UN/SCETDG/20/INF.9

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
(Twentieth session, 3-12 December 2001, agenda item 8 (a))

EXPLOSIVES, SELF-REACTIVE SUBSTANCES AND ORGANIC PEROXIDES

Report of the UN working group on the classification of fireworks, 16-18 October 2001 (The Hague, Netherlands)

Transmitted by the expert from the Netherlands

1. The Working Group was attended by experts from Belgium, Canada, China, Finland, France, Germany, Japan, the Netherlands, Norway, Poland, Sweden and the United Kingdom and the observer of Switzerland. The non-governmental organizations CTIF (International Technical Committee for the Prevention and Extinction of Fire) and ICCA (International Council of Chemical Associations) were also represented.

2. The Director of the Transport Safety Division of the Dutch Ministry of Transport Mr. J. Stuitje opened the meeting and welcomed the participants in the Netherlands. Although he understood and respected the decision of the expert from the United States of America due to the circumstances not to attend this meeting he regretted very much their absence. He recalled the severe accident in the Netherlands in May 2000 and the enormous political impact of this accident in his country. An important issue, which is of particular interest for transport, is the incorrect classification of fireworks. Tests after the accident of Enschede show that a lot of fireworks should be classified and offered for transport as being much more dangerous as indicated in the transport documentation and the label(s). In Enschede only lower hazard fireworks were allowed for storage, however due to the incorrect classification much more hazardous fireworks were stored. The enforcement of the correct classification is important and has been strengthened. In the regulations of RID/ADR an authorisation of the classification of fireworks will be introduced per 1-1-2003. Apart from the enforcement he stressed the more fundamental approach of improving the functioning of the classification system on a worldwide basis. He stressed the work of the UN Subcommittee in this field and expressed the hope that this working group will come with solutions to overcome the problems.

3. Mr. Huurdeman of the Netherlands was the Chairman of the working group. The report will be prepared by the Netherlands and will be, after consultation of the participants of the working group, submitted to the Sub-Committee of Experts on the Transport of Dangerous Goods.

4. The working group regretted with Mr. Stuitje the absence of the United States of America.

5. Documentation: Working papers were prepared as input for the discussion during this meeting as follows: working papers nr. 1 (the Chairman), 2 to 4 (Netherlands), nr. 5 (France), nr. 6 (United States), nr. 7 (United kingdom) and nr. 8 (Germany) and a paper nr. 9 (China) to be distributed at the beginning of the meeting.

6. The Chairman recalled the mandate of the Working Group as has been mentioned in paragraph 89 of the report of the UN Sub-Committee of July (ST/SG/AC.10/C.3/38):

(a) Basic agreement on the interpretation of the test results of series 6 (a), 6 (b) and 6 (c);
(b) Development of a classification system by default based on existing systems and proposals on how such a system could be introduced into the Recommendations.

7. The proposal of the Chairman to use his working paper nr. 1 (handling about main questions) as guideline to the discussion was adopted.

Mandate (a)

Basis agreement on the interpretation of the test results of series 6 (a), 6 (b) and 6 (c)

8. The Netherlands introduced their working paper nr. 2 and stated that the test series 6 (a), 6 (b) and 6 (c) give an adequate assignment to the classification codes 1.1 to 1.4. Specific aspects like behaviour under confinement are under investigation but are not subject to discussion in this working group. Some question were raised on the interpretation of mass explosion and the decisive criteria of the fiery projection over a distance of more than 15 meter for assignment to division 1.3.
The Working Group was of the opinion that the test series 6 (a), (b) and (c) are suitable for classification (but they have to be applied too!) and that the description in the UN Test Manual is basically correct.
Further exchange of experiences between competent authorities on the interpretation of test results is however recommended.

Mandate (b)

Development of a classification system by default based on existing systems and proposals on how such a system could be introduced into the Recommendations

Existing systems

9. Following working paper nr. 1 of the Chairman a discussion took place on the existing regulations. It was observed that many regulations are primarily dealing with aspects concerning consumer safety and the quality of the fireworks. Although it is acknowledged that this is an important aspect it is not within the scope of the working group to discuss this matter. Probably standardisation bodies like CEN or ISO could do something. The working group agreed to restrict the discussion on the transport classification of fireworks, that is to say the assignment to divisions 1.1G to 1.4S.

Classification according to the UN Manual of Tests and Criteria

10. The proposal of the Chairman in working paper 1 to develop a classification system by default based on the test series 6 of the UN Test Manual was adopted by the Working Group.

Default classification

11. Several countries stressed the importance of a default classification system (based on tests of the UN Test Manual), because of difficulties with transport classification in practice (lack of testing in practice and lack of background information on the classification of the imported fireworks). Several countries stressed the importance of UN transport classification (based on packed fireworks) for purpose of storage as well.
A default list should not be a static list, but be adapted as a consequence of new data.

