



**WORKING PAPER**

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

**Beijing, China, 25 October to 3 November 2006**

**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 2009/2010 Edition**

**2.4: Part 4 — Packing Instructions**

**OPEN CRYOGENIC RECEPTACLES FOR THE TRANSPORT OF  
LIQUID NITROGEN**

(Presented by K. Vermeersch)

**SUMMARY**

This paper proposes amendment to Packing Instruction 202 to allow for the use of glass receptacles for the transport of certain cryogenic liquids.

Action by the DGP-WG is in paragraph 2.

**1. INTRODUCTION**

1.1 A new concept of a container for the transport of liquid nitrogen was presented to the Belgian Packaging Institute (BVI-IBE) and the Belgian competent authorities for the different modes of transport. The concept was developed by the French company “Cryogena”. The new packaging called “Gyrotainer“ is a single-use cryogenic packaging that would offer an alternative to the traditional cryogenic tanks which oblige the user to organize the necessary logistics to return the packaging.

1.2 The “gyrotainer“ consists of a glass bulb with two walls separated by a vacuum of the “thermos” type with a capacity of 2.4 litres. The receptacle is not hermetically sealed and the stopper allows the gases to escape. The glass bulb is surrounded by two polystyrene half-shells. To avoid any risk of breakage during transport the container is suspended in the centre of a cubic case and fixed to a shock-absorbed “gyroscopic” system (see pictures in Appendix A).

1.3 Investigation of the different transport regulations has shown, however, that this type of packaging is not currently authorized for the transport of liquid nitrogen. (see Appendix B).

1.4 It is intended to restrict the quantity of liquid nitrogen that would be permitted in this type of packaging. In addition, the complete package is capable of withstanding the drop test (Part 6;4.3) from 1.2 m.

1.5 We believe that the use of glass receptacles for the transport of certain cryogenic liquids should be allowed under well-established conditions.

## 2. ACTION BY THE DGP-WG

2.1 The DGP-WG is invited to agree to the following amendment to Packing Instruction 202:

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### *Open cryogenic receptacles*

1. Open cryogenic receptacles must be metal **or glass** vacuum insulated vessels or flasks vented to the atmosphere to prevent any increase in pressure within the package— **and must be designed and constructed to permit the release of the gas.**
2. The use of safety relief valves, check valves, frangible discs or similar devices in the vent lines is not permitted.
3. Receptacles must be equipped with devices which prevent the release of liquid.
4. Fill and discharge openings must be protected against the entry of foreign materials which might increase the internal pressure.
5. The maximum water capacity **for metal receptacles** is 50 litres— **and for glass receptacles is 5 litres.**
6. The open **metal** receptacle must have a secure base and must be designed so that it will remain stable and will not topple under normal conditions of transport.
7. ~~Open cryogenic receptacles are permitted for nitrogen, argon, krypton and xenon refrigerated liquids.~~ **The glass vessel or flask must be double walled vacuum insulated, protected by shock absorbent material or structure and placed in a strong outer packaging. The package must be designed so that the upright position of the glass vessel or flask is guaranteed under normal conditions of transport.**

The design type of each packaging must be capable of successfully passing the drop test described in Part 6;4.3 except that the height of the drop must be not less than 1.20 m without breakage or leakage of the glass vessel or flask and without significant reduction in effectiveness.

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**APPENDIX A**  
**GYROTAINER**

[WP.47.App.A.pdf](#)



APPENDIX B

REGULATIONS OPEN CRYOGENIC RECEPTACLES FOR UN 1977  
(NITROGEN, REFRIGERATED LIQUID)

Regulations Open Cryogenic Receptacles for UN 1977 (Nitrogen, refrigerated liquid)			
	Receptacles	Max. Water Capacity	Special Conditions
UN	No provisions for open cryogenic receptacles		
IMDG	No provisions for open cryogenic receptacles		
ICAO (2007-2008): PI 202	metal, vacuum insulated vessels/flasks	50L	<ul style="list-style-type: none"> <li>* vented to the atmosphere</li> <li>* use of safety valves, frangible discs: forbidden</li> <li>* must be designed to remain stable during transport and may not topple</li> <li>* openings must be protected against entry of foreign material</li> </ul>
ADR (2005-2006): P 203 RID (2005-2006): P 203	<ul style="list-style-type: none"> <li>* metal synthetic and composite packagings</li> <li>* double-walled vacuum insulated glass receptacles, surrounded by absorbent/insulating material, protected by iron wire baskets and placed in metal cases (for details see also ADR 6.2.1.2)</li> </ul>		<ul style="list-style-type: none"> <li>* comply with general requirement of 4.6.1 of ADR</li> <li>* receptacles must be insulated to avoid coating with dew or hoar-frost</li> <li>* openings must allow escape of gas, preventing any splashing out of the liquid and so fixed they cannot fall out</li> </ul>

ADR: Special provision 593:

This gas intended for cooling of e.g. medical or biological specimens if contained in double wall receptacles which comply with the provisions of packing instruction P203 (12) of 4.1.4.1, is not subject to the requirement of ADR.