

# UN/SCETDG/25/INF.97

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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-fifth session  
Geneva, 5-14 July 2004  
Item 13 of the provisional agenda

### Report of the Working Group on Explosives

1. The Working Group on Explosives met from 5 to 8 July 2004, under the chairmanship of Mr. A. Johansen (Norway), with the mandate to discuss the default list on fireworks, and to discuss the papers regarding ANE's.

2. Representatives from governmental organisations and industry from Australia, Belgium, Canada, Germany, France, India, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States of America participated.

#### **Fireworks**

##### Background document:

ST/SG/AC.10/C.3/48/Add.1

ST/SG/AC.10/C.3/2004/35 (Australia)

3. The Australian document contained three proposals. The first proposal to change the name of the table was adopted with amendments. The majority of the experts felt that it was important to include the word 'default' in the name, which will now be: "Default fireworks classification table". The second proposal to include a mass limit for packages in paragraph 2.1.3.5.6 of the proposed new text was not adopted. There was some support for a mass limit but this should be greater than the proposed 15 kg. However, several experts questioned the necessity of such a mass limit, where the apparent explosive density in the packaging is really the determining factor. The third proposal to amend the column heading of Calibre / mass to specification and to add a note 3 to clarify what was meant by the various dimensions in the table was adopted in general with some changes proposed by the experts from the UK and Sweden.

ST/SG/AC.10/C.3/2004/43 (Japan)

4. The proposal contained in the Japanese document was adopted with amendments. Instead of the diameter of the spherical report unit the mass of flash composition, 25 gram, was taken as the determining factor. A new entry on smaller shell of shells with propellant charge was accepted.

ST/SG/AC.10/C.3/2004/45 (United Kingdom)

UN/SCETDG/25/INF.67 (United Kingdom)

5. The two documents submitted by the United Kingdom were dealt with together. The expert from the UK started by showing a video with an external fire test on a container with 125 mm star shells to show a typical 1.3 reaction.

Test results of a 6(c) test with Roman candle batteries were presented by showing another video. All experts agreed on the cut-off levels proposed in the UK documents and agreed to introduce the 25% level for flash composition.

It was also agreed to have a 1.3G entry for shot tubes.

6. The proposal to introduce an explosive mass level for shells on the 1.1 / 1.3 borderline was not adopted.

7. In order to avoid confusion or deliberate circumvention of the 200 mm limit for shells, the limit was now set at 180 mm. The 200 mm originates from the calibre of the mortar from which they are to be shot: 8 inch (203.2 mm). The other diameters referred to in the table (50 mm, 120 mm and 300 mm) were not altered.

8. There was unanimous support for the proposal to include ‘peanut shells’ in the default list, since this type of shell (two or more spherical shells stacked in a common wrapper) is a common professional display firework.

9. The proposal to raise the maximum amount for each whistle for wheels and aerial wheels, together with a restriction on the total mass of whistles per wheel was accepted.

10. The expert from the UK showed a video of a 6(c) with rockets without stick and following the discussions he proposed to delete the entries on rockets without stick.

11. The proposal to simplify the entries for mines, by merging the two existing entries was unanimously accepted.

UN/SCETDG/25/INF.19 (Spain)

12. The expert from Spain presented test results on flash bangers. Items containing 2.8 g flash composition resulted in a mass explosion and should be classified as 1.1G.

The test results on items containing 2 g gave no mass explosion in the 6(a) and 6(b) test and some projections beyond 15 metre in the 6(c) test. The expert from Spain therefore proposed to classify bangers with up to 2 g flash composition as 1.3G.

Items with 1 g flash composition clearly demonstrated a 1.4G behaviour in the Series 6 tests.

The Spanish proposals were accepted with an amendment on the maximum mass per inner packaging.

UN/SCETDG/25/INF.53 (Netherlands)

13. The expert from the Netherlands presented test results obtained from joint German – Netherlands tests aimed at finding justification for the maximum percentage of flash powder (as loose powder or report units) of 25% in shells, rockets and mines. Two tests were performed on bag mines containing just over 25% of report units with a different degree of confinement. In both tests, no mass explosion was found. It was concluded that the level of 25% can be used as the upper limit for 1.3G classification for shells, rockets and mines and the square brackets were removed.

UN/SCETDG/25/INF.69/Rev.1 (Germany)

14. The proposal to change the name “combinations / batteries” to “batteries / combinations” was accepted.

15. The majority of the experts felt that test results (including a 4(b) test) were required to justify a raise to 2.5 mg silver fulminate for throwdowns and snaps. Several countries had a good safety record with the current level of 1.6 mg and a raise with over 50% needed a good justification.

