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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-third session, 30 juin-4 juillet 2003)

PROVISIONS FOR THE TRANSPORT OF GASES

Miscellaneous proposals to amend the Packing Instruction P 200

Transmitted by the European Industrial Gases Association (EIGA)

Introduction

Following experience with the use of the P200 in the modal regulations, a few problems and inconsistencies have come to light. These proposals seek to rectify these issues and also suggest modifications to some provisions which EIGA considers will improve safety.

The proposals are divided into 3 groups:

1. Corrections to the text in order to reflect the original intentions of the Working Group;
2. Proposed changes to make the provision more practicable but without changing the safety level;
3. Changes which improve the safety level and make the provision more practicable

New text is shown underlined.

Proposals

1 Corrections to the text of the P 200 special packing provisions to reflect the intentions of the Gases Working Group

1.1 Proposed correction to one paragraph of special packing provision k

k:	~~Pressure receptacles~~ Cylinders and individual cylinders in a bundle shall ~~(i)~~ have a test pressure greater than or equal to 200 bar and a minimum wall thickness of 3.5 mm for aluminium alloy or 2 mm for steel. ~~or (ii) have~~ Individual cylinders not complying with this requirement shall be transported in an outer packaging meeting the PG I performance level.

Justification

The Working Group intended that this requirement should apply only to gas cylinders and gas cylinders in a bundle. It did not take into account that some highly toxic substances, such as UN 1067 Dinitrogen tetroxide, UN 1076 Phosgene and UN 1975 Nitric oxide and dinitrogen tetroxide mixture, are permitted in pressure drums. Neither a 200 bar test pressure nor a PG1 overpack is practicable for pressure drums. The text has also been worded to remove the impractical and undesirable option of a PG1 overpack for bundles.

1.2 Proposed correction to special packing provision n

n:	~~Pressure receptacles~~ Cylinders and assemblies of individual cylinders in a bundle shall contain not more than 5 kg of the gas.

Justification

The existing wording has had the unintended effect of limiting the contents of a bundle containing UN 1045 Fluorine, compressed and UN 2190 Oxygen difluoride, compressed to 5 kg of the gas. The Working Group clearly did not intend this restriction since, due to the requirements of 'k', cylinders in a bundle are equipped with valves that are shut during transport. This text also introduces the concept of an assembly of cylinders in a bundle which is explained in more detail in paragraph 3.1.

1.3 Proposed correction to special packing provision z

z:	The construction materials of the pressure receptacles and their accessories shall be compatible with the contents and shall not react to form harmful or dangerous compounds therewith. The test pressure and filling ratio shall be calculated in accordance with the relevant requirements of (3). Unless otherwise specified in the tables of this packing instruction, toxic substances with an LC_{50} less than or equal to 200 ml/m^3 shall not be transported in tubes, pressure drums or MEGCs and shall meet the requirements of special packing provision 'k'. For pressure receptacles containing pyrophoric gases or flammable mixtures of gases containing more than 1% pyrophoric compounds, the requirements of special packing provision q shall be met. ***The necessary steps shall be taken to prevent dangerous reactions (i.e. polymerisation or decomposition) during transport. If necessary, stabilisation or addition of an inhibitor shall be required.*** Mixtures containing diborane, UN 1911, shall be filled to a pressure such that, if complete decomposition of the diborane occurs, two thirds of the test pressure of the pressure receptacle shall not be exceeded.

Justification

UN 1975 Nitric oxide and dinitrogen tetroxide (Nitric oxide and nitrogen dioxide mixture) is permitted for transport in pressure drums in Table 2 of P200, but being a mixture, it is subject to special packing provision z which as currently worded prohibits such transport. This change removes this contradiction.

2 Proposed change to make the provision more practicable but without changing the safety level

d: When steel pressure receptacles are used, only those ~~bearing the 'H' mark~~ resistant to hydrogen embrittlement shall be authorized.

