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CONSEQUENTIAL AMENDMENTS FOR TANKS OF CLASS 2 IN 4.3.3 AND CLASSIFICATION OF TOXIC GASES IN 2.2.21.5

Transmitted by the European Industrial Gases Association (EIGA) */

SUMMARY

Executive summary:	Following the adoption of the P200 Packing Instruction based on the UN Model Regulations, consequential amendments are required to the use instructions for tanks of Class 2 in 4.4.3 of ADR. Also, the classification of toxic gas mixtures in 2.2.2.1.5 can be calculated using data in P200.
Action to be taken:	Amend Chapter 4.4.3 and 2.2.2.1.5 as indicated below
Relevant documents:	ST/SG/AC.10/27/Add.1

Introduction

The changes made below reflect the changes in definition of compressed gases, high pressure liquefied gases and low pressure liquefied gases. Also, since the LC_{50} values of toxic gases are included in P200, it is no longer necessary to refer to the standard ISO 10289: 1995 in 2.2.21.5.

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Proposal

Amend 4.3.3 as follows.

4.3.3 Special provisions applicable to Class 2

4.3.3.2 *Filling conditions and test pressures*

4.3.3.2.1 The test pressure for tanks intended for the carriage of compressed gases ~~having a critical temperature below -50 °C~~ shall be at least one and one half times the ~~filling~~ working pressure ~~at 15 °C~~ as defined in 1.2.1 for receptacles.

4.3.3.2.2. The test pressure for tanks intended for the carriage of high pressure:

~~- compressed gases having a critical temperature of 50° C or above~~;

- liquefied gases ~~having a critical temperature below 70 ° C~~; and

- gases dissolved under pressure

shall be such that, when the shell is filled to the maximum mass of the contents per litre of capacity, the pressure reached in the shell by the substance at 55° C for tanks with thermal insulation or 65° C for shells without thermal insulation does not exceed the test pressure.

4.3.3.2.3 The test pressure for tanks intended for the carriage of low pressure liquefied gases ~~having a critical temperature of 70° C or above~~ will be:

(a) If the tank is equipped with thermal insulation, at least equal to the vapour pressure, reduced by 0.1 MPa (1 bar) of the liquid at 60 ° C, but not less than 1 MPa (10 bar);

(b) If the tank is not equipped with thermal insulation, at least equal to the vapour pressure, reduced by 0.1 MPa (1 bar), of the liquid at 65 °C, but not less than 1 MPa (10 bar).

The maximum permissible mass of contents per litre of capacity is calculated as follows:

Maximum permissible mass of contents per litre of capacity = 0.95 x density of the liquid phase at 50 °C (in kg/l)

Moreover the vapour phase shall not disappear below 60 °C.

If the shells are not more than 1.5 m in diameter, the values of the test pressure and maximum permissible mass of contents per litre of capacity conforming to packing instruction P200 in 4.1.4.1 shall be applicable.

4.3.3.2.4 The test pressure for tanks intended for the carriage of refrigerated liquefied gases shall be not less than 1.3 times the maximum allowable working pressure as defined in 6.7 and indicated on the tank but not less than 300 kPa (3 bar) (gauge pressure); for tanks with vacuum insulation the test pressure shall be not less than 1.3 times the maximum allowable working pressure increased by 100 kPa (1 bar).

4.3.3.2.5 *Table of gases and gas mixtures which may be carried in fixed tanks (tank-vehicles), battery-vehicles, demountable tanks, tank-containers and MEGCs indicating the minimum test pressure for tanks and as far as applicable the filling ratio,* In the case of gases and gas mixtures classified under n.o.s. entries, the values of the test pressure and the filling ratio shall be prescribed by the expert approved by the competent authority.

When shells for compressed or high pressure liquefied gases ~~having a critical temperature of -50 °C or above and below 70 °C~~ have been subjected to a test pressure lower than shown in the table, and the tanks are fitted with thermal insulation, a lower maximum load may be prescribed by the expert approved by the competent authority, provided that the pressure reached in the tank by the substance at 55 °C does not exceed the test pressure stamped on the tank.