16. The proposals concerning sparklers were adopted in a modified form. The test results presented by Germany with sparklers containing pyrotechnic composition based on nitrates were confirmed by several other experts. It was questioned whether the results would also apply to sparklers containing perchlorate oxidisers (usually coloured sparklers). It was therefore decided to introduce separate levels for those sparklers.

17. The proposal for bangers containing black powder as a report charge was accepted.

#### **Other issues**

18. The Working Group decided on the outstanding issue of rockets by addressing the determining factor for projection hazard: the mass of the rocket motor. A maximum of 10 g for a rocket motor was agreed together with tight limits on the amount of flash powder for a 1.4G default classification. All the square brackets in the rocket entry could then be deleted. The UK expert said he would be carrying out tests on rocket motors > 10 g to accurately define the limit for 1.3 / 1.4 boundary. The results would be presented at the December meeting of the Sub-Committee.

19. The remaining square brackets around the entries for Bengal sticks and firecrackers were removed after some modifications to the text.

20. The UK expert has found that some fireworks contain black powder with aluminium powder. He will be performing tests to compare the properties of these mixtures with the compositions mentioned in note 2. The results would be presented at the December meeting of the Sub-Committee.

21. Finally, the Working Group went through the introductory text and made some editorial amendments in the reference to the default fireworks classification table. The chairman concluded the work on the fireworks table by summarising that all the square brackets had now been dealt with and have been removed, that there was agreement on the table and by thanking all the experts for their contribution.

**Proposal:**

Insert new text as 2.1.3.5 as follows and renumber 2.1.3.5 to 2.1.3.6.

**"2.1.3.5            *Assignment of fireworks to hazard divisions***

2.1.3.5.1            Fireworks shall normally be assigned to hazard divisions 1.1, 1.2, 1.3, and 1.4 on the basis of test data derived from Test Series 6. However, since the range of such articles is very extensive and the availability of test facilities may be limited, assignment to hazard divisions may also be made in accordance with the procedure in 2.1.3.5.2.

2.1.3.5.2            Assignment of fireworks to UN Nos. 0333, 0334, 0335 or 0336 may be made on the basis of analogy, without the need for Test Series 6 testing, in accordance with the default fireworks classification table in 2.1.3.5.7. Such assignment shall be made with the agreement of the competent authority. Items not specified in the table shall be classified on the basis of test data derived from Test Series 6.

2.1.3.5.3            Where fireworks of more than one hazard division are packed in the same package they shall be classified on the basis of the highest hazard division unless test data derived from Test Series 6 indicate otherwise.

2.1.3.5.4            The addition of other types of fireworks to column 1 of the table in 2.1.3.5.7 shall only be made on the basis of full test data submitted to the UN Sub-Committee on the Transport of Dangerous Goods for consideration.

2.1.3.5.5            Test data derived by competent authorities which validates, or contradicts the assignment of Hazard Division to firework types and/or sub-divisions by the specification in column 4 of the table in 2.1.3.5.7 to hazard divisions in column 5 shall be submitted to the UN Sub-Committee on the Transport of Dangerous Goods for information (see also note 3 in 2.1.3.2.3).

2.1.3.5.6            The classification shown in the table in 2.1.3.5.7 applies only for articles packed in fibreboard boxes (4G).".

2.1.3.5.7 Default fireworks classification table

**NOTE 1:** References to percentages in the table, unless otherwise stated, are to the mass of all pyrotechnic composition (e.g. rocket motors, lifting charge, bursting charge and effect charge).

**NOTE 2:** "Flash composition" in this table refers to pyrotechnic compositions containing an oxidizing substance and a metal powder fuel that are used to produce an aural report effect or used as a bursting charge in fireworks devices.

**NOTE 3:** Dimensions in mm refers to:

- for spherical and peanut shells the diameter of the sphere of the shell,
- for cylinder shells the length of the shell,
- for a shell in mortar, Roman candle, shot tube firework or mine the inside diameter of the tube comprising or containing the firework,
- for a bag mine or cylinder mine, the inside diameter of the mortar intended to contain the mine.