Justification

The 'H' mark is only relevant to those high strength steels which can be susceptible to hydrogen embrittlement. The mark is applied to chrome molybdenum steels, for example, to distinguish those that have sufficient resistance to embrittlement. Carbon manganese steels and austenitic stainless steels are not susceptible to hydrogen embrittlement so the 'H' mark is not applied to them. As the provision is written in the 12th and 13th Revisions, many receptacles which can safely carry embrittling gases are prohibited from such use. An alternative approach would be to create a derogation for a list those steels which are not susceptible to hydrogen embrittlement, but this would be more complicated and difficult provide a definitive list. The approach adopted also avoids unnecessary stampmarking. The proposed wording has been successfully used in the ADR for many years.

3 Proposed changes which improve the safety level and make the provision more practicable

3.1 Changes to special packing provision k

k: Cylinders and individual cylinders in a bundle shall have a test pressure greater than or equal to 200 bar and a minimum wall thickness of 3.5 mm for aluminium alloy or 2 mm for steel. Individual cylinders not complying with this requirement shall be transported in an outer packaging meeting the PG I performance level. *(text as proposed in 1.1 above)*

Cylinders shall be limited to a maximum water capacity of 85 litres and each assembly of individual cylinders in a bundle shall be limited to a maximum water capacity of 150 litres.

Each cylinder or each assembly of cylinders within a bundle shall be fitted with an individual valve that shall be closed during transport. After filling, the manifold shall be evacuated, purged and plugged.

~~Each valve shall have a taper threaded connection directly to the pressure receptacle and~~ Valves and other items of equipment which are directly connected to cylinders, individual cylinders in a bundle and pressure drums shall be taper threaded and shall be capable of withstanding the test pressure of the pressure receptacle.

Valve outlets shall be fitted with gas tight plugs or caps

Each valve shall either be of the packless type with non-perforated diaphragm, or be of a type which prevents leakage through or past the packing.

Each pressure receptacle shall be tested for leakage after filling.

Justification

The opportunity has been taken to rearrange the text into a logical order so that all provisions relating to the receptacle appear first, followed by valve requirements and finally the post-filling leak check.

The purpose of these wording changes is to allow the limited manifolding together of cylinders within a bundle. Each valve presents a potential leak path and a source of unreliability in the substance containment. It is proposed that safety would be enhanced if the total number of valves were reduced. This risk reduction must be balanced against the increased volume of highly toxic substance that could be released in the event of a containment failure. Manifolding together of three 50 litre cylinders has been used in the past and this aggregate volume of 150 litre seems a reasonable compromise.

3.2 Changes to special packing provision q

q:	~~The valves~~ Valve outlets of pressure receptacles for pyrophoric gases or flammable mixtures of gases containing more than 1% of pyrophoric compounds shall be fitted with gas-tight plugs or caps. ~~When these pressure receptacles are manifolded in a bundle, each of the pressure receptacles shall be fitted with an individual valve that shall be closed during transport, and the manifold outlet valve shall be fitted with a gas-tight plug or cap.~~

Insert special packing provision ‘q’ to UN 2192 Germane in the relevant column of P200 Table 2.

Justification

The logic of this change is essentially the same as that for proposal 3.1. Each valve presents a potential leak path and a source of unreliability in the substance containment. It is proposed that safety would be enhanced if the total number of valves were reduced. Germane and silane are not highly toxic, so neither the requirement for special packless valves (or their equivalents) nor the prohibition on pressure relief devices applies. Therefore, with the multiplicity of valves required on bundles the leakage risk is significant, especially when pressure relief devices are employed. EIGA proposes that removing them will enhance the overall safety of pyrophoric gases transported in bundles.

Special packing provision ‘q’ is applied only to UN 2203 Silane in the 12th and 13th Revisions of the Model Regulations. It is proposed that it should also be applied to the pyrophoric gas UN 2192 Germane. UN 2188 Arsine is also pyrophoric but is covered by special packing provision ‘k’, so it is not necessary to apply ‘q’. If ‘q’ did appear in the relevant column, however, it would alert the user to the fact that this gas is pyrophoric as well as highly toxic.
