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**COMMITTEE OF EXPERTS ON THE TRANSPORT
OF DANGEROUS GOODS**

**Sub-Committee of Experts on the
Transport of Dangerous Goods**
(Eighteenth session, 3-14 July 2000,
agenda item 3 (a))

TRANSPORT IN BULK IN PORTABLE TANKS AND FREIGHT CONTAINERS

Miscellaneous draft amendments to Chapters 4.2 and 6.6

Refrigerant gases

Section 4.2.4 Portable tank instructions

Transmitted by the expert from Italy

Introduction

In revising the Tables of RID/ADR concerning filling degrees and test pressures it was discovered that some values, referring to refrigerant gases, were incorrect.

A proposal for amending RID/ADR was then presented to the RID/ADR Joint Meeting (document TRANS/WP.15/AC.1/1999/32), stating also that, if agreed, the relevant proposals will be submitted to the UN Sub-Committee of Experts.

The proposal was adopted at the last Joint Meeting (13-24 March 2000).

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Proposal 1

In the portable tank instructions T50 point 4.2.4.2.6 change the maximum filling ratio for:

Refrigerant gas R 404 A from 0.82 Kg/l to 0.84 Kg/l
 Refrigerant gas R 407 A from 0.94 Kg/l to 0.95 Kg/l
 Refrigerant gas R 407 B from 0.93 Kg/l to 0.95 Kg/l

Justification

The values given in the portable tank instructions T50 are based on the UN Recommendations, Rev.10, originated by ST/SG/AC.10/C.3/R.774, dated 25 April 1996.

The data sheets attached to this document show the following values of density at 50 °C:

R 404 A 0.89 Kg/l
 R 407 A 1.00 Kg/l
 R 407 B 1.00 Kg/l

Therefore according to point 4.2.2.7.2 of general provision for the use of portable tank maximum filling degrees are:

R 404 A $0.95 \times 0.89 = 0.84$
 R 407 A $0.95 \times 1.00 = 0.95$
 R 407 B $0.95 \times 1.00 = 0.95$

Proposal 2

In the portable tank instructions T50 point 4.2.4.2.6 change the values of maximum allowable working pressure as follows:

| | | | |
|---------|-----------|---------------|-------------|
| R 404 A | Small | none | none |
| | Bare | from 28.2 bar | to 28.3 bar |
| | Sunshield | from 25.2 bar | to 25.3 bar |
| | Insulated | from 22.1 bar | to 22.5 bar |
| R 407 A | Small | from 32.3 bar | to 31.3 bar |
| | Bare | from 29.0 bar | to 28.1 bar |
| | Sunshield | from 25.7 bar | to 25.1 bar |
| | Insulated | none | none |
| R 407 B | Small | from 34.0 bar | to 33.0 bar |
| | Bare | from 30.5 bar | to 29.6 bar |
| | Sunshield | from 27.0 bar | to 26.5 bar |
| | Insulated | none | none |
| R 407 C | Small | from 30.2 bar | to 29.9 bar |

| | | | | |
|-----------|------|----------|----|----------|
| Bare | from | 27.0 bar | to | 26.8 bar |
| Sunshield | from | 24.1 bar | to | 23.9 bar |
| Insulated | from | 21.4 bar | to | 21.3 bar |

Justification

According to point 6.7.3.1 of requirements for the design, construction, inspection and testing of portable tanks intended for the transport of non-refrigerated liquefied gases, the maximum allowable working pressure is the absolute vapour pressure of non-refrigerated liquefied gas at the design reference temperature minus 1 bar.

The values of the absolute vapour pressures at 65 °C, 60 °C, 55 °C et 50 °C from the calculation program “NIST THERMODYNAMIC PROPERTIES OF REFRIGERANTS AND REFRIGERANT MIXTURES (Rev. 5.10)” are:

| | | | | |
|---------|-------|-----------|---------------|----------|
| R 404 A | 65 °C | 32.55 bar | rounded up to | 32.6 bar |
| | 60 °C | 29.29 bar | rounded up to | 29.3 bar |
| | 55 °C | 26.28 bar | rounded up to | 26.3 bar |
| | 50 °C | 23.50 bar | rounded up to | 23.5 bar |
| R 407 A | 65 °C | 32.29 bar | rounded up to | 32.3 bar |
| | 60 °C | 29.07 bar | rounded up to | 29.1 bar |
| | 55 °C | 26.08 bar | rounded up to | 26.1 bar |
| | 50 °C | 23.32 bar | rounded up to | 23.4 bar |
| R 407 B | 65 °C | 33.92 bar | rounded up to | 34.0 bar |
| | 60 °C | 30.55 bar | rounded up to | 30.6 bar |
| | 55 °C | 27.42 bar | rounded up to | 27.5 bar |
| | 50 °C | 24.53 bar | rounded up to | 24.6 bar |
| R 407 C | 65 °C | 30.82 bar | rounded up to | 30.9 bar |
| | 60 °C | 27.73 bar | rounded up to | 27.8 bar |
| | 55 °C | 24.86 bar | rounded up to | 24.9 bar |
| | 50 °C | 22.22 bar | rounded up to | 22.3 bar |

Therefore the values of the test pressure should be:

| | | |
|---------|-----------|----------|
| R 404 A | Small | 31.6 bar |
| | Bare | 28.3 bar |
| | Sunshield | 25.3 bar |
| | Insulated | 22.5 bar |
| R 407 A | Small | 31.3 bar |

| | | |
|---------|-----------|----------|
| | Bare | 28.1 bar |
| | Sunshield | 25.1 bar |
| | Insulated | 22.4 bar |
| R 407 B | Small | 33.0 bar |
| | Bare | 29.6 bar |
| | Sunshield | 26.5 bar |
| | Insulated | 23.6 bar |
| R 407 C | Small | 29.9 bar |
| | Bare | 26.8 bar |
| | Sunshield | 23.9 bar |
| | Insulated | 21.3 bar |
