHIUM BATTERIES AS CARGO ON AIRCRAFT

1. DOCUMENTS UNDER DEVELOPMENT

1.1 The committee was working on four separate documents:

a) the main package performance based standard intended to provide a test method to demonstrate and document the control of potential hazards from UN 3090 — **Lithium metal batteries** and UN 3480 — **Lithium ion batteries** resulting from the failure of a single cell within the package by containing the hazards within the package (numbered AS6413);

b) a performance based standard intended to provide a test method to demonstrate and document that either a package meeting the AS6413 standard or material used as supplementary protection could withstand the thermal effects from an external fire in a cargo compartment (numbered AS6413/1);

c) a performance based standard intended to provide a test method to demonstrate and document that either a package meeting the AS6413 standard or material used as supplementary protection could withstand a flame from an external fire in a cargo compartment (numbered AS6413/2); and

d) an aerospace information report (AIR) that provided information about the standard including rationale for the test procedures (numbered AIR6840).

2. SCOPE

2.1 The committee had been working on a range of tests to cover different battery sizes and cell configurations, packagings that could be used for a variety of cells or batteries, and benign cells and batteries that could be transported in any type of packaging. Validation of the tests was a necessary part of the standard development process, and most of this had focused on lithium ion cylindrical cells. Validating and achieving consensus on all of the tests was complex and time consuming, so the committee had recently decided to narrow the scope of the standard to these cells as a baseline to facilitate development. It would work at broadening the scope from the baseline to include prismatic and pouch cells, batteries, lithium metal cells and batteries, and the various other tests once the committee reached a consensus on the baseline. It expected this would be a much faster process once the baseline was complete. Publishing the baseline would also allow regulators the opportunity to consider how to implement it, something some members on the committee wanted to know. It would also allow for full round robin testing using labs additional to the ones involved with the G27 committee. This would help determine whether the test standard provided consistent results from multiple labs unfamiliar with the standard. The committee's goal was to complete the baseline and put it through the SAE's formal balloting process at the beginning of 2023. The remaining tests would then be less onerous to complete, potentially within two years.

2.2 A concern was raised at DG-WG/22 that members of the G27 committee were questioning how regulators would implement the standard. It was not the committee's role or responsibility to consider this and should have no bearing on the content of the standard itself. It was suggested that this point be emphasized to the G27 committee.

3. GENERAL TEST METHODOLOGY FOR BASELINE

3.1 The test method in AS6413 abused a single cell to initiate thermal runaway within the package to demonstrate whether or not the consequences of thermal runaway were controlled and contained within the package. The ultimate goal was to prevent an uncontrollable fire in a cargo compartment and the accumulation of a large quantity of gas that could ignite from high heat and create a pressure pulse that would compromise fire suppression systems on the aircraft. AS6413 tested the batteries or cells and the packaging together, i.e. the package. This meant that cells that were inherently safer might need less robust packaging.

3.2 The test was conducted on a package of lithium ion cells at a state of charge that was 110% of the maximum state of charge that the cells would be presented for transport. This meant that if the cells were planned to be transported at 30 percent state of charge, they would need to be tested at 33 per cent state of charge. The test did not prescribe a set state of charge, that was a regulatory function, so the test could validate cells at any state of charge. The method of initiating thermal runaway in a single cell was to heat it until the cell entered thermal runaway, at which point the heater power was removed. If thermal runaway could not be confirmed by the time the cell reached 200°C, the temperature would be maintained for one hour before removing the heater power, and pass/fail criteria would be monitored for five hours after.

3.3 Pass/fail criteria

3.3.1 A test was a pass if the following was demonstrated:

a) No hazardous flame or hazardous particles exiting the package that could ignite surrounding material. This could be determined visually, or through use of cheesecloth as a witness panel;

b) Surface temperature of package not sufficient to ignite adjacent materials; and

c) No hazardous quantity of flammable vapour released outside package, demonstrated by the absence of an ignition of the vapour collected within the test chamber.

4. TESTS OUTSIDE OF SCOPE FOR FIRST PUBLISHED STANDARD

4.1.1 The following tests were beyond the baseline but were planned to be developed and validated once the baseline was complete:

a) Benign state of charge test to demonstrate that thermal runaway from a cell did not propagate to other cells at a specific state of charge and did not produce anything hazardous, regardless of packaging;

b) Oversize package for batteries too big to fit in the test chamber;

c) Generic package: A package qualified for a variety of cells or batteries versus the baseline test that qualified a package of specific cells;

d) External fire — thermal effects (AS6413/1);

e) External fire — flame (AS6413/2).

