



**WORKING PAPER**

**DANGEROUS GOODS PANEL (DGP)**

**TWENTY-FOURTH MEETING**

**Montréal, 28 October to 8 November 2013**

**Agenda Item 2: Development of recommendations for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2015-2016 Edition**

**SMALL QUANTITIES OF PEROXYACETIC ACID**

(Presented by the Dangerous Goods Advisory Council)

**SUMMARY**

This paper proposes a new additional packaging requirement for Packing Instruction 570 allowing limited venting of oxygen in the case of specialized peroxyacetic acid packagings consistent with exemptions issued by four national authorities. The paper also proposes a minor clarifying amendment to Special Provision A75. This paper follows discussion at DGP/WG-13 on the basis of DGP/WG/13-WP/22 (see DGP/24-WP/3, paragraph 3.2.21).

**Action by the DGP:** The DGP is invited to agree to the addition of a new additional packaging requirement for Packing Instruction 570 and to amend Special Provision A75 as presented in appendix to this working paper.

**1. INTRODUCTION**

1.1 At the 2013 Meeting of the DGP Working Group of the Whole (DGP-WG/13, Montreal, 15 to 19 April 2013) DGAC proposed a special provision which would allow small quantities of oxygen to be vented from inner packagings containing peroxyacetic acid (UN 3107, **Organic peroxide type E, liquid** (< 37% peroxyacetic acid and < 7.5% hydrogen peroxide)) contained in medical sterilization devices (see DGP/24-WP/3, paragraph 3.2.21). The proposal was based on approvals issued by four national authorities. Components of the authorized packaging are pictured below. While the substance of the proposal appeared acceptable to DGP/WG-13, participants asked that DGAC (see 3.2.21.3 of the DGP-WG/13 Report in DGP/24-WP/3):

- a) provide a basis for why the amount of oxygen released would not pose a danger in air transport;

- b) consider other requirements in exemptions by national authorities (e.g. orientation arrows);
- c) justify the inner packaging and outer packaging quantity limits;
- d) clarify why only 4G packages were proposed; and
- e) revise the proposal so that the provisions would appear in the relevant packing instruction instead of as a special provision.

1.2 **Evaluation of the risk of oxygen release.** As noted at DGP/WG-13 (see DGP/24-WP/3, paragraph 3.2.21), the average release rate is 0.1 ml of oxygen per hour per inner packaging (70 ml volume). With 20 such inner packagings per outer package, the release rate per outer package is approximately 2.0 ml per hour. The concentration of oxygen in air is approximately 21%. If one considers a one cubic meter volume (100 cm x 100 cm x 100cm) of air inside a ULD, it would contain 1,000,000 cm<sup>3</sup> or ml of air; and considering oxygen is present in air at a concentration of 21%, 210,000 ml of oxygen would be present. At an oxygen evolution rate of 2 ml per hour, the release of oxygen from a single outer package inside such a ULD, assuming no ventilation, would increase from 21% to 21.0002 % in one hour. Considering that oxidizing gases are ones that have an oxidizing power greater than 23.5% oxygen in air (see note under 2;2.2.1 b)) this may be considered a trivial increase in oxygen even under very conservative assumptions (i.e. no ventilation).

1.3 **Orientation arrows.** The requirement for orientation arrows (*Note.— The orientation arrow exception was made more broadly applicable in the 2013-2014 Edition of the Technical Instructions; hence exclusion from DGAC's proposal to DGP-WG/13*) was not included in DGAC's original proposal but would be addressed in the revised proposal in that general requirements (including 4;1.1.3.1) in Part 4;1 are applicable to packagings in Packing Instruction 570.

1.4 **Justification of packaging limitations.** The packaging limitations (i.e. inner packaging volume of 70 ml, 20 inner packagings per outer packaging) were based on what was provided in exemptions issued by national authorities. DGAC notes that the quantity limit under Packing Instruction 570 per inner package is 2.5 L and the limit per outer packaging is 25 L in the case of cargo aircraft. An outer packaging of this size would release approximately 36 mL of oxygen per hour. Using the analysis above, the oxygen concentration in the 1m<sup>3</sup> ULD space would increase from 21% to 21.0036% in one hour. This also would be a trivial change in oxygen concentration. Considering the low degree of risk, DGAC has provided two options: one reflecting the original proposal and a second taking into account the relevant inner and outer volume limits of the packing instruction.

1.5 **4G packagings.** 4G packagings were proposed since these were the only packagings authorized by the exemption by national authorities. Other outer packagings that permit release of pressure could also be acceptable.