Type	Includes / Synonym	Definition	Specification	Classification
shell, spherical or cylindrical	spherical display shell: aerial shell, colour shell, dye shell, multi-break shell, multi-effect shell, nautical shell, parachute shell, smoke shell, star shell; report shell: maroon, salute, sound shell, thunderclap, aerial shell kit	device with or without propellant charge, with delay fuse and bursting charge, pyrotechnic unit(s) or loose pyrotechnic composition and designed to be projected from a mortar	all report shells	1.1G
			colour shell: $\geq 180$ mm	1.1G
			colour shell: $< 180$ mm with $> 25\%$ flash composition, as loose powder and/ or report effects	1.1G
			colour shell: $< 180$ mm with $\leq 25\%$ flash composition, as loose powder and/ or report effects	1.3G
			colour shell: $\leq 50$ mm, or $\leq 60$ g pyrotechnic composition, with $\leq 2\%$ flash composition as loose powder and/ or report effects	1.4G
peanut shell	device with two or more spherical aerial shells in a common wrapper propelled by the same propellant charge with separate external delay fuses	the most hazardous spherical aerial shell determines the classification		
preloaded mortar, shell in mortar	assembly comprising a spherical or cylindrical shell inside a mortar from which the shell is designed to be projected	all report shells	1.1G	
		colour shell: $\geq 180$ mm	1.1G	
		colour shell: $> 50$ mm and $< 180$ mm	1.2G	

Type	Includes / Synonym	Definition	Specification	Classification
			colour shell: ≤ 50 mm, or < 60 g pyrotechnic composition, with ≤ 25% flash composition as loose powder and/ or report effects	1.3G
	shell of shells (spherical) (Reference to percentages for shell of shells are to the gross mass of the fireworks article)	device without propellant charge, with delay fuse and bursting charge, containing report shells and inert materials and designed to be projected from a mortar	> 120 mm	1.1G
		device without propellant charge, with delay fuse and bursting charge, containing ≤ 25 g flash composition per report unit, with ≤ 33% flash composition and ≥ 60% inert materials and designed to be projected from a mortar	≤ 120 mm	1.3G
		device without propellant charge, with delay fuse and bursting charge, containing colour shells and/or pyrotechnic units and designed to be projected from a mortar	> 300 mm	1.1G
		device without propellant charge, with delay fuse and bursting charge, containing colour shells ≤ 70 mm and/or pyrotechnic units, with ≤ 25% flash composition and ≤ 60% pyrotechnic composition and designed to be projected from a mortar	> 200 mm and ≤ 300 mm	1.3G
		device with propellant charge, with delay fuse and bursting charge, containing colour shells ≤ 70 mm and/or pyrotechnic units, with ≤ 25% flash composition and ≤ 60% pyrotechnic composition and designed to be projected from a mortar	≤ 200 mm	1.3G

Type	Includes / Synonym	Definition	Specification	Classification
battery / combination	barrage, bombardos, cakes, finale box, flowerbed, hybrid, multiple tubes, shell cakes, banger batteries, flash banger batteries	assembly including several elements either containing the same type or several types each corresponding to one of the types of fireworks listed in this table, with one or two points of ignition	the most hazardous firework type determines the classification	
Roman candle	exhibition candle, candle, bombettes	tube containing a series of pyrotechnic units consisting of alternate pyrotechnic composition, propellant charge and transmitting fuse	≥ 50 mm inner diameter, containing flash composition, or < 50 mm with > 25% flash composition	1.1G
			≥ 50 mm inner diameter, containing no flash composition	1.2G
			< 50 mm inner diameter and ≤ 25% flash composition	1.3G
			≤ 30 mm. inner diameter, each pyrotechnic unit ≤ 25 g and ≤ 5% flash composition	1.4G
shot tube	single shot Roman candle, small preloaded mortar	tube containing a pyrotechnic unit consisting of pyrotechnic composition, propellant charge with or without transmitting fuse	≤ 30 mm inner diameter and pyrotechnic unit > 25 g, or > 5% and ≤ 25% flash composition	1.3G
			≤ 30 mm inner diameter, pyrotechnic unit ≤ 25 g and ≤ 5% flash composition	1.4G
rocket	avalanche rocket, signal rocket, whistling rocket, bottle rocket, sky rocket, missile type rocket, table rocket	tube containing pyrotechnic composition and/or pyrotechnic units, equipped with stick(s) or other means for stabilization of flight, and designed to be propelled into the air	flash composition effects only	1.1G
			flash composition > 25% of the pyrotechnic composition	1.1G
			rocket motor > 10 g, total flash composition ≤ 25%	1.3G
			rocket motor ≤ 10 g; black powder bursting charge and ≤ 0.13 g flash composition per report and ≤ 1 g in total	1.4G

