

COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS AND ON THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS

Sub-Committee of Experts on the Transport of Dangerous Goods
(Twenty-second session, 2-6 December 2002, agenda item 4(a))

NEW PROPOSALS

Outstanding issues

MAWP, design pressure and test pressure of portable tanks **Belgian comments on document ST/SG/AC.10/C.3/2002/64**

The UIC/IUR is right in stating that the definition of design pressure in 6.7.2.1 needs improving :

"Design pressure means the pressure to be used in calculations required by a recognised pressure vessel code. The design pressure shall be not less than the highest of the following pressures :

- (a) The maximum effective gauge pressure allowed in the shell during filling or discharge ; or
- (b) The sum of :
 - (i) the absolute vapour pressure (in bar) of the substance at 65 °C (at highest temperature during filling, discharge or transport for elevated temperature substances transported above 65 °C), minus 1 bar ; and
 - (ii) the partial pressure (in bar) of air or other gases in the ullage space being determined by a maximum ullage temperature of 65 °C and a liquid expansion due to an increase in mean bulk temperature of $t_r - t_f$ (t_f = filling temperature usually 15 °C ; t_r = 50 °C maximum mean bulk temperature) ; and
 - (iii) a head pressure determined on the basis of the dynamic forces specified in 6.7.2.2.12, but not less than 0.35 bar ; or
- (c) Two thirds of the minimum test pressure specified in the applicable portable tank instruction in 4.2.5.2.6 ; "

This definition is written as though the pressures obtained in (a), (b) and (c) are independent of each other, which is not true of course :

- pressure (a) is the highest pressure which may be encountered during filling or discharge and pressure (b) is the highest pressure which may be encountered during transport. The highest of both values gives an adequate design pressure for the tank and if every tank would be designed and constructed individually, part (c) of the definition would not be necessary ;

- pressure (c) is the arbitrarily chosen design pressure for the mass-produced tanks constructed according to the portable tank instructions (in this system, only five design pressures are used). Through the dangerous goods list in chapter 3.1 a standardised tank type is allocated to a particular substance : this is done in such a way that the design pressure of this standardised tank type is at least equal to the highest pressure which may be encountered during transport [pressure (b) of the definition].

In order to improve the user-friendliness of the definition of design pressure, it has to indicate this link between part (b) and (c).

Proposal :

Change the definition of design pressure as follows :

"Design pressure means the pressure to be used in calculations required by a recognised pressure vessel code. The design pressure shall be not less than the highest of the following pressures :

- (a) the maximum effective gauge pressure allowed in the shell during filling or discharge ; or
- (b) two thirds of the minimum test pressure specified in the applicable portable tank instruction in 4.2.5.2.6.

NOTE : *This specified minimum test pressure is always equal to or higher than the maximum pressure in the tank during transport, which is the sum of :*

- (i) *the absolute vapour pressure (in bar) of the substance at 65 °C (at highest temperature during filling, discharge or transport for elevated temperature substances transported above 65 °C), minus 1 bar ; and*
- (ii) *the partial pressure (in bar) of air or other gases in the ullage space being determined by a maximum ullage temperature of 65 °C and a liquid expansion due to an increase in mean bulk temperature of $t_r - t_f$ (t_f = filling temperature usually 15°C ; t_r = 50 °C maximum mean bulk temperature) ; and*
- (iii) *a head pressure determined on the basis of the dynamic forces specified in 6.7.2.2.12, but not less than 0.35 bar."*
