

Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals

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Item 5 (b) of the provisional agenda

Transport of gases: miscellaneous

Triggering of pressure relief devices taking the operating temperature into account

Transmitted by the expert from Germany

Introduction

1. The current version of the Model Regulations does not contain any regulation as to the conditions under which pressure relief devices of pressure receptacles should be triggered or must not yet be triggered.
2. The pressure within a pressure receptacle mainly depends on the ambient temperature. Insulation might further increase the effect of temperature.
3. When determining the test pressure of pressure receptacles for liquefied gases (e.g. UN 1013 carbon dioxide), a maximum operating temperature of +65 °C and a temperature of +15 °C during filling were used as a basis. Thus, the test pressure of 250 bar is reached at a filling ratio FR=0.76 at +65 °C, cf. UN 1013 in Table 2 of packing provision P200.
4. In zones with a warmer climate, a temperature of +65 °C can indeed be reached under normal conditions of transport. Against this backdrop, a key role will be played by future climate change developments. A leakage of gas must be ruled out under normal operating conditions. This is a crucial requirement, also with regard to the occupational safety of the operator.
5. It is suggested that “normal operating conditions” be defined with regard to temperature and a provision be adopted stating that pressure relief devices must not be triggered under “normal conditions of transport”.
6. It must also be ruled out that the pressure relief device is triggered too late because this would lead to an unacceptable stress (plastic deformation) on the pressure receptacle. In this context, an interior pressure in the pressure receptacle of up to 1.15 times the test pressure is considered an acceptable stress.

Proposal 1

7. Insertion of a new definition in 1.2.1:

“Operating temperature of pressure receptacles means the minimum temperature range between -20 °C and +65 °C, within which a safe operation of pressure receptacles must be guaranteed.”

Proposal 2

8. It is suggested that the following addendum be included in 6.2.1.3.4 with the aim of ruling out both a premature and a delayed triggering of pressure relief devices. At the same time, an editorial amendment is suggested to clarify the requirements to be met to prevent the leakage of gas.

“Individual pressure receptacles shall or may be equipped with pressure relief devices as specified in packing instruction P200 (1) or P205 of 4.1.4.1 or in 6.2.1.3.6.4 and 6.2.1.3.6.5. The pressure relief devices used shall be designed to prevent the entry of foreign matter, the leakage of gas under normal operating conditions and the development of any dangerous excess pressure.

The pressure relief devices shall meet the following requirements:

Taking into account all tolerances, the pressure relief devices shall neither be triggered below the pressure developing within the pressure receptacle at the highest operating temperature nor above a pressure that equals 1.15 times the test pressure of the pressure receptacle. The reference temperature for the triggering of frangible discs shall be +65 °C.

Note: Pressure relief devices not complying with the requirements specified in 6.2.1.3.4 (a) may continue to be used for pressure receptacles manufactured before 1 July 2021.

In bundles of cylinders for flammable gases with pressure relief devices whose elements are assembled horizontally and interconnected by a manifold, the pressure relief devices shall be arranged to discharge freely to the open air in such a manner as to prevent any impingement of escaping gas upon the pressure receptacle itself under normal conditions of transport.”