Type	Includes / Synonym	Definition	Specification	Classification
mine	pot-a-feu, ground mine, bag mine, cylinder mine	tube containing propellant charge and pyrotechnic units and designed to be placed on the ground or to be fixed in the ground. The principal effect is ejection of all the pyrotechnic units in a single burst producing a widely dispersed visual and/or aural effect in the air; or: cloth or paper bag or cloth or paper cylinder containing propellant charge and pyrotechnic units, designed to be placed in a mortar and to function as a mine	> 25% flash composition, as loose powder and/ or report effects	1.1G
			≥ 180 mm and ≤ 25% flash composition, as loose powder and/ or report effects	1.1G
			< 180 mm and ≤ 25% flash composition, as loose powder and/ or report effects	1.3G
			≤ 150 g pyrotechnic composition, containing ≤ 5% flash composition as loose powder and/ or report effects. Each pyrotechnic unit ≤ 25 g, each report effect < 2g; each whistle, if any, ≤ 3 g	1.4G
fountain	volcanos, gerbs, showers, lances, Bengal fire, flitter sparkle, cylindrical fountains, cone fountains, illuminating torch	non-metallic case containing pressed or consolidated spark and flame producing pyrotechnic composition	≥ 1 kg pyrotechnic composition	1.3G
			< 1 kg pyrotechnic composition	1.4G
sparkler	handheld sparklers, non-handheld sparklers, wire sparklers	rigid wire partially coated (along one end) with slow burning pyrotechnic composition with or without an ignition tip	perchlorate based sparklers: > 5 g per item or > 10 items per pack	1.3G
			perchlorate based sparklers: ≤ 5 g per item and ≤ 10 items per pack; nitrate based sparklers: ≤ 30 g per item	1.4G
Bengal stick	dipped stick	non-metallic stick partially coated (along one end) with slow-burning pyrotechnic composition and designed to be held in the hand	perchlorate based items: > 5 g per item or > 10 items per pack	1.3 G
			perchlorate based items: ≤ 5 g per item and ≤ 10 items per pack; nitrate based items: ≤ 30 g per item	1.4G



Type	Includes / Synonym	Definition	Specification	Classification
low hazard fireworks and novelties	table bombs, throwdowns, crackling granules, smokes, fog, snakes, glow worm, serpents, snaps, party poppers	device designed to produce very limited visible and/ or audible effect which contains small amounts of pyrotechnic and/ or explosive composition.	throwdowns and snaps may contain up to 1.6 mg of silver fulminate; snaps and party poppers may contain up to 16 mg of potassium chlorate/ red phosphorous mixture; other articles may contain up to 5 g of pyrotechnic composition, but no flash composition	1.4G
spinner	aerial spinner, helicopter, chaser, ground spinner	non-metallic tube or tubes containing gas- or spark-producing pyrotechnic composition, with or without noise producing composition, with or without aerofoils attached	pyrotechnic composition per item > 20 g, containing ≤ 3% flash composition as report effects, or whistle composition ≤ 5 g	1.3G
			pyrotechnic composition per item ≤ 20 g, containing ≤ 3% flash composition as report effects, or whistle composition ≤ 5 g	1.4G
wheel	Catherine wheel, Saxon	assembly including drivers containing pyrotechnic composition and provided with a means of attaching it to a support so that it can rotate	≥ 1 kg total pyrotechnic composition, no report effect, each whistle (if any) ≤ 25 g and ≤ 50 g whistle composition per wheel	1.3G
			< 1 kg total pyrotechnic composition, no report effect, each whistle (if any) ≤ 5 g and ≤ 10 g whistle composition per wheel	1.4G

Type	Includes / Synonym	Definition	Specification	Classification
aerial wheel	flying Saxon, UFO, rising crown	tubes containing propellant charges and sparks- flame- and/ or noise producing pyrotechnic compositions, the tubes being fixed to a supporting ring	> 200 g total pyrotechnic composition or > 60 g pyrotechnic composition per driver, ≤ 3% flash composition as report effects, each whistle (if any) ≤ 25 g and ≤ 50 g whistle composition per wheel	1.3G
			≤ 200 g total pyrotechnic composition and ≤ 60 g pyrotechnic composition per driver, ≤ 3% flash composition as report effects, each whistle (if any) ≤ 5 g and ≤ 10 g whistle composition per wheel	1.4G
selection pack	display selection box, display selection pack, garden selection box, indoor selection box; assortment	a pack of more than one type each corresponding to one of the types of fireworks listed in this table	The most hazardous firework type determines the classification	
firecracker	celebration cracker, celebration roll, string cracker	assembly of tubes (paper or cardboard) linked by a pyrotechnic fuse, each tube intended to produce an aural effect	each tube ≤ 140 mg of flash composition. or ≤ 1 g black powder	1.4G
banger	salute, flash banger, lady cracker	non-metallic tube containing report composition intended to produce an aural effect	> 2 g flash composition per item	1.1G
			≤ 2 g flash composition per item and ≤ 10 g per inner packaging	1.3G
			≤ 1 g flash composition per item and ≤ 10 g per inner packaging or ≤ 10 g black powder per item	1.4G