12. The expert from the United Kingdom explained the UK default list, mentioned in working paper nr. 7. The list is based on firework descriptions (according to use) from a British Standard (and a future European Standard) and on data from test series 6 or data from other competent authorities. He gave a visual presentation of test series 6 (a) and 6 (b) results for flash rockets and report shells. These tests demonstrated that not all rockets containing report composition should be classified as division 1.1. The tests on report shells down to 50 mm diameter gave mass explosion results and the default classification should be division 1.1. By Spring 2002 the UK will have results for large rockets, mines and small star shells, including some mixed star shell packs.

13. The expert from France explained a default system, mentioned in working paper nr. 5, based on UN tests for packed goods. It is used by main companies and as a guideline by smaller ones before formal classification. The French list takes account of density of the explosive material and explosive contents. He stressed that his system takes into account the practice of many different fireworks articles within one package.
It was remarked that the parameter of density doesn't seem to be suitable for a general default list, with respect to enforceability.

14. The expert from the Netherlands explained that the default list in working paper nr. 3 was based on UN test series 6 and on more than 50 tests done with different types of fireworks.
He stressed the importance of fulfilling the 6 (a) and especially the 6 (b) tests, as mentioned in working paper nr. 4. Only doing the 6 (c) test will not always give the correct result. By visual presentation he demonstrated that report shells are of division 1.1 and colour shells could be of division 1.1 or 1.3. The 6b) test, and not the 6c) test is often decisive in this assignment.

15. The Chairman explained as mentioned in his working paper nr. 1 that a default classification system means that the type of fireworks is related to a given classification. The principle of a default classification is that the types of fireworks mentioned in the system should represent the worst case of classification as demonstrated by test series 6 of the Test Manual. Not each and every article should be tested within such a system. Fireworks, falling in the default system, can be classified less severe on base of tests according to the Test Manual; if a firework article is not covered by the default list, again the tests should be performed. The working group followed this interpretation and accepted the "worst case" principle for a default classification.

Definition of the types of fireworks

16. The Chairman stated that it will be very difficult to assign each and every article in a world wide default classification system and asked for opinions on the way of grouping them.

17. The expert from Netherlands explained that in his working paper nr. 3 a grouping was made.
The Working Group is of the opinion that further definition is necessary for different types of fireworks, and the aspect of composition should be regarded too.
The expert from the United Kingdom recalled the work that has been done by CEN/TC 212 with respect to typing and definitions of fireworks (draft prEN14035-2: 2000), which could be helpful. Furthermore the working papers of USA (nr. 6) and China (nr. 9) should be taken into account to reach a worldwide approach.

18. The Working Group is of the opinion that the number of types of fireworks according to the draft CEN standard (for use) and the papers of USA and China could be reduced to a smaller number of types for the purpose of transport classification.

19. Subsequently a sub-working group chaired by Mr. Jarnryd from Sweden made a list (table) of types and definitions of fireworks (columns 1 to 3) for purposes of transport classification (working paper nr. 10). The grouping has been based on different types of fireworks all around the world. The Working Group regarded the table as a good starting-point for the further discussion.
Columns 5 and 6 of the table were reserved for factors on which the classification is depending on, like calibre and weight, and finally the hazard division.

Parameters for default classification

20. The Chairman opened the discussion on the number of parameters that are needed in a default classification system to come to the correct hazard division (according to the "worst case" principle). On one hand it is important to have parameters, which can be enforced easily, on the other hand it is clear that many factors can influence the classification.

21. The expert from China explained, as mentioned in working paper nr. 9, that size, type and weight (amount of pyrotechnical composition) are important parameters, but also the packaging of fireworks, the tightness and moisture rate of paper roll (confinement). He also stressed the importance of the quality of fireworks, and the establishing of an ISO-standard in that respect; other experts agreed with him but remarked that this subject is not related to the scope of the Working Group (transport classification).

22. The expert from Germany is of the opinion, as mentioned in working paper nr. 8, that a default classification system is helpful for Authorities in order to verify the correct labelling on articles. A classification on the basis of analogy shall only be issued by competent authorities and only when test results for the same or similar objects are available. The basis for any classification of fireworks is test series 6 of the UN Recommendation on the Transport of Dangerous Goods. In a default classification system the parameter of packaging is relevant too. A division assigned by a default classification to an untested article could in some cases not reflect the actual danger. An exemplary summary of classifications in a table does not seem suitable as basis for classification for packed articles. The importance of the way a packaging for classification (see UN chapter 2.1, Note 4) was recognized by other experts in the Working Group but they didn't find it necessary to take this into account as a parameter in a default list. The Chairman stated that a conservative approach ("worst case") for classification in a default list could encounter the objections of Germany.

