International Civil Aviation Organization

DGP/30-WP/31
14/7/25

WORKING PAPER

DANGEROUS GOODS PANEL (DGP)

THIRTIETH MEETING

Montréal, 6 to 10 October 2025

Agenda Item 2: Managing air-specific safety risks and identifying anomalies (REC-A-DGS-2027)
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 2027-2028 Edition

PRESSURE DIFFERENTIAL REQUIREMENTS APPLICABLE TO PACKAGINGS CONTAINING RADIOACTIVE MATERIAL

(Presented by S. Bitossi)

SUMMARY

This working paper proposes provisions to support implementation of Part 6;7.2.3 of the Technical Instructions in the form of a note under this provision and guidance material intended for publication on the ICAO public website.

Part 6;7.2.3 requires packages containing radioactive material to be capable of withstanding an internal pressure that produces a pressure differential of not less than maximum normal operating pressure plus 95 kPa. The proposed note provides an alternate means of compliance with this provision for packages containing solid radioactive material based on provisions in IAEA advisory material for its regulations for the safe transport of dangerous goods. The text proposed for publication on the ICAO website provides guidance to States and shippers on normal and emergency flight conditions with respect to differential pressure. The proposal considers comments raised during discussions on a similar proposal made at the Dangerous Goods Panel Working Group Meeting in 2024 (DGP-WG/24, 21 to 25 October 2024, Montreal) and during discussions on the topic at previous DGP meetings.

Action by the DGP: The DGP is invited to:

a) review and consider the note proposed for inclusion under Part 6;7.2.3 of the Technical Instructions as presented in Appendix A to this working paper and agree to its incorporation in the 2027-2028 edition of the Technical Instructions; and

b) review and consider the proposed guidance material in Appendix B to this working paper for publication on the ICAO public website.

1. INTRODUCTION

1.1 This working paper follows on from discussions that were had at the Dangerous Goods Panel Working Group Meeting in 2024 (DGP-WG/24, 21 to 25 October 2024, Montreal) (see paragraph 4.3.5 of the DGP-WG/24 Report).

1.2 Part 6;7.2.3 of the Technical Instructions states that:

> Packages containing radioactive material must be capable of withstanding, without loss or dispersal of radioactive contents from the containment system, an internal pressure that produces a pressure differential of not less than maximum normal operating pressure plus 95 kPa.

1.3 The IAEA published *Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material (2018 Edition) Specific Safety Guide No. SSG-26 (Rev. 1)*, where explanatory text in para 621.2 states that:

> In the case of solid material, to comply with para. 621 of the Transport Regulations, means other than pressure resistance may be used to demonstrate compliance. If it can be demonstrated that there is no loss or dispersal of the radioactive contents from the containment system when the package is exposed to the pressure differential expected during flight, the package design can be considered to meet the requirement even if the internal pressure is not maintained.

1.4 Some radioactive packages designed for solid radioactive material do not evidence differential pressure testing to maximum normal operating pressure (MNOP) plus 95kPa in line with Part 6;7.2.3 and are at risk of perceived non-compliance with the regulations with the current wording.

1.5 These radioactive packages (designed for solid radioactive material) are able to evidence other means of compliance to demonstrate that there is no loss or dispersal of the radioactive contents from the containment system (this is in line with IAEA SSR-6 and corresponding IAEA SSG-26 (current editions)).

1.6 The Technical Instructions (or its Supplement) do not have explanatory text or provide for other means of demonstrating compliance with Part 6;7.2.3 for solid radioactive material packages, which is conflicting with the guidance published in IAEA SSG-26 and ultimately resulting in the denial of shipments.

1.7 Noting the above, Appendix A to this working paper proposes a note after Part 6;7.2.3 which has been extracted from para 621.2 of the IAEA SSG-26 and adjusted to ensure that it is limited to packages containing solid material only.

1.8 Appendix B to this working paper presents the proposed guidance material regarding normal and emergency flight conditions with respect to differential pressure for packages containing solid radioactive material. This wording was developed by a DGP/IAEA Working Group on Pressure Differential Requirements and is aimed at providing clarification to both States and Shippers.

1.9 This guidance was discussed at DGP-WG/24, and consideration was given as to whether it should reside within the Supplement or on a specified ICAO website. DGP-WG/24 did not consider the Supplement to be the most effective location for this guidance, given that the material is more directed at shippers than States. Therefore, this paper proposes that the guidance in Appendix B be published on the ICAO public website, at a suitable location, to be determined by the DGP Secretariat.