4.1.2 The external fire tests were included in what the SAE called "slash sheets". These were used as a tool to structure the standard effectively and to allow their development and approval process independently from the main standard. There might be other ways for operators to mitigate against the threat from an external fire, so this structure would provide flexibility so that one or both tests might not be necessary depending on operational capabilities and the regulatory framework. The test procedures for each were:

a) External fire — thermal effects (AS6413/1): Test article placed in an oven for three hours at 205°C to test the ability of the package to withstand the heat. Test article could be either the package (battery plus packaging) or material (no battery, but material needed to be the final product, including seams and interfaces, and contain a thermal mass as a surrogate for a cell);

b) External fire — flame (AS6413/2). Test article subjected to a five minute flame penetration test that is based on the FAA's oil burner test method. Test article could be either the package (battery plus packaging) or material (no battery, but material has to be the final product, including seams and interfaces and contain a thermal mass as a surrogate for a cell)

4.1.3 It was noted that the need for the G27 committee to focus on a much more narrow scope was to speed up the process, and that the delay in completing the full standard was due to the amount of time spent on all of the test variations. This was unfortunate, given that the narrow scope would have limited use for transport. Some of test variations were intended for batteries that were not permitted for transport by air without an approval because of their large size. It was suggested that ICAO direct the G27 committee to give these tests the lowest priority.

5. CONCLUSION

5.1 DGP-WG/22 expressed its appreciation for the update and the work of the co-chairs in guiding the committee.

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APPENDIX E

TERMS OF REFERENCE FOR DGP WORKING GROUP ON REMOTELY PILOTED AIRCRAFT SYSTEMS

REMOTELY PILOTED AIRCRAFT SYSTEMS (RPAS) **TERMS OF REFERENCE**	
Mission	To ensure Annex 18 and associated dangerous goods provisions support the safe transport of dangerous goods by RPAS
Tasks	1. Develop recommendations to address elements on ANC job cards and identified anomalies or gaps that apply to the safe transport of dangerous goods by RPAS. 2. Develop proposed amendments to Annex 18, the Technical Instructions, its Supplement, or other ICAO documents, when applicable, based on the output from task 1. 3. Ensure the associated proposed provisions align with the principles and terminology provided in Annexes 6, 8, 19, or related provisions in any other ICAO document.
Specific working arrangements	A panel member will be appointed as the rapporteur of the working group. The rapporteur will remain impartial and avoid conflicts of interest. The function of the rapporteur is primarily to ensure that the items on the work programme for the specific group are completed in a timely and efficient manner. The rapporteur will report the working group's progress to the DGP along with any recommendations, which may include proposed draft amendments to ICAO provisions. Such reports shall be made at a minimum at each Dangerous Goods Working Group of the Whole and panel meeting. The working group will comprise of panel members, advisors and observers. It will seek specialized expertise when necessary. The rapporteur will ensure a balanced representation of required expertise and reserves the right to limit the number of participants for the sake of efficiency. The working group will conduct its work informally. It will coordinate with other DGP working groups and relevant ICAO panels as appropriate. The Working Group may meet for detailed discussions as required, with ongoing correspondence and work via e-mail. The Working Group shall be assisted by the Secretariat as required.

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APPENDIX F

AMENDMENT TO THE PASSENGER PROVISIONS PROPOSED FOR INCORPORATION IN THE 2023-2024 EDITION OF THE TECHNICAL INSTRUCTIONS THROUGH AN ADDENDUM

Part 8

PROVISIONS CONCERNING PASSENGERS AND CREW

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Table 8-1. Provisions for dangerous goods carried by passengers or crew

Dangerous Goods	*Location*		*Approval of the operator(s) is required*	*Restrictions*
	Checked baggage	*Carry-on baggage*		
Batteries				
1) Lithium batteries (including portable electronic devices)	Yes (except for g) and h))	Yes	(see c) and d))	a) each battery must be of a type which meets the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3; b) each battery must not exceed the following: — for lithium metal batteries, a lithium content of 2 grams; or — for lithium ion batteries, a Watt-hour rating of 100 Wh; c) each battery may exceed 100 Wh but not exceed 160 Wh Watt-hour rating for lithium ion with the approval of the operator; d) each battery may exceed 2 grams but not exceed 8 grams lithium content for lithium metal for portable medical electronic devices with the approval of the operator; See paragraph 4.4.3 of the DGP-WG/22 report, to be incorporated in 2023-2024 Edition through addendum: e) batteries contained in portable electronic devices exceeding: — for lithium metal batteries, a lithium content of 0.3 grams; or — for lithium ion batteries, a Watt-hour rating of 2.7 Wh; should be carried as carry-on baggage; however, if carried as checked baggage: — measures must be taken to prevent unintentional activation and to protect the devices from damage; and — the devices must be completely switched off (not in sleep or hibernation mode);
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APPENDIX G

SUMMARIZED OUTCOME OF DISCUSSIONS

WP No.	FL No.	IP No.	Title	Presented by	Outcome
1			Extension of the Concept of "Exclusive Use" to Aircraft Containers (ULDs)	P. Tatin	Not agreed.
2			Consolidated Amendments to the Technical Instructions and the Supplement to the Technical Instructions to Address Identified Errors	P. Guo	Agreed as amended (delete record in Table 3-1 referring to Organic peroxide type D, liquid UN 3105).
3 Rev.			Proposed Special Provision for UN 3530	P. Guo	Agreed.
4			Removal of Special Provision A185 from UN 3481 and UN 3091	P. Guo	Not agreed.
5			Revisions to Special Provision A123 and A199	P. Guo	Agreed.
6			The Maximum Permitted Stacking Load Applicable for Overpack with IBCs	P. Guo	Not agreed.
7			Revision to Dangerous Goods List in the Chinese Version of the Technical Instructions	P. Guo	Agreed, potential for one more revision for Chinese Edition. Will communicate with Secretary for onward submission to Chinese Section at ICAO.
8			Proposed Revision to Special Provision A88	D. Brennan	Not agreed. May have unintended consequences.
9			Carriage of "Not Regulated" Dangerous Goods by "No-Carry" Operators	D. Brennan	Support for development of provisions. Tasked to newly established Secretariat ad hoc working group on Annex 6.
10	2		Revision of Exception for UN 3082 in Packing Instruction 964	D. Brennan	Revised proposal agreed.

