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EXPLOSIVES AND RELATED MATTERS

Special Packing Provisions for goods of Class 1

Transmitted by the Expert from the United Kingdom

Introduction

1. This information paper has been prepared in response to the proposal by the expert from Australia circulated as ST/SG/AC.10/C.3/2008/26. The expert from the United Kingdom agrees with the Australian expert that the current text in 4.1.5.5 is unenforceable and that some revision is required. However he does not agree with the expert from Australia's proposed amendment to the text as the United Kingdom believes that the proposal would have significant and far reaching (unexpected) consequences and does not reflect the original intention of paragraph 4.1.5.5.

Background to UN paragraph 4.1.5.5

2. In order to understand the intentions of paragraph 4.1.5.5 of the UN Model Regulations it is necessary to go back to earlier editions of the Recommendations. The text from the 1977 edition at paragraph 9.8 provides a lot more clarity of the intention at that time. It read "*Because of the special nature of explosives, the varying degree of hazard they present according to the manner in which they are packed, and the desirability of bringing about more uniformity in packing them, detailed recommendations are included on the way in which individual explosive substances and articles, or groups thereof, should be packed (see chapter 10). Unless specific provision to the contrary is made in the individual recommendations, the packagings used for goods of class 1 should comply with the requirements for the medium danger (Group II) category mentioned in paragraph 9.7 above.*"

3. When the UN re-ordered the Recommendations the complete text was moved to paragraph 9.1.4 where it remained unaltered until 1997. There was in addition a further paragraph providing some useful background. 4.1.9 (1995 edition) *“Group II packagings are generally specified for goods of class 1 (see 9.1.4). The type of packaging frequently has a decisive effect on the hazard and therefore on the assignment of a particular division in this class. Consequently, a particular explosive substance or article may appear in several places in the list.”* This disappeared from the 11th edition onwards.

4. In the reordered 10th edition of UN (1997) the text moves to 4.1.3.5 and is simplified to *“Packagings shall conform to the requirements of Chapter 6.1 and shall meet the test requirements of 6.1.5 for Packing Group II, subject to 4.1.1.13 and 6.1.2.4”*. Neither of these paragraphs are relevant to this proposal. The 11th edition (1999) adds *“To avoid unnecessary confinement, metal packagings of Packaging Group I shall not be used”* to paragraph 4.1.5.5. However from the 9th Edition onwards there has also been a paragraph (4.8.2.15 (4.1.5.16 in the 15th)) *“Explosive substances should not be packed in inner or outer packagings where the differences in internal and external pressures, due to thermal or other effects, could cause an explosion or rupture of the package”*.

Analysis of the text

5. The analysis of the previous text reveals that the primary reason for requiring the packing group II test level was to provide a minimum acceptable standard for explosives packaging. The current text on over confinement is relatively new and was only adopted after the reasoning behind the original text had been removed from the Model Regulations. The absence of any mention in the earlier text to confinement can be explained by the fact that it was, and still is, dealt with elsewhere in the Model Regulations.

6. Confinement of explosives and the effects of packaging are particularly dealt within the classification tests for class 1. The following should be considered:

- a) In order to classify an explosive substance or article it is necessary to conduct a series of tests with the explosive in situ with the packaging (Test Series 4 and 6). The same substances or articles can be given different hazards depending on the packaging used and the internal arrangements. This could for example, allow detonators in a PG1 steel container to achieve a 1.4S classification whereas the same detonators in a PG1 fibreboard box may give a 1.4B or even a 1.1B classification. On the other hand, it would not make any difference if a mass explosive, (eg. PETN UN 0150 & 0411) is placed in a fibreboard or metal box because both mass explode in test 6(a) and (b). (See Manual of Tests and Criteria paragraphs 16.4.1.3.4 and 16.5.1.3)
- b) If confinement was the issue in the current 4.1.5.5 then why was the text limited to metal packagings when other types of packaging could be equally as confining?

Comments on the Australian proposal

1. The Classification testing and allocation of divisions and compatibility groups already deals with confinement as it does for fire hazards, fiery projection and metallic projections
2. With some explosives there is a need to hold the explosives within the container but allow the explosive effects (eg. flames or jets of flame from marine pyrotechnics) to escape. This may require a robust container such as a PG1 steel package with suitably sized holes that will withstand the effects of a fire from within, and/or without, the container but prevent fiery projections that may hinder fire fighting. The definition of a box allows holes for the purpose of classification.
3. A new concept is introduced into the Model Regulations, namely the guaranteed failure of a package against PG1 criteria. In this instance a metal package would be required to pass a 1.2 metre drop test and fail above that height and before 1.8m is reached.
4. Since only simple pass detail is available at 1.2m for most PGII approved explosive packages it is not known how many of these packages would be capable of passing at 1.8m as PGI. All would need to be tested at 1.8m, with those that passed being unsuitable for use.
5. Some existing UK approvals for metal boxes cover many different explosives articles and substances and it is quite likely that the failure heights could split above and below 1.8m, this would lead to similar problems of interpretation.
6. High density (above 1.8 kg/m³) liquid explosives would need to pass a drop test in excess of 1.8m. The only way to demonstrate that they were not suitable for packing group I would be to fail the pressure tests. This could possibly be arranged by reducing the closure torques. Fillers though would be liable to over torque closures and thereby increase confinement.
7. How would a box that has passed at packing group II test levels but failed before packing group I be marked to show that it was suitable? Without an additional mark users would not readily be able to tell from the Y mark if it was an X failure.
8. There would be a significant economic and environmental impact as existing metal packages were replaced with inferior shorter-lived alternatives.

Finally the UK are unaware of any incidents involving metal packaged explosives where the confinement capabilities of the packaging was a factor in the accident.

Proposal

The expert from the United Kingdom believes that the references in the current paragraph 4.1.5.5 to 4.1.1.13, 6.1.2.4 and 6.5.1.4.4. are not relevant either to packing group II tests or the issue of confinement. 4.1.1.13 is a general packing requirement and applies along with all the other

general packing requirements, 6.1.2.4 and 6.5.1.4.4 are packaging type mark suffixes. It is suggested that these are removed for clarity.

The UK proposes to reword 4.1.5.5 to read as follows:

Unless specific provisions to the contrary are made in these recommendations, to ensure a minimum standard for packagings, large packagings or IBCs for Class 1, they shall conform to and meet the test requirements of Chapter 6.1, 6.5 or 6.6, respectively for packing group II.
