United Nations ST/SG/AC.10/C.3/2014/59

Secretariat

Distr.: General
7 April 2014

Original: English

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-fifth session
Geneva, 23 June – 2 July 2014
Item 2 (a) of the provisional agenda
Explosives and relates matters: tests and criteria for flash compositions

Classification of fireworks

Transmitted by the expert from the Netherlands[1]

Introduction

1. In the year 2000, a large explosion in a fireworks storage facility in Enschede in the Netherlands occurred. It became obvious that a lot of fireworks was not correctly classified and after extensive discussions the default table for the classification of fireworks was developed and introduced in the Model Regulations in 2005.

2. The question whether or not the classification on the basis of the small scale tests in the test series 6 is predictive for the behaviour of large quantities remained unanswered after the Enschede investigations. This question ultimately became the subject of an intensive research program. From 2003 until 2005 the research program CHAF, an acronym of "Quantification and Control of the Hazards Associated with the transport and storage of Fireworks" was carried out. It was a funded project and the work was done by a consortium of the United Kingdom Health and Safety Laboratory (HSL), the German federal Institute for Materials and Research (BAM) and the Netherlands Organisation for Applied Scientific Research (TNO).

3. The conclusion of the CHAF research program was that the classification on the basis of test series 6 is predictive for the large scale behaviour. However, there was one exception and that concerns the behaviour of waterfalls.

[1] 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).

Waterfalls

4. Waterfalls are within the fireworks type of fountains. In the series 6 tests, the outcome was a 1.3G classification. Also in the default table, the result is a 1.3G classification. However, the experiment of the full container load with the same waterfalls articles clearly gives a mass explosion. In this particularly case the small scale series 6 tests gives a 1.3G classification and the large scale tests (full container load) ended in a mass explosion (1.1G classification).

5. A follow up study was set up by the Netherlands with the goal to explain and understand the behaviour of waterfalls on a large scale and to establish the consequences in terms of the transport regulations. Reference is made to informal document INF.5 (TDG, 45th session) submitted by the Netherlands with an excerpt of the report of the study.

6. The study demonstrated that the waterfalls tested are very sensitive for deflagration to detonation transition (DDT), not only at the large scale of a full container load but also on the small scale of a few articles. Based on this and other observations described in INF.5, it was concluded that the behavior of waterfalls was not a scale effect.

7. The pyrotechnic substance in the waterfalls is clearly positive when tested both in the HSL flash composition test and in the newly proposed USA flash composition test. However, fountains are not within the scope of the definition of flash composition (note 2 of 2.1.3.5.5) and it is therefore proposed to amend the definition in order to include fountains. This is done in order to prevent the situation that a product which is tested and labelled as 1.3G indicating a fire propagation hazard, can under slightly different circumstances give a mass explosion. It is proposed to stay on the safe side and therefore classify fountains containing flash composition as 1.1G regardless of the result of the test series 6.

Proposal

8. On this basis it is proposed to amend:

   (a) The definition of flash composition in note 2 of 2.1.3.5.5. to include fountains;

   (b) The default table to make clear that the classification should be 1.1G in case of a flash composition. Furthermore it is proposed to add waterfalls in the column of “Includes, synonyms” to make clear that waterfalls are within the fireworks type of fountains; and

   (c) 2.3.5.1 to make clear that if the charge of the fountain is a flash composition, the classification should be 1.1G in any case.

9. Amendments are indicated in bold italics.

   (a) in NOTE 2, insert the words “in fountains” to read: “… that are used **in fountains or** to produce an aural effect etc…:”

   (b) Consequential amendment: In Appendix 7 of the Manual of Tests and Criteria, paragraph 1, second line, amend to read: “… that are used **in fountains or** to produce an aural effect etc…:”

   (c) In the default table in the row of “fountains”, in the column “Includes / Synomyn” insert: “, waterfall” after “illuminating torch”

(d) In the default table in the row of "fountains", insert an extra row in the column for "Specification" prescribing: "***Pyrotechnic substance is flash composition***" and in the column "Classification": "***1.1G***"

(e) Under the heading of "2.1.3.5 Assignment of fireworks to hazard divisions"

Amend 2.1.3.5.1 to read:

"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:

(a) Fountains containing flash composition as defined in note 2 of 2.1.3.5.5 shall be classified as 1.1G

(b) Since the range of such articles… (present text)."