



WORKING PAPER

**DANGEROUS GOODS PANEL (DGP)
MEETING OF THE WORKING GROUP OF THE WHOLE**

Abu Dhabi, United Arab Emirates, 7 to 11 November 2010

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 2013/2014 Edition

2.4: Part 4 — Packing Instructions

PROPOSED CHANGES TO PACKING INSTRUCTION 565 FOR UN 3356, OXYGEN GENERATOR, CHEMICAL

(Presented by A. Tušek)

SUMMARY

This paper proposes editorial changes to Packing Instruction 565 in order to make clear the positive means of preventing unintentional actuation required when an **Oxygen generator, chemical** is equipped with an actuation device.

The paper is presented due to a safety issue identified as the result of a dangerous goods incident.

If the proposed amendment is agreed, the DGP-WG is invited to consider implementing it by way of an addendum to the 2009-2010 Edition.

Action by the DGP-WG is in paragraph 2.

1. INTRODUCTION

1.1 During a recent audit of a cargo airline in Australia, a dangerous goods inspector from the Civil Aviation Safety Authority found a chemical oxygen generator shipment in Sydney which had travelled from Adelaide via another cargo only airline.

1.2 The chemical oxygen generator was not tightly packed as required by Packing Instruction 523 (565 in the 2011/2012 Edition) but loosely packed and able to move around freely within the packaging.

1.3 This generator also lacked the proper pins that prevent unintentional actuation, and a pin that was inserted had been inserted incorrectly.

1.4 Initial investigations revealed many incorrectly packaged chemical oxygen generators within the airline's engineering stores section, including legacy stores from other airlines.

1.5 It was also discovered that engineers may not be removing in-service chemical oxygen generators correctly and did not have the required "special" tool used for pin insertion.

1.6 Further, staff members were re-using incomplete manufacturers' original packaging expecting that the stores despatch personnel would re-package them properly, and stores despatch personnel were operating in the belief that the engineers had properly packaged and prepared the chemical oxygen generators for transport.

1.7 Of those checked in stores, 95 per cent of the chemical oxygen generators that had been removed from service had not been properly prepared to prevent inadvertent activation.

1.8 The airline involved has currently banned the carriage of repackaged chemical oxygen generators that have been removed from service and are only transporting new units. They are revisiting the engineering procedures and aircraft maintenance manuals as a check of the procedures showed to be lacking detail sufficient to ensure the chemical oxygen generators are returned to stores in a condition that permits safe transport and storage by means that prevent unintentional actuation.

1.9 It was identified that a person given the task of despatching a chemical oxygen generator and using only Packing Instruction 523 (565 in the 2011/2012 Edition) for guidance might not have sufficient information of what is required to ensure the two positive means of preventing unintentional actuation.

1.10 The 49CFR173.168 of the United States contains text that prescribes the means required to prevent the unintentional actuation required under the packing instruction and it is proposed that this should be incorporated for the purposes of safety. See Appendix D for 49 CFR 173.168.

1.11 As a result of the incident, the matter was presented to the International Air Transport Association (IATA) Dangerous Goods Board (DGB) by one of the board members, and changes to the applicable packing instruction were adopted in the IATA Dangerous Goods Regulations — 2011 (52nd Edition) (see Appendix C). This indicates that IATA has recognized the safety implications. However, the additional information would not be available to those in industry who use only the Technical Instructions.

2. ACTION BY THE DGP-WG

2.1 The DGP-WG is invited to consider:

- a) amending Packing Instruction 965 as shown in Appendix A to this working paper; and
 - b) issuing an addendum to the 2009/2010 Edition of the Technical Instructions which would contain the equivalent amendment to Packing Instruction 523 as shown in Appendix B.
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APPENDIX A

PROPOSED AMENDMENT TO THE 2011/2012 EDITION OF THE TECHNICAL INSTRUCTIONS

Packing Instruction 565

Passenger and cargo aircraft for UN 3356 only

General requirements

Part 4, Chapter 1 requirements must be met, including:

1) Compatibility requirements

- Substances must be compatible with their packagings as required by 4;1.1.3.
- Metal packagings must be corrosion resistant or be protected against corrosion.