2. ACTION BY THE DGP

2.1 The DGP is invited to:

a) review and consider the note proposed for inclusion under Part 6;7.2.3 of the Technical Instructions as presented in Appendix A to this working paper and agree to its incorporation in the 2027-2028 edition of the Technical Instructions; and

b) review and consider the proposed guidance material in Appendix B to this working paper for publication on the ICAO public website.

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APPENDIX A

PROPOSED AMENDMENT TO PART 6 OF THE TECHNICAL INSTRUCTIONS

Part 6

PACKAGING NOMENCLATURE, MARKING, REQUIREMENTS AND TESTS

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Chapter 7

REQUIREMENTS FOR THE CONSTRUCTION, TESTING AND APPROVAL OF PACKAGES FOR RADIOACTIVE MATERIAL AND FOR THE APPROVAL OF SUCH MATERIAL

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7.2 ADDITIONAL REQUIREMENTS FOR PACKAGES TRANSPORTED BY AIR

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7.2.3 Packages containing radioactive material must be capable of withstanding, without loss or dispersal of radioactive contents from the containment system, an internal pressure that produces a pressure differential of not less than maximum normal operating pressure plus 95 kPa.

Note.—In the case of solid material, to comply with 7.2.3, means other than pressure resistance may be used to demonstrate compliance. If it can be demonstrated that there is no loss or dispersal of the radioactive contents from the containment system when the package is exposed to the pressure differential expected during flight, the package design can be considered to meet the requirement even if the internal pressure is not maintained.

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APPENDIX B

PROPOSED GUIDANCE FOR PUBLICATION ON ICAO WEBSITE

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ADDITIONAL GUIDANCE FOR PACKAGES OF RADIOACTIVE MATERIAL TRANSPORTED BY AIR

GUIDANCE TO SHIPPERS AND STATES ON NORMAL AND EMERGENCY FLIGHT CONDITIONS WITH RESPECT TO DIFFERENTIAL PRESSURE

1. The normal conditions of flight and the emergency flight conditions are defined in ISO Standard 11242 as follows:

a) **Normal flight conditions:** Flight conditions with cabin/cargo compartment pressure decreasing from standard sea level 100 kPa to minimum cruise flight cabin altitude pressure 75 kPa (8000 ft) during climb at minimum rate of 150 Pa/s (2500 ft/min), and increasing back to standard sea level during descent, at minimum rate of 90 Pa/s (1500 ft/min). Some cargo-only aircraft are designed and operated such that the cargo compartment is not pressurized during flight. For these type of aircraft the normal rate of pressure change experienced by the cargo is the actual rate of aircraft climb and descent which is expected to be greater than the "normal" pressure change provided in the ISO standard 11242.

b) **Emergency (rapid decompression) flight conditions:** Cabin/cargo compartment atmosphere dropping linearly from a minimum normal equivalent altitude of 6000 ft, i.e. a maximum normal pressure of 81 kPa in cruise flight, to the standard ambient pressure of 15 kPa at 45000 ft altitude in a duration of 1 s.

2. The maximum normal operating pressure (MNOP) is at least the gauge pressure developed in the containment system of the package at 55°C (primary receptacle, or intermediate packaging or outer packaging), i.e. the absolute pressure developed in the package at 55°C less 100 kPa.

3. The differential pressure of MNOP + 95 kPa results from a consideration of aircraft depressurization at a maximum civil aviation flight altitude together with any pressure already inside the package, plus a safety margin.

4. In the particular case of solid material, in order to comply with Part 6, 7.2.3 other means of demonstration than pressure resistance may be used by the designer of a package design.

5. If "no loss or dispersal" can be justified when the package is exposed to pressure differential the package design is considered to meet the requirement even if the internal pressure is not maintained.

6. *Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material* (2018 edition), Safety Standard Series No. SSG-26 (Rev.1), paragraph 621.3 states:

> If, within the definition of MNOP, the phrase "conditions of temperature and solar radiation corresponding to environmental conditions" is interpreted to include consideration of conditions specific to air transport (para. 620), then the MNOP does provide a suitable basis for specifying this requirement. If the temperature range given in para. 620 (–40°C to 55°C) is used, self-heating of the package contents is taken into account and the solar radiation input is considered to be zero, as the package is inside an aircraft, and hence the MNOP is consistent with the ICAO approach.

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