

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

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EXPLOSIVES AND RELATED MATTERS

Classification table, default list for fireworks

1.3G Classification of rockets with up to 25 % flash composition according to the default list

Transmitted by the expert from Germany

Proposal

The expert from Germany suggests changing the classification criteria for rockets with up to 25 % flash composition.

Update Version (ADR / RID)

The present classification guideline for rockets is presented in the following table.

Type	Includes: / synonym:	Definition	Specification	Classification
Rocket	Bottle rocket, missile type rocket, sky rocket, whistling 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
			> 20 g pyrotechnic composition and flash composition ≤ 25 %	1.3G
			≤ 20 g pyrotechnic composition, black powder bursting charge and ≤ 0.13 g flash composition per report and ≤ 1 g in total.	1.4G

Though, the given definition > 20 g pyrotechnic composition and flash composition ≤ 25 %, 1.3G, is not applicable to all rockets.

Reason

Experts of the Federal Institute for Materials Research and Testing (BAM, Germany) carried out UN 6a and 6c tests with rockets, which resulted in mass explosions (1.1).

The rockets contained 16.6 % flash composition. According to the default list, the investigated rockets had to be classified as 1.3G. Nevertheless, the results showed without doubts mass explosive behaviour, leading to a deviant classification of 1.1.

Therefore, we suggest to limit the flash composition of rockets to 10 %.

Details of the performed UN 6a and 6c tests are illustrated in the annex.

Remark

The flash composition limits for 1.1 classifications (> 25 %) have to be changed for other articles as well, like shells, shot tubes, and roman candles.

Moreover, it is a fact that the reaction rate of fireworks also depends on construction characteristics.

For that matter two kinds of rockets were tested. The rockets contained the same chemical composition (flash composition > 25 %), but had different construction features.

As a result of these tests, one kind of the investigated rockets was classified as 1.1, the other one was classified as 1.3 (in spite of an equal chemical composition).

Annex

Report UN 6a and 6c tests

Test object: Rockets "Don Juan"

Classification as delivered: 1.3G

Quantity of the rockets: 3 packaging with 48 rockets per packaging

Tests: UN 6a and 6c tests, according to UN-Recommendations on the Transport of Dangerous Goods-Tests and Criteria (fourth revised edition ST/SG/AC.10/11/Rev.4)

Chemical composition:

Rocket	Don Juan	
	Manufacturer	Analysis BAM
Ignite fuse ca. 5g :		
Pottasium nitrate [%]	No specification	No contained
Potassium perchlorate [%]	No specification	51.4 ± 2.5
Sulfur [%]	No specification	11.5 ± 1.0
Bursting charge ca. 25g:		
Potassium perchlorate [%]	50	50.9 ± 2.5
Sulfur [%]	20	9.0 ± 1.0
Magnesium / Aluminium [%]	No specification	rest
Effect powder (Stars) ca.120 g:		
Potassium perchlorate [%]	14	11.8 ± 1.0
Potassium nitrate [%]	2.3	18.2 ± 2.0
Barium nitrate [%]	36.7	17.9 ± 1.0
Sulfur [%]	9.3	10.3 ± 1.0
Insoluble substances: (with spelts)	-	36.7 %
Magnesium / Aluminium / Calcium [%]	-	rest

Net total: 150g

Flash composition: 16.6 %

Results

UN 6a:

- mass explosive
- strong bang with smoke
- crater about . 3 m Ø and 2 m deep
- steel plate slightly baggy
- all rockets have reacted

Result:
UN 6a test (Don Juan, 296)
Diameter: approx. 3 m
Depth: approx. 2 m



Picture 1: UN 6a test

UN 6c:

- mass explosive
- strong bang with smoke
- aluminium plates toppled over
- impacts and buckles on the aluminium plates



Picture 2: UN 6c test

Heat radiation UN 6c test 4.5 kW/m²
