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**ECONOMIC COMMISSION FOR EUROPE**

**INLAND TRANSPORT COMMITTEE**

Working Party on the Transport  
of Dangerous Goods  
(Seventy-sixth session, Geneva,  
3-7 May 2004,  
agenda item 5 (b))

**PROPOSALS FOR AMENDMENTS TO ANNEXES A AND B OF ADR**

**Cylinders for use in hot air balloons and hot air airships**

**Transmitted by the Governments of the United Kingdom and Germany  
on behalf of the Working Group on Hot Air Balloon Cylinders**

**SUMMARY**

Executive Summary:	To amend ADR to permit specified types of lightweight pressure receptacles to be carried for the purposes of providing fuel for hot air balloons and hot air airships.
Action to be taken:	To add a new Special Provision to Chapter 3.3 and allocate it to UN 1011, 1965 and 1978 in column 6 of Table A of Chapter 3.2.
Related documents:	TRANS/WP.15/AC.1/2003/11; INFs 14, 51 and 60 (Sept/Oct 03 Joint Meeting); TRANS/WP.15/2004/15; INF.31 (WP.15-75); ADR Multilateral Agreement M90.

**1. Introduction and background**

At the September 2003 RID/ADR Joint Meeting, the United Kingdom presented document TRANS/WP.15/AC.1/2003/11 proposing new provisions for the carriage of lightweight pressure receptacles used in hot air ballooning. These pressure receptacles do not

meet the requirements of RID/ADR and are currently only permitted for carriage under Multilateral Agreement M90.

While recognizing the potential carriage problems, the Joint Meeting felt that the proposal needed further work. The delegate from Germany offered to host a Working Group meeting in Bonn during the second half of the Joint Meeting in October 2003. The report from the Working Group meeting is available in Joint Meeting paper INF 60. Members of the Working Group have continued to work on finalizing the proposal which is presented below.

Hot air balloons and hot air airships are fuelled not only by hydrocarbon gases, principally UN 1978 Propane but also UN 1011 Butane and UN 1965 Hydrocarbon Gas Mixture, liquefied, n.o.s. The fuel is transported, generally by road, to launch sites in the receptacles that will be used on the balloon and hot air ship in flight for propulsion. After flights, part-filled receptacles will be returned to the home base. The receptacles are rarely completely emptied. While they are removable for filling, balloon or airship fuel receptacles are never refilled on an exchange basis: each owner retains his own receptacles and has responsibility for ensuring their maintenance and periodic inspections.

## **2. Proposal**

To add a new Special Provision 6XX in Chapter 3.3 of ADR to be applied to UN No 1011, UN 1965 and UN 1978 in Column 6 of Table A of Chapter 3.2. The text of the Special Provision would be as follows:

6XX Welded austenitic stainless steel and titanium receptacles which do not meet the requirements of Chapter 6.2 of ADR but have been constructed and approved in accordance with national aviation provisions for use as hot air balloon or hot air ship fuel receptacles may be carried by road provided they comply with the following:

- (a) the general provisions of 6.2.1;
- (b) the design and construction of the receptacles shall have been approved for aviation use by a national authority;
- (c) in derogation from 6.2.1.1.1, the calculation pressure shall be derived from a reduced maximum ambient temperature of +40°C;
- (d) in derogation from 6.2.1.2, cylinders may be manufactured from rolled and annealed commercially pure titanium with the minimum requirements of  $R_m > 450 \text{ MPa}$ ,  $\epsilon_A > 20\%$  ( $\epsilon_A$  = elongation after fracture);
- (e) in derogation from 6.2.3, austenitic stainless steel cylinders may be used with a stress level up to 85% of the minimum guaranteed yield strength ( $R_e$ ) at a calculation pressure derived from a reduced maximum ambient temperature of +40°C;

- (f) the receptacles shall be equipped with a pressure relief device having a nominal set pressure of 26Bar, the test pressure of these receptacles shall be not less than 26 Bar;
- (g) receptacles designed according to the reference temperature of ADR (65 °C) may be equipped with relief devices with a set pressure as specified by the competent authority of the country of use;
- (h) the main body of the receptacles shall be carried in an outer, water resistant protective layer at least 25mm thick made from structural cellular foam or similar material;
- (i) the receptacles shall be marked with a clear, visible label stating that the receptacles are for use only in hot air balloons and hot air ships;
- (j) the cylinders shall have been put in to service (the date of initial inspection) before the 1 July 2004;
- (k) the duration of service (from the date of initial inspection) shall not exceed 25 years.

As an alternative to a new Special Provision, the Committee may wish to consider placing this text in a new sub-section in Section 1.1.4 Applicability of other regulations. e.g. "1.1.4.x Carriage of pressure receptacles approved for hot air balloon and hot air airship fuel".

### **3. Justification**

The receptacles concerned are engineered to exacting standards and are supplied as part of the aircraft (i.e. the balloon or the airship). They are tested and inspected to high standards in accordance with the requirements of local airworthiness authorities to a schedule prescribed by the manufacturer.

They are designed especially to be lighter than other receptacles. A consequence of this is that they cannot comply with the requirement in 6.2.3.1 that at test pressure the stress in the metal should not exceed 77% of the guaranteed minimum yield stress. As a result of this, they do not fully meet the requirements of RID/ADR.

There are currently some 2000-3000 active hot air balloons or hot air airships in Europe, and more than 9,500 lightweight receptacles in use. Hot air balloons and hot air ships are used for commercial purposes including passenger flights. International transport of receptacles in connection with these commercial purposes is frequent.

To permit the carriage of such receptacles by road, a number of ADR Contracting Parties have entered into a multilateral special agreement (M90), which expires on 1 July 2004.

A proposal with a similar purpose was presented to the twentieth meeting of UNSCOE but it was rejected primarily because experts considered that land transport of hot-air ballooning and of mentioned shipping receptacles was too narrow an issue to justify inclusion in multimodal model regulations. The United Kingdom therefore seeks the agreement of the meeting to the following amendment that will permit the carriage of these lightweight receptacles by road.

**4. Safety implications**

No safety implications. The cylinders are constructed and maintained to very high standards to ensure they remain safe for use to fuel hot air balloons and hot air airships, so they are considered to be no less safe for carriage by road. They have a good safety record during carriage by road under Multilateral Agreement M90 and its predecessor M74. With a view to the general safety philosophy of ADR regarding the design of safety pressure relief devices of pressure receptacles, the minimum test pressure for those pressure receptacles which are used for hot air balloons and hot air ships and designed with a reduced wall thickness must correspond with the opening pressure of the safety pressure relief devices (see 2 (f)). This requirement aims at the protection of the receptacle. Regarding the requirements of item (g), it is proposed to use the procedure as described in the packing instruction P 200 (1) of the Orange book.

**5. Feasibility**

The cylinders are already in use.

**6. Enforceability**

The construction and maintenance is regulated under national aviation controls.

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