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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****Forty-third session**

Geneva, 24–28 June 2013

Item 2 (f) of the provisional agenda

**Explosives and related matters: miscellaneous****Discussion on relief for low hazard explosive articles****Transmitted by the Dangerous Goods Advisory Council (DGAC)<sup>1</sup>****Introduction and background**

1. There are certain articles containing small amounts of explosives having a minimal practical explosive or pyrotechnic effect which in DGAC's opinion warrant relief from some or all the requirements for explosives. This paper follows previous DGAC informal documents (informal documents INF.8, 9 and 17) submitted to the forty-first session and takes into account Explosives Working Group comments. DGAC offers this paper as a basis for discussion with the objective of clarifying how such articles might be excluded from Class 1 or alternatively be subjected to lesser requirements such as requirements for limited quantities of dangerous goods.

2. At the forty-first session several low hazard items were identified in DGAC informal submissions referred to the Sub-Committee's Working Group on Explosives. For example,

- Novelty fireworks known as snaps (throwdowns) and party poppers are currently treated as 1.4G explosives (under "low hazard or novelty fireworks" in Table 2.1.3.5.5). These articles make a popping noise when thrown on a walkway. In the case of those used in the United States, it would be difficult to explain what transport risk these pose to warrant treatment as dangerous goods even when transported in full freight container volumes. Under an authorization by the US

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<sup>1</sup> In accordance with the programme of work of the Sub-Committee for 2013-2014 approved by the Committee at its sixth session (refer to ST/SG/AC.10/C.3/84, para. 86 and ST/SG/AC.10/40, para. 14).

competent authority, these may be transported as non-dangerous, except in air transport where they are regulated as Division 4.1 flammable solids.

- Flares used, for example, in the case of highway emergencies (also referred to as fusees) that when tested to the burning rate test for classification as a Division 4.1 do not qualify for this classification based on burn time. The US competent authority presently allows these fusees to be transported as Division 4.1 articles but they are treated as 1.4G explosives under the Model Regulations.

3. In each case, the US competent authority classifications would seem to more accurately reflect the actual transportation risk of these items. Yet, while these classifications provide relief in the case of domestic transport, the difference between the international and domestic classifications introduces complications when international transport is involved.

4. The seemingly unjustified explosive classification for these example items is problematic in that these items are frequently sold in retail locations (party supply stores in the case of snaps and auto supply stores in the case of fusees). For these items and certain other low hazard items, where use is unrelated to the normal use of explosives, Class 1 classification frustrates business operations due to local fire codes and general inapplicability of dangerous goods training in the case of distribution personnel (e.g., drivers making deliveries to bridal shops in the case of sparklers).

5. While the Working Group on Explosives expressed some appreciation for the problems posed, they noted in their report (informal document INF.67) that:

”The problem is related to the definition of explosives, which allows little room for exclusion of articles or substances that are designed to function by an explosive or pyrotechnic effect. If this issue is to be resolved, the definition would have to be amended.”

6. In addition, in relation to fusees described in informal document INF.17, the working group report highlighted the potential for regional differences to also play a role in frustrating uniformity. The working group noted that:

“In Europe these articles are covered by a directive that considers them pyrotechnical articles. This would pose a significant problem for acceptance of the proposal in Europe.”

7. In this document, DGAC seeks to explore potential solutions for resolving issues surrounding these low hazard materials through discussions on various relevant provisions and possible options.

#### **Current provision for exclusion from Class 1**

8. Any article which contains an explosive substance or substance having a practical pyrotechnic effect is accepted for classification as an explosive. Box 36 of Table 10.3 of the Manual of Tests and Criteria offers the only possibility for exclusion for low hazard articles with a practical effect. This text references subparagraph 2.1.1.1(b) of the definition of an explosive which states:

“(b) Explosive articles, except devices containing explosive substances in such quantity or of such character that their inadvertent or accidental ignition or initiation during a transport shall not cause any effect external to the device either by projection, fire, smoke, heat or loud noise (see 2.1.3.6);”

9. Paragraph 16.6.1.4.7 of the Manual sets out the conditions under which an article may be excluded from class 1 if, as demonstrated by testing, they pose no hazardous effects. The criteria are different depending on whether the article is intended to have a

practical explosive/pyrotechnic effect or not. As such, it may be that, for two articles posing an identical low hazard risk, one may be treated as non-dangerous (i.e., the one with no practical pyrotechnic/explosive effect) while the other may still be regarded as dangerous. For articles with a practical explosive or pyrotechnic effect, paragraph 16.6.1.4.7(a) (ii) allows these to be excluded from class 1 provided there is “no effect (projection, fire, smoke, heat or loud noise) external to the device.”

10. In the seventeenth revised edition, a new paragraph 2.1.3.6.4 was introduced (for convenience, the new text is provided in Annex I). It describes the conditions under which a “device” may be excluded. While the documents leading up to agreement of the new text suggest the intention is to cover devices activated by a small explosive (e.g., cable cutters, money bags and seat belts), this is not clear from the adopted text. In fact, literal reading suggests that articles such as the snaps described above, which meet all the criteria in 2.1.3.6.4, are also eligible for exemption.

11. Questions:

Q1. May the criteria introduced in 2.1.3.6.4 also be used to exclude articles with a practical explosive or pyrotechnic effect? The text is not limited to articles without a practical effect. Without the background documents, it would appear that the text could be used.

Q2. Is it necessary for the Regulations to make a distinction between articles with and without a practical effect?

