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**COMMITTEE OF EXPERTS ON THE TRANSPORT  
OF DANGEROUS GOODS**
**Sub-Committee of Experts on the  
Transport of Dangerous Goods**  
(18th session, 3-12 July 2000, agenda item 2 (a))

**DEVELOPMENT OF PROVISIONS FOR THE TRANSPORT OF GASES**
**Comments on ST/SG/AC.10/C.3/34 Annex 1**
**Transmitted by the expert from Germany**
**1. Solvent-free acetylene**

The expert from Germany announced at the last meeting of the Working Group on gas receptacles and multiple element gas containers (MEGCs) in December 1999 to provide appropriate packing requirements for solvent-free acetylene in packing instruction P200 (see para 19).

The following entry should be added to the table of gases in P200:

UN No.	Name and description	Receptacles	Test Pressure x working pressure	MPa	Test period	Filling	Special Requirement.
33xx	ACETYLENE, SOLVENT FREE	(1),,,,(5)		6,0	5		c, i

The meaning of the Special Requirements is the following:

- c: Metal parts in contact with the contents shall not contain more than 70% copper (see ISO 11114-1)
- i: The maximum filling ratio shall be in accordance with the figures specified in the approval [of the monolithic porous mass].

The existing special packing provision PP23 should be amended:

**PP23** For UN 1001 and UN 33xx, cylinders shall be filled with a homogenous monolithic porous mass. For UN 1001, cylinders shall contain an adequate quantity of acetone or other equally suitable solvent.

**2. Dew point of corrosive gases**

At the same meeting the expert from Germany announced to make an proposal for the maximum acceptable water content of corrosive gases (see para 27).

The risk of corrosion, particularly in the case of wet corrosion, is associated with the presence of water in the receptacle. Therefore the limitation of the water content of corrosive gases can help to avoid the corrosive attack on the inner surface of the receptacle.

In the standard EN ISO 11114-1:1998 "Transportable gas cylinders - Compatibility of cylinder and valve materials with gas contents - Part 1: Metallic materials" are contained several definitions which are used for the description of the material compatibility; one of its is the definition for "dry":

"Dry" implies no free water in the cylinders under any service conditions including the highest and lowest working pressures.

To verify this condition the dew point temperature of the corrosive gases must be lower than the lowest temperatures which can occur during normal weather conditions in winter. In Germany, a country in the middle of Europe, we have good experience in limiting the water content of some corrosive gases to a dew point temperature of -10 °C, since only for few hours in some winter nights the ambient temperature is lower than -10 °C. But having in mind that the UN Recommendations will be used all over the world, in warmer and colder areas than Central Europe, it seems logical to use a lower dew point temperature of -20 °C. The same temperature is, as an example, used as the reference temperature for the impact strength of the material for welded pressure receptacles (para 6.2.1.1.4).

The following calculations show the water content of compressed or liquefied gases in relation to the settled pressure of the gas in the receptacle:

The concentration (v/v) of the water equals the ratio of the vapour pressure of water @ -20°C (in bar) to the settled pressure @ 15°C (in bar):

$$C_w = \frac{0.001253}{P_s}$$

settled pressure $P_s = 10$ bar:	$C_w = 125$ ppm
settled pressure $P_s = 20$ bar:	$C_w = 63$ ppm
settled pressure $P_s = 200$ bar :	$C_w = 6.3$ ppm
settled pressure $P_s = 300$ bar:	$C_w = 4.2$ ppm.

The variation of the water content in relation to the settled pressure of the different gases in the receptacles should be discussed in light of the proposal to extend the time interval for the periodic test/inspection of receptacles used for corrosive gases from 3 years to 5 years. It seems to be acceptable to use a longer time interval for the compressed gases with settled pressures of 200 bar and more, since the amount of water in these receptacles is very low, 10 ppm or lower.

But from the point of safety there are doubts, that an extension of the time interval for the periodic test/inspection of receptacles for liquefied corrosive gases from 3 years to 5 years is justified, since the amount of water in these receptacles is significantly higher, 50 ppm and more.

The discussion of this item - a decision is needed in conjunction with para 200(j) in packing instruction P200 - should include the evaluation of the use of residual pressure valves for receptacles for corrosive gases, to make sure that during the withdrawal of the gases by the customer no humidity or water will be introduced into the receptacle by improper handling. If by using such equipment it can be successfully avoided that additional humidity or water will be introduced into the receptacles an extension of the test period seems more acceptable.

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