23. The expert from the Netherlands focussed on size as main parameter for classification of fireworks in their proposed default system (see working paper nr. 3), which covers primarily the large fireworks. He thinks that size is sufficient as main ("overarching") parameter for these articles and easy enforceable. Tests have been done with more than 50 (mainly large) articles of different calibre to settle classification borderlines per type of article. He gave a visual presentation of some tests on cake boxes, roman candles, colour and report shells and on a combination of 1.1 and 1.3 shells.

24. The Working Group discussed the list of the different types of fireworks (working paper nr. 10) in detail (per type of fireworks) on aspects of

- typification (characterization) of the fireworks;
- the parameter(s) (calibre/weight) to be used for default classification; and
- the related classification.

The main decision classification principle in the discussion was a conservative ("worst case") approach to the assignment of types of fireworks to divisions, based on scientific grounds (test results). This to prevent as much as possible that fireworks are classified in a lower division than on base of tests. If no or not enough test results were available for a decision, further test results could be awaited during this biennium.

25. With respect to roman candles and rockets the opinions of the experts diverged: according to some experts not enough test results are available at this moment for a sound decision, for example:

- how to handle small candles with flash effect?
- the assignment of rockets to 1.4?
- which attribute should be used to distinguish rockets (weight, rock motor size, effect diameter/volume)?

The expert from the United Kingdom offered to present further classification evidence.

In addition the Working Group had no unanimous interpretation of the 6 (c) test ("fiery projection more than 15 metres) for the small roman candles/rockets. Further discussion on the interpretation between experts is needed.

Division 1.4 in default classification system

26. The expert from the Netherlands proposed, not to include division 1.4 in the default classification system. He referred to the discussion on roman candles/rockets in which a clear distinction between 1.3 and 1.4 on base of enough test results seemed to be difficult. Also parameters like packaging and composition are more relevant for assignment to division 1.4 than for other divisions.

27. The experts from Norway and Sweden are in favour of the proposal of the Netherlands, but see no problem in assignment fireworks like "low hazard fireworks and novelties" to division 1.4. The expert from Germany supports the proposal of the Netherlands and can accept a more simple list like table 1 in working paper nr. 3 (without low hazard fireworks of division 1.4) of the Netherlands as basis for a default classification. Several experts wanted to focus the rest of this meeting time primarily on assignments to divisions 1.1 to 1.3.

28. The expert from the United Kingdom disagreed with the proposal of the Netherlands. According to the mandate of the Sub-Committee the task of the Working Group is to develop a default classification system based on existing systems (division 1.4 is included in USA- en UK-systems). Furthermore the UK will continue testing and the results will go to the Sub-Committee.

29. The expert from the Netherlands is of the opinion that from the point of safety the assignment to divisions 1.1 to 1.3 in a default system is most important, and should be finished during this meeting; possibly in a later stage, based on more data, some further work could be done on the assignment in division 1.4.

30. The expert from China said that about 50% of their fireworks are of classification code 1.4G and 1.4S. Excluding 1.4G will create problems for the trade. The Chairman noted that the classification in 1.4 G is still possible, but not on base of the default classification system but on base of normal testing.

31. On the basis of the deliberations the Chairman proposed to the Working Group to focus the rest of the meeting time primarily on assignment to 1.1 tot 1.3.
The Chairman concluded that the Sub-Committee should be asked whether some types of fireworks should be included in the default list under division 1.4 or not. Apart from this principle decision to be taken, the classification of these types of fireworks will be put between brackets in the default list [to be defined…..1.4G] since apparently not enough data are available on this moment.

32. A majority of the Working Group is of the opinion that classification code 1.4S should not come in the default list because 1.4S is based by definition on tests .

Introductory text to the default table

33. Mr. Hart from the United Kingdom chaired a small working group for making a introductory text to the default table in Chapter 2.1 as has been proposed in the Working Group.
He explained the results as laid down in working paper nr. 11 (the insertion of a new section 2.1.3.5 Assignment of fireworks to hazard divisions). The Working Group agreed in general on the proposed text as an explanation on the use of the default table.
A proposed paragraph 2.1.3.5.3 with respect to mixed packing of fireworks of more than one hazard division was amended, by taking the principle of classifying the fireworks in the mixed packing according to the highest hazard division unless test data indicate otherwise.
The amended text of 2.1.3.5 (working paper 11, version 2) is given in Annex 1 to this report.

Final version default table

34. The Chairman concluded that, as a result of the discussion on the default table at this meeting, the Working Group finalized the work on the default table (working paper 10, final version). The default table as mentioned in Annex 1 of this report will be submitted to the Sub-Committee.