UN No.	Name	Classification code	Minimum test pressure for tanks				Filling ratio
			With thermal insulation		Without thermal insulation		
			MPa	bar	MPa	bar	
1008	Boron trifluoride, ~~compressed~~	1 2 TC	22.5 30	225 300	22.5 30	225 300	0.715 0.86
1859	Silicon tetrafluoride, ~~compressed~~	12 TC	20 30	200 300	20 30	200 300	0.74 1.10
1962	Ethylene, ~~compressed~~	12 F	12 22.5	120 225	22.5 30	225 300	0.25 0.36 0.34 0.37
1982	Tetrafluoromethane , ~~compressed~~ (Refrigerant gas R14, ~~compressed~~)	12 A	20 30	200 300	20 30	200 300	0.62 0.94
2036	Xenon, ~~compressed~~	12 A	12	120	13	130	1.30 1.24
2193	Hexafluoroethane, ~~compressed~~ (Refrigerant gas R116 ~~compressed~~)	12 A	16 20	160 200	20	200	1.28 1.34 1.10
2203	Silane, ~~compressed~~ [b]	12 F	22.5 25	225 250	22.5 25	225 250	0.32 0.41
2417	Carbonyl fluoride, ~~compressed~~	12 TC	20 30	200 300	20 30	200 300	0.47 0.70
2451	Nitrogen trifluoride, ~~compressed~~	12 O	20 30	200 300	20 30	200 300	0.50 0.75
3374	Acetylene, solvent free	2 F	only in battery-vehicles and MEGCs composed of receptacles				

Amend the appropriate paragraphs of 2.2.21.5 as follows:

Toxic gases

NOTE: *Gases meeting the criteria for toxicity in part or completely owing to their corrosivity are to be classified as toxic. See also the criteria under the heading "Corrosive gases" for a possible subsidiary corrosivity risk.*

Gases which:

(a) are known to be so toxic or corrosive to humans as to pose a hazard to health; or

(b) are presumed to be toxic or corrosive to humans because they have a LC_{50} value for acute toxicity equal to or less than 5 000 ml/m³ (ppm) when tested in accordance with 2.2.61.1.

In the case of gas mixtures (including vapours of substances from other classes) the following formula may be used:

$$LC_{50}\ \text{Toxic (mixture)} = \frac{1}{\sum_{i=1}^{n} \frac{f_i}{T_i}}$$

where f_i = mole fraction of the i^{th} component substance of the mixture;

T_i = toxicity index of the i^{th} component substance of the mixture. The T_i equals the LC_{50} value as found in ~~ISO 10298:1995~~ 4.1.4.1 P200.
When no LC_{50} value is listed in ~~ISO 10298:1995~~ P200, a LC_{50} value available in scientific literature shall be used.
When the LC_{50} value is unknown, the toxicity index is determined by using the lowest LC_{50} value of substances of similar physiological and chemical effects, or through testing if this is the only practical possibility.

Corrosive gases

Gases or gas mixtures meeting the criteria for toxicity completely owing to their corrosivity are to be classified as toxic with a subsidiary corrosivity risk.

A gas mixture that is considered to be toxic due to the combined effects of corrosivity and toxicity has a subsidiary risk of corrosivity when the mixture is known by human experience to be destructive to the skin, eyes or mucous membranes or when the LC_{50} value of the corrosive components of the mixture is equal to or less than 5 000 ml/m^3 (ppm) when the LC_{50} is calculated by the formula:

$$LC_{50}\ \text{Corrosive (mixture)} = \frac{1}{\sum_{i=1}^{n} \frac{fc_i}{Tc_i}}$$

where fc_i = mole fraction of the i^{th} corrosive component substance of the mixture;

Tc_i = toxicity index of the i^{th} corrosive component substance of the mixture.

The Tci equals the LC50 value as found in ~~ISO 10298:1995~~ 4.1.4.1 P200.

When no LC_{50} value is listed in ~~ISO 10298:1995~~ P200, a LC_{50} value available in scientific literature shall be used. When the LC_{50} value is unknown the toxicity index is determined by using the lowest LC_{50} value of substances of similar physiological and chemical effects, or through testing if this is the only practical possibility.

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