2) Closure requirements

- Closures must meet the requirements of 4;1.1.4.

COMBINATION PACKAGINGS				SINGLE PACKAGINGS
UN number and proper shipping name	Packing conditions	Total quantity per package — passenger	Total quantity per package — cargo	
UN 3356 Oxygen generator, chemical	The generators must be tightly packed in the outer packagings listed below.	Forbidden	25 kg G	Unpackaged No

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- The generator, without its packaging, must be capable of withstanding a 1.8 m drop test onto a rigid, non-resilient, flat and horizontal surface, in the position most likely to cause actuation, without loss of its contents and without actuation. For portable breathing equipment (PBE), which are in a vacuum-sealed bag as part of their containment system, this test may be conducted on the PBE in the vacuum-sealed bag.
- When a generator is equipped with an actuating device, it must have at least two positive means of preventing unintentional actuation. For PBE, which are in a vacuum-sealed bag as part of their containment system, the vacuum-sealed bag may be considered the second positive means of preventing unintentional actuation. For oxygen generators, indicative methods for two positive means of preventing unintentional actuation are as follows:
 - 1) mechanically actuated devices:
 - i) two pins, installed so that each is independently capable of preventing the actuator from striking the primer;
 - ii) one pin and one retaining ring, each installed so that each is independently capable of preventing the actuator from striking the primer; or
 - iii) a cover securely installed over the primer and a pin installed so as to prevent the actuator from striking the primer and cover.
 - 2) electrically actuated devices: The electrical leads must be mechanically shorted and the mechanical short must be shielded in metal foil.
- The generator(s) must be transported in a package which will meet the following requirements when one generator in the package is actuated:
 - 1) other generators in the package will not be actuated;
 - 2) packaging material will not ignite; and
 - 3) the outside surface temperature of the completed package will not exceed 100°C.

Note.— To enable tests 1), 2) and 3) to be conducted on PBE, it is acceptable to break the vacuum-sealed bag to actuate the generator before placing it in the package.

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APPENDIX B

PROPOSED AMENDMENT TO THE 2009/2010 EDITION OF THE TECHNICAL
INSTRUCTIONS

523	PACKING INSTRUCTION 523	523
<p>The general packing requirements of 4;1, except for 1.1.12, must be met.</p> <p>Oxygen generator, chemical containing oxidizing substances, including when fitted in associated equipment, e.g. passenger service units (PSUs), portable breathing equipment (PBE), must meet all the following conditions:</p> <p>a) the generator, without its packaging, must be capable of withstanding a 1.8 m drop test onto a rigid, non-resilient, flat and horizontal surface, in the position most likely to cause actuation, without loss of its contents and without actuation. For PBE, which are in a vacuum-sealed bag as part of their containment system, this test may be conducted on the PBE in the vacuum-sealed bag;</p> <p>b) when a generator is equipped with an actuating device, it must have at least two positive means of preventing unintentional actuation. For PBE, which are in a vacuum-sealed bag as part of their containment system, the vacuum-sealed bag may be considered the second positive means of preventing unintentional actuation. <u>For oxygen generators, indicative methods for two positive means of preventing unintentional actuation are as follows:</u></p> <p><u>1) mechanically actuated devices:</u></p> <p>i) <u>two pins, installed so that each is independently capable of preventing the actuator from striking the primer;</u></p> <p>ii) <u>one pin and one retaining ring, each installed so that each is independently capable of preventing the actuator from striking the primer; or</u></p> <p>iii) <u>a cover securely installed over the primer and a pin installed so as to prevent the actuator from striking the primer and cover.</u></p> <p><u>2) electrically actuated devices: The electrical leads must be mechanically shorted and the mechanical short must be shielded in metal foil.;</u></p> <p>c) the generator(s) must be transported in a package which will meet the following requirements when one generator in the package is actuated:</p> <p>1) other generators in the package will not be actuated;</p> <p>2) packaging material will not ignite; and</p> <p>3) the outside surface temperature of the completed package will not exceed 100°C;</p> <p><i>Note. — To enable test c) 1), 2) and 3) to be conducted on PBE, it is acceptable to break the vacuum-sealed bag to actuate the generator before placing it in the package.</i></p> <p>d) the generator(s) must be tightly packed in steel drums (1A2), aluminium drums (1B2), plywood drums (1D), fibre drums (1G), plastic drums (1H2), steel jerricans (3A2), plastic jerricans (3H2), metal boxes (4A, 4B), wooden boxes (4C1, 4C2), plywood boxes (4D), reconstituted wood boxes (4F), fibreboard boxes (4G) or solid plastic boxes (4H2).</p>		