Information on correct classification during transport or otherwise

35. The Chairman raised the question which kind of additional information on classification should be required in cases of using or not using the default system and whether (further) minimum requirements should be settled for the test report.

36. The expert from the Netherlands suggested in working paper nr. 3 to have some information on classification during transport for the benefit of the competent authority (before arrival on the place of destination) and enforcement bodies.

37. Several experts expressed that information should not accompany the transport or taken up in the transport document, because this was found unpractical. Information should be transmitted to the competent authority instead.

38. The representative of China stated that China is in the position to transmit test data to the competent authorities; and this should be done before the shipment of the fireworks.

39. With respect to minimum requirements in the test report it was remarked that in the existing paragraph 2.1.3.1.4 minimum requirements for the test report are given.

40. The representative of the United Kingdom considered that both the discussion on transport document and on the test report was beyond the mandate of the working group. The Netherlands did not pursue this point further for consideration in the working group. This point should be discussed further in the UN Sub-Committee, if necessary.

41. The experts from the United Kingdom and China thanked the Netherlands for the organization of this Working Group and for the preparative work done for this meeting.

* * * * *

Annex 1 to the report

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 numbers 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 table in 2.1.3.5.6. Such assignment shall be made with the agreement of the competent authority.

2.1.3.5.3 Where fireworks of more than one Hazard Division are packaged 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 new types of fireworks to column 1 of the default list in 2.1.3.5.6 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 calibre / weight in column 4 of the table in 2.1.3.5.6 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 Default table

Type	Includes: / Synonym:	Definition	Calibre /Weight	HD
shell, spherical or cylindrical	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	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: ? 200 mm	1.1G
			colour shell: < 200 mm	1.3G
	aerial shell kit, preloaded mortar, shell in mortar	assembly comprising a shell inside a mortar from which the shell is designed to be projected	all report shells	1.1G
			colour shell: ? 200 mm	1.1G
			colour shell: < 200 mm	1.3G
combination/ batteries	barrage, bombardos, cakes, finale box, flowerbed, hybrid, multiple tubes	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 candles	exhibition candle, candle, bombettes	tube containing alternate propellant charge(s), pyrotechnic unit(s) and transmitting fuse(s)	< 25 mm	1.4G
			? 25 mm and < 50 mm	1.3G
			? 50 mm, containing no flash composition	1.2G
			? 50 mm containing flash composition	1.1G]
[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 stabilisation of flight, and designed to be propelled into the air	report as primary effect, limits to be determined	1.1G
			Other	1.3G
			to be defined	1.4G]
mine	pot-a-feu	tube containing propellant charge and pyrotechnic units and designed to be placed on the ground or to be fixed in the ground	report as primary effect, limits to be determined	1.1G
			Other	1.3G
			[to be defined	1.4G]
	bag mine	bag containing propellant charge and pyrotechnic units and designed to be placed in a mortar	report as primary effect, limits to be determined	1.1G
			Other	1.3G
			[to be defined	1.4G]

fountain	volcanos, gerbs, showers, falls, rains, lances, Bengal fire, flame projectors, flitter sparkle, cylindrical fountains, cone fountains, illuminating torch, tourbillions, strobes, whistle	non-metallic case containing sparks- and flame producing pyrotechnic composition	Other	1.3G
			[to be defined	1.4G]
sparklers	handheld sparklers, non-handheld sparklers, wire sparklers, dipped sticks	rigid wire or thin stick partially coated (along one end) with slow burning pyrotechnic composition. with or without an ignition tip	pyrotechnic composition per item ? 10 g	1.3G
			pyrotechnic composition per item < 10 g	1.4G
low hazard fireworks and novelties	table bombs, throw downs, crackling granules, smokes, fog, chaser, snakes, glow worm, serpents	device designed to produce very limited visible and/ or audible effect which contains small amounts of pyrotechnic and/ or explosive composition	All	1.4G
spinners	aerial spinners, helicopters, ground spinners	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	1.3G
			pyrotechnic composition per item ? 20 g	1.4G
wheels	Catherine wheels, Saxon	assembly including a non-metallic tube or tubes containing pyrotechnic composition and provided with a means of attaching it to a support so that it can rotate	> 60 g pyrotechnic composition per driver	1.3G
			? 60 g pyrotechnic composition per driver	1.4G
aerial wheels	flying Saxon, UFO's, rising crown	tubes containing propellant charges and sparks-flame- and/ or noise producing pyrotechnic compositions, the tubes being fixed to a supporting ring	> [60 g] pyrotechnic composition per driver	1.3G
			? [60 g] pyrotechnic composition per driver	1.4G