Q3. If no in the case of Q1, what criteria do apply for purposes of excluding articles with a practical effect in accordance with paragraph 16.6.1.4.7(a) (ii) which permits exclusion on the basis of test results and “no effect (projection, fire, smoke, heat or loud noise) external to the device”? For purposes of discussion DGAC has provided a draft text in Annex II that builds on the new 2.1.3.6.4.

Q4. The term pyrotechnic effect is undefined in the Model Regulations. A dictionary definition of a pyrotechnic is:

“A material capable of undergoing self-contained and self-sustained exothermic chemical reactions for the production of heat, light, gas, smoke and/or sound.”

Matches are often identified as pyrotechnic articles in such definitions. But under the Model Regulations these are regulated in Division 4.1 where limited quantity relief is possible. Could criteria be developed so that certain other articles with a pyrotechnic effect (e.g., fusees, novelty fireworks such as sparklers) could be excluded on the basis of burning time?

#### **Limited quantities of explosives**

12. The seventeenth edition of the Model Regulations introduced the possibility of low hazard explosive articles being relieved of some requirements through provisions for limited quantities of dangerous goods in Chapter 3.4. While some criteria for permitting explosives to qualify for relief as limited quantities were proposed to the explosives working group at the thirty-seventh session (see informal document INF.73, para 4 submitted at the 37<sup>th</sup> session), there is no evidence suggesting criteria were ultimately adopted. Relief by way of application of limited quantity provisions might also offer a means of solving some of the practical distribution problems that are being encountered in the case of some articles.

13. Question:

Q. What criteria should be used to evaluate whether an explosive article may be transported under the limited quantity exceptions?

Q. Do the criteria proposed by SAAMI as noted in UN/SCETDG/37/INF.73 provide a consensus opinion on what explosives should be eligible for limited quantity provisions? SAAMI's proposed criteria were as follows:

“The items must not propagate independent of packaging.

No entries on high consequence list were selected.

No generic entries or n.o.s. entries were selected.

The item must present no hazardous effects outside the package in the event of accidental initiation (as determined by use of the 6(d) test).”

**Recommendation**

14. DGAC offers this paper as a basis for discussion by the Working Group on Explosives at the forty-third session of the Sub-Committee.

## Annex I

Paragraph 2.1.3.6.4 as introduced in the seventeenth edition:

2.1.3.6.4 An article may be excluded from Class 1 when three unpackaged articles, each individually activated by its own means of initiation or ignition or external means to function in the designed mode, meet the following test criteria:

- (a) No external surface shall have a temperature of more than 65° C. A momentary spike in temperature up to 200 °C is acceptable;
- (b) No rupture or fragmentation of the external casing or movement of the article or detached parts thereof of more than one metre in any direction;

*NOTE:* Where the integrity of the article may be affected in the event of an external fire these criteria shall be examined by a fire test, such as described in ISO 12097-3.

- (c) No audible report exceeding 135 dB(C) peak at a distance of one metre;
- (d) No flash or flame capable of igniting a material such as a sheet of  $80 \pm 10$  g/m<sup>2</sup> paper in contact with the article; and
- (e) No production of smoke, fumes or dust in such quantities that the visibility in a one cubic metre chamber equipped with appropriately sized blow out panels is reduced more than 50% as measured by a calibrated light (lux) meter or radiometer located one metre from a constant light source located at the midpoint on opposite walls.

The general guidance on Optical Density Testing in ISO 5659-1 and the general guidance on the Photometric System described in Section 7.5 in ISO 5659-2 may be used or similar optical density measurement methods designed to accomplish the same purpose may also be employed. A suitable hood cover surrounding the back and sides of the light meter shall be used to minimize effects of scattered or leaking light not emitted directly from the source.

*NOTE 1:* If during the tests addressing criteria (a), (b), (c) and (d) no or very little smoke is observed the test described in (e) may be waived.

*NOTE 2:* The competent authority may require testing in packaged form if it is determined that, as packaged for transport, the article may pose a greater risk."

## Annex II

Draft text for possible relief for articles with a practical explosive or pyrotechnic effect:

Add a new 2.1.3.6.5 as follows:

2.1.3.6.5 An article manufactured with a view to producing a practical explosive or pyrotechnic effect and when packaged and tested in accordance with the Test Series 6 Type 6(c) test, is considered as having no effect external to the device in accordance with 16.6.1.4.7(a)(ii) if:

1. The article activated by a means other than an external ignition:
  - (a) Does not result in a rupture or fragmentation of the external casing or movement of the article or detached parts thereof of more than one metre in any direction;
  - (b) Does not produce an audible report exceeding 135 dB(C) peak at a distance of one metre;
  - (c) Does not produce smoke in a quantity described in 2.1.3.6.4(e)
  - (d) Does not produce a surface temperature of more than 65C except that a momentary spike in temperature up to 200C is acceptable; and
  - (e) Does not produce a flash or flame capable of igniting a material such as a sheet of 80 + 10 g/m<sup>2</sup> paper in contact with the article. or
2. In the case of an article with a pyrotechnic effect initiated by ignition:
  - (a) Has a burning rate less than [45 s] when tested in accordance with the test requirements used for classification of a flammable solid of Division 4.1 (Test N.1 in the Manual of Test and Criteria); and
  - (b) When activated by an external source the conditions in 1.1, 1.2 and 1.3 above.

Articles excluded from class 1 on the basis of 2 above shall be reclassified as having a hazard of Division 4.1 packing group III.

Articles excluded from class 1 on the basis of this provision should also be considered for classification in another class or division.