APPENDIX C

EXTRACT FROM THE IATA DANGEROUS GOODS REGULATIONS – 2011 (52nd Edition)

PACKING INSTRUCTION 565

This packing instruction applies to Oxygen generator, chemical (UN 3356) on Cargo Aircraft Only.

The General Packing Requirements of Subsection 5.0.2 must be met.

Compatibility Requirements

Substances must be compatible with their packagings as required by 5.0.2.6;

Closure Requirements

Closures must meet the requirements of 5.0.2.7;

Additional Packing Requirements

Oxygen generator, chemical containing oxidizing substances, including when fitted in associated equipment e.g. passenger service units (PSUs), portable breathing equipment (PBE) etc., must meet all the following conditions:

(a) the generator, without its packaging, must be capable of withstanding a 1.8 m (6 ft) drop test onto a rigid, non-resilient, flat and horizontal surface in the position most likely to cause actuation without loss of its contents and without actuation. For PBE, which are in a vacuum-sealed bag as part of their containment system, this test may be conducted on the PBE in the vacuum-sealed bag;

(b) when a generator is equipped with an actuating device it must have at least two positive means of preventing unintentional actuation. For PBE, which are in a vacuum-sealed bag as part of their containment system, the vacuum-sealed bag may be considered the second positive means of preventing unintentional actuation. For oxygen generators, indicative methods for two positive means of preventing unintentional activation are as follows:

1. mechanically actuated devices:

(i) two pins, installed so that each is independently capable of preventing the actuator from striking the primer;

(ii) one pin and one retaining ring, each installed so that each is independently capable of preventing the actuator from striking the primer; or

(iii) a cover securely installed over the primer and a pin installed so as to prevent the actuator from striking the primer and cover.

2. electrically actuated devices: The electrical leads must be mechanically shorted and the mechanical short must be shielded in metal foil.

(c) the generator(s) must be transported in a package which will meet the following requirements when one generator in the package is actuated:

(1) other generators in the package will not be actuated;

(2) packaging material will not ignite; and

(3) the outside surface temperature of the completed package will not exceed 100°C (212°F).

Note: To enable test (c) (1), (2) and (3) to be conducted on PBE, it is acceptable to break the vacuum-sealed bag to actuate the generator before placing in the package.

OUTER PACKAGINGS

Type	Drums						Jerricans			Boxes						
	Steel	Alum- inium	Ply- wood	Fibre	Plastic	Other metal	Steel	Alum- inium	Plastic	Steel	Alum- inium	Wood	Ply- wood	Recon- stituted wood	Fibre- board	Plastic
Spec	1A2	1B2	1D	1G	1H2	1N2	3A2	3B2	3H2	4A	4B	4C1 4C2	4D	4F	4G	4H1 4H2

APPENDIX D

49 CFR 173.168

49 CFR 173.168 Chemical oxygen generators.

An oxygen generator, chemical (defined in § 171.8 of this subchapter) may be transported only under the following conditions:

(a) *Approval.*

A chemical oxygen generator that is shipped with an explosive or non-explosive means of initiation attached must be classed and approved by the Associate Administrator in accordance with the procedures specified in § 173.56 of this subchapter.