1.6 **Similar formulations under UN 3109 (Type F).** There are similar formulations in Type F. On the basis that Type F is less hazardous, DGAC has also provided for these formulations in its proposal.

1.7 **Relief from certain general requirements/A75.** When venting is permitted, the requirements of 4;1.1.6, 4;1.1.12 and 4;7.1.2 are impracticable and should not apply. There was general agreement at DGP/WG-13 that this should be clarified. DGAC also noted in DGP/WG-13 WP/22 that Special Provision A75 was amended in the 2013-14 Edition of the Technical Instructions to permit venting and it should likewise be clarified to indicate these general requirements should not be applicable.

## 2. PROPOSAL

2.1 On the basis of comments from DGP/WG-13 and as discussed above, DGAC revises its original proposal as an amendment to Packing Instruction 570. This entails inserting a new item under “Additional Packing Requirements for Combination Packagings”. DGAC provides two options. Option 1 is a more generalized approach reflecting the low degree of risk even substantially larger vented inner packagings would pose. Option 2 reflects the requirements of the current exemptions by national authorities.



**Illustration of the packaging authorized under approvals**

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APPENDIX

PROPOSED AMENDMENT TO PART 3 OF THE TECHNICAL INSTRUCTIONS

Part 3

DANGEROUS GOODS LIST,  
SPECIAL PROVISIONS AND  
LIMITED AND EXCEPTED QUANTITIES

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Chapter 3

SPECIAL PROVISIONS

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Table 3-2. Special provisions

<i>TIs</i>	<i>UN</i>	
#	A75	Articles such as sterilization devices, when containing less than 30 ML per inner packaging with not more than 150 ML per outer packaging, may be transported on passenger and cargo aircraft in accordance with the provisions in 3.5, irrespective of the value in column 9 and the indication of "forbidden" in columns 10 to 13 of the Dangerous Goods List (Table 3-1), provided such packagings were first subjected to comparative fire testing. Comparative fire testing between a package as prepared for transport (including the substance to be transported) and an identical package filled with water must show that the maximum temperature measured inside the packages during testing does not differ by more than 200°C. Packagings may include a vent to permit the slow escape of gas (i.e. not more than 0.1 ML/hour per 30 ML inner packaging at 20°C) produced from gradual decomposition.

The requirements of 4;1.1.6, 4;1.1.12 and 4;7.1.2 do not apply.

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**Part 4**

**PACKING INSTRUCTIONS**

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**Chapter 7**

**CLASS 5 — OXIDIZING SUBSTANCES;  
ORGANIC PEROXIDES**

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**7.2 PACKING INSTRUCTIONS**

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**Option 1 — Generalized approach**

**Packing Instruction 570**

Passenger and cargo aircraft

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**ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS**

- Packagings must meet the Packing Group II performance requirements.
- For UN 3107 **Organic peroxide type E, liquid** and UN 3109 **Organic peroxide type F, liquid peroxyacetic acid and hydrogen peroxide mixtures**:

Inner packagings may be fitted with a vent consisting of hydrophobic membrane, provided:

- 1) less than 50 ml of oxygen per outer packaging is vented per hour;
- 2) the inner packaging is designed so that the vent is not immersed in liquid in any orientations;
- 3) each inner packaging is enclosed in an intermediate rigid plastic packaging with a small opening to permit release of gas and containing a buffer that neutralizes the contents of the inner packaging in the event of leakage. Each intermediate packagings must be packed in an outer packagings that avoids pressure build-up;
- 4) the requirements of 4;1.1.6, 4;1.1.12 and 4;7.1.2 do not apply.

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**Option 2 — Approach reflecting existing exemptions**

**Packing Instruction 570**

Passenger and cargo aircraft

**ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS**

- Packagings must meet the Packing Group II performance requirements.
- For UN 3107 **Organic peroxide type E, liquid** and UN 3109 **Organic peroxide type F, liquid peroxyacetic acid and hydrogen peroxide mixtures**:

Inner packagings may be fitted with a vent consisting of hydrophobic membrane, provided:

- 1) Each inner packaging must not contain more than 70 ml;
- 2) The inner packaging is designed so that the vent is not immersed in liquid in any orientations;

- 3) Each outer packaging must not contain more than 1.4L of liquid;
- 4) Each inner packaging must be enclosed in an intermediate rigid plastic packaging with a small opening to permit release of gas and containing a buffer that neutralizes the contents of the inner packaging in the event of leakage. Each intermediate packagings must be packed in a 4G outer packagings; and
- 5) The requirements of 4:1.1.6, 4:1.1.12 and 4:7.1.2 do not apply.

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