WP No.	FL No.	IP No.	Title	Presented by	Outcome
11	3		Dangerous Goods Training and Assessment Records	Sam Bitossi	Revised proposal agreed.
12			Draft Amendments to Attachment I to Chapter 1 of the Supplement to the Technical Instructions	S. Bitossi — Rapporteur DGP-WG/SUPP	Discussed (Feedback provided).
13			Development of Provisions for Sodium Ion Batteries	D. Brennan — Rapporteur of DGP-WG/UN Harmonization	Discussed. Formal proposal for WG/23.
14			Pressure Differential Requirements in Part 4;1 1 6 and Part 6;4.3.5	D. Brennan	Agreed.
15			Revision of Packing Instruction 952	D. Brennan	Agreed as amended (replace machines with machinery and remove reference to PI 492). Remove references to PI 492 in PIs 220, 378, 950, 951 and 972.
16			Exception for Lithium Battery Powered Data Loggers / Cargo Tracking Devices	D. Brennan	Support for developing an exception under acceptable limits. Members to engage with industry to collect data and information on what is in use today. Feedback to D. Brennan by end of February 2023.
17			Revsion to the Definition of "Passenger Aircraft"	D. Brennan	Support need to address issue. Newly established Secretariat ad hoc working group on Annex 6 to develop new proposal.

WP No.	FL No.	IP No.	Title	Presented by	Outcome
18			Lithium Battery Powered Tracking Devices Carried by Passengers or Crew	D. Brennan	Agreed. Secretariat to seek approval for Addendum. Further modified post DGP-WG/22 through correspondence so that amendment requiring PEDs to be protected from damage/ inadvertent activation when in carry-on is not included in the addendum.
19			Review of Annex 6 Provisions Having an Impact on Dangerous Goods	the Secretary	Discussed. Secretariat ad hoc working group established to progress the work. Those interested in participating to send email to Secretary.
20			Dangerous Goods Provisions to Support Remotely Piloted Aircraft Systems	the Secretary	Discussed. WG established. Held first meeting on 23/11/2022 and developed terms of reference. Those interested in participating to send email to Secretary.
21			Mishandled baggage	S. Bitossi	Agreed.
		1	Proposed Revision to the Packing Instruction 967	G. Peng	Discussed, no support. In any case would need agreement by UN Committee first.

WP No.	FL No.	IP No.	Title	Presented by	Outcome
		2	Classification of Lithium Battery-Powered Mobility Aids	D. Brennan	Discussed. Devices described considered mobility aids, but accepting them not so black and white, i.e. may depend on needs of person carrying them.
		3	Provisions for the Use of Electronic Data to the Pilot-In-Command	D. Brennan	Support for allowing electronic data. Some consider already permitted under current provisions. Measures to address potential failure of electronic only need to be in place. Amendment should be performance based.
		4	Guidance on the Application of the Definition of Passenger Aircraft	the Secretary	Presented. Related to WP/17.
		5	Report of the Dangerous Goods Panel Working Group on Energy Storage Devices (DGP-WG/Energy storage devices)	DGP-WG/Energy storage devices	Discussed. Held working group meetings to progress work.
		14	U.S. Import-Export Data for UN3480/UN3481/UN3090		Presented. Related to IP/5.
		6	Report of the Working Group of the Supplement	S. Bitossi — Rapporteur DGP-WG/SUPP	Discussed.
		7	Report from DGP-WG/Annex 18	DGP-WG/Annex 18	Discussed. Members to provide feedback on draft SARPs by 17 February 2023.
		8	Fire safety testing lithium cell powered tracking devices	D. Pfund	Presented.

WP No.	FL No.	IP No.	Title	Presented by	Outcome
		9	Transport airplane cargo compartment fire suppression capabilities, requirements and dangerous goods assessment in three parts	Secretary	Presented. Related to IP/5.
		10	Thermal Incident Data related to Cargo Operations reported through the Voluntary Thermal Runaway Incident Program (TRIP) RIP Cargo Data: Summary Of Data	Secretary	Presented. Related to IP/5.
		11	Status of SAE G27 Lithium Battery Packaging Performance Committee	D. Ferguson	Presented.
		12	Progress on Clarifying State Responsibilities in Annex 18	Secretary	Presented. Related to IP/7.
		13	Briefing on the State safety programme (SSP) and safety management systems (SMS)	Secretary	Presented. Related to IP/7.

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