(b) *Impact resistance.*

A chemical oxygen generator, without any packaging, must be capable of withstanding a 1.8 meter drop onto a rigid, non-resilient, flat and horizontal surface, in the position most likely to cause actuation or loss of contents.

(c) *Protection against inadvertent actuation.*

A chemical oxygen generator must incorporate one of the following means of preventing inadvertent actuation:

(1) A chemical oxygen generator that is not installed in protective breathing equipment (PBE):

(i) Mechanically actuated devices:

(A) Two pins, installed so that each is independently capable of preventing the actuator from striking the primer;

(B) One pin and one retaining ring, each installed so that each is independently capable of preventing the actuator from striking the primer; or

(C) A cover securely installed over the primer and a pin installed so as to prevent the actuator from striking the primer and cover.

(ii) Electrically actuated devices: The electrical leads must be mechanically shorted and the mechanical short must be shielded in metal foil.

(iii) Devices with a primer but no actuator: A chemical oxygen generator that has a primer but no actuating mechanism must have a protective cover over the primer to prevent actuation from external impact.

(2) A chemical oxygen generator installed in a PBE must contain a pin installed so as to prevent the actuator from striking the primer, and be placed in a protective bag, pouch, case or cover such that the protective breathing equipment is fully enclosed in such a manner that the protective bag, pouch, case or cover prevents unintentional actuation of the oxygen generator.

(d) *Packaging.* A chemical oxygen generator and a chemical oxygen generator installed in equipment, (e.g., a PBE) must be placed in a rigid outer

packaging that—

(1) Conforms to the requirements of either:

(i) Part 178, subparts L and M, of this subchapter at the Packing Group I or II performance level; or

(ii) The performance criteria in Air Transport Association (ATA) Specification No. 300 for a Category I Shipping Container.

(2) After September 30, 2009, with its contents, is capable of meeting the following additional requirements when transported by cargo-only aircraft:

(i) The Flame Penetration Resistance Test in Appendix E to part 178 of this subchapter;

(A) At least three specimens of the outer packaging materials must be tested;

(B) Each test must be conducted on a flat 16 inch x 24 inch test specimen mounted in the horizontal ceiling position of the test apparatus to represent the outer packaging design;

(C) Testing must be conducted on all design features (latches, seams, hinges, etc.) affecting the ability of the outer packaging to safely prevent the passage of fire in the horizontal ceiling position; and

(D) There must be no flame penetration of any specimen within 5 minutes after application of the flame source, and the maximum allowable temperature at a point 4 inches above the test specimen, centered over the burner cone, must not exceed 205 ° C (400 ° F).

(ii) The Thermal Resistance Test specified in Appendix D to part 178 of this subchapter.

(iii) None of the following conditions may occur when one generator in the package is actuated:

(A) Actuation of other generators in the package;

(B) Ignition of the packaging materials; and

(C) A temperature above 100 °C (212 °F) on the outside surface temperature of the package.

(iv) All features of the packaging must be in good condition, including all latches, hinges, seams, and other features, and the packaging must be free from perforations, cracks, dents, or other abrasions that may negatively affect the flame penetration resistance and thermal resistance characteristics of the packaging, verified by a visual inspection of the package before each shipment.

(e) *Equipment marking.* The outside surface of a chemical oxygen generator must be marked to indicate the presence of an oxygen generator (e.g., "oxygen generator, chemical"). The outside surface of equipment containing a chemical oxygen generator that is not readily apparent (e.g., a sealed passenger service unit) must be clearly marked to indicate the presence of the oxygen generator (example: "Oxygen Generator Inside").

(f) *Items forbidden in air transportation.*

(1) A chemical oxygen generator is forbidden for transportation on board a passenger-carrying aircraft.

(2) A chemical oxygen generator is forbidden for transportation by both passenger-carrying and cargo-only aircraft after:

(i) The manufacturer's expiration date; or

(ii) The contents of the generator have been expended.

[72 FR 4455, Jan. 31, 2007, as amended at 72 FR 55097, Sept. 28, 2007; 74 FR 2259, Jan. 14, 2009]
