

**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-seventh session
Geneva, 4-8 July 2005
Item 3 of the provisional agenda

EXPLOSIVES, SELF-REACTIVE SUBSTANCES AND ORGANIC PEROXIDES

Test series 8 and miscellaneous proposals

Transmitted by the chairman of working group

- 1 The Working Group on explosives met on the 4th and 5th of July 2005, in a parallel session with the Sub-Committee of Experts on the Transport of Dangerous Goods to have technical discussions on the documents related to Test Series 8 and the Miscellaneous proposals, under the Chairmanship of Mr. A. Johansen (Norway).
2. Experts from Australia, Canada, Germany, Fiji, France, Italy, Japan, the Netherlands, Norway, Portugal, South Africa, Spain, Sweden, Switzerland, the United Kingdom and the United States of America participated, as well as representatives from CLEPA, DGAC, and ICCA.
3. Since audio-visual aids were necessary to present some of the work on Test Series 8, the group first discussed the Miscellaneous proposals.
4. **Specification of witness screen material for test 6(c).**

ST/SG/AC.10/C.3/2005/5 (Australia)

Aluminium witness screens used in Series 6 (c) testing

UNSCETDG/27/INF.31 (Netherlands)

Aluminium witness screens used in Series 6 (c) testing; comments on ST/SG/AC.10/C.3/2005/5

From the information given in documents .../C.3.2005/5 and ...27/INF.31 the working group discussed whether the specifications given in current paragraph 16.6.1.2 (g) of the Manual of Tests and Criteria are the most relevant parameters. The work done by Canada, the Netherlands and the USA in the past, have shown that determining the ballistic resistance of the screens gives the relevant information: perforation of the witness screens at a kinetic energy of 20J and indentation of 4 mm at 8 J. It is proposed to insert a note after paragraph 16.6.1.2 (g) giving guidance on how to determine this ballistic resistance.

However such a procedure can only be performed in a laboratory with the proper equipment and guidance on suitable witness screen materials will be supplied as well.

All experts are invited to assess whether aluminium 1100-0 or 1050A is available and obtainable in relatively small quantities in their countries.

Proposals, including consequential amendments to be included in the Manual, will be submitted during the current biennium.

5. Classification in Hazard Division 1.4S

ST/SG/AC.10/C.3/2005/22 (Canada)

Additional test for determining 1.4 S classification

UNSCETDG/27/INF.20 (USA)

Comments on ST/SG/AC.10/C.3/2005/22

The expert from Canada stated that the proposal was not intended for all articles currently classified under 1.4S (e.g. small arms ammunition), but for articles such as shaped charges, detonators, etc.

The expert from the USA stated that Canada's proposal does not demonstrate sufficiently that the current criteria for 1.4S in the Test Manual are not adequate and therefore no change is necessary. He further pointed out that the new criteria proposed by Canada do not have any data to show they are valid.

The expert from the UK said that there seems to be two different sets of criteria: one where the package is unaffected by fire and no effects external of packages are anticipated and the other, in case the package is degraded by fire, where criteria for kinetic energy of fragments, heat radiation, etc. are given in the Manual.

The expert from the Netherlands remarked that these two did not seem to match, especially in case in combustible packagings.

DGAC questioned whether the results of the confined 6(a) test can somehow be used to assess the effects external to the packaging, but other experts felt that the confinement in the 6(a) test can lead to different behaviour and results.

The chairman recalled that not only the transport needed to be taken into account but also the other GHS aspects, such as storage and handling and emergency response by, for example, a shopkeeper.

The expert from France raised the point of assessing the relevance of "accidental functioning" in the 1.4S definition. He gave examples of tests done on shaped charges with bullet impact and large fragment impact, where the shaped charges could not be initiated. These test results can be used to waive the necessity of an "accidental functioning test".

The expert from the UK remarked that it may be worthwhile to review the description of 1.4S in the different parts of the Model Regulations and the Test Manual.

The expert from Canada thanked the working group for their input and said that a new proposal will be drafted for consideration at a future session.

6. Better specification of Koenen test.

UNSCETDG/27/INF.4 (Germany)

Amendments to the Manual of Tests and Criteria

UNSCETDG/27/INF.36 (France)

Amendments to the Manual of Tests and Criteria

After the introduction of both papers, it was apparent that the use of a reference substance does not qualify the steel to be used.

On the other hand, specifying the correct steel quality does not address poorly manufactured tubes and that static and dynamic behaviour of the steel tubes may be different.

There was general support to better specify the steel to be used to deep draw the tubes; but it was stressed that it is important to check that the specified steel quality is available and obtainable in relatively small quantities.

Several experts asked for a tighter specification of the musk-xylene, especially the impurities since they may affect the outcome of the test.

The general view in the working group was that using a reference substance may be a good laboratory practice to ensure the correct hardware, but that this does not need to be included in the Manual. France will not pursue the matter of a reference substance in the test any further.

7. Test results of rockets.

UNSCETDG/27/INF.19 (Denmark) Default classification of fireworks; information on test results for a rocket

Although no expert from Denmark could be present at the meeting, the chairman was asked in advance if the working group could discuss INF.19.

The general view of the working group was that the results provided were important, but that the information provided was insufficient and that details on construction of the article, chemical composition and physical appearance in the article were missing. For instance, the composition listed as “silver composition” could also be a flash powder if present in powdery form, especially since no binder is present according to the data sheet.

Some experts raised the point of further refining the definition of flash powder and, additionally, a definition of comets and stars.

The expert from Denmark is invited to provide the additional data.

TEST SERIES 8

Background document:

ST/SG/AC.10/C.3/2005/6 (Chairman) Report of the informal Working Group on ANE

8. Figure 10.4

ST/SG/AC.10/C.3/2005/14 (United Kingdom) Figure 10.4 - Procedure for Ammonium Nitrate Emulsion, suspension or gel, intermediate for blasting explosives

UNSCETDG/27/INF.21 (USA) Comments to proposed to Test Series 8 described in ST/SG/AC.10/C.3.2005/14 and ST/SG/AC.10/C.3.2005/6

As already described in document .../C.3/2005/6, the expert from the UK has identified one or two ‘loopholes’ for candidates that fail Test Series 8 to be later transported as non-dangerous goods. The proposal contained in document .../C.3/2005/14 is aimed at preventing this.

The expert from the USA believes that the current restrictions on the composition makes such a further guidance unnecessary.

The chairman reminded the group of several incidents with substances related to ANE’s which clearly demonstrate that these substances are not ‘non-dangerous’.

Several experts were of the opinion that, if an ANE candidate would fail Test Series 8, it should always be a Class 1 substance.

The expert from Germany questioned whether substances failing Test Series 8 would always be ‘blasting explosives’ and if an N.O.S. entry would be more appropriate. The definition given in the Glossary allows other use than mining for blasting explosive.

The working group advises the Sub-Committee to accept the proposal from the UK in general, subject to further harmonisation of the wording in blocks 4 and 6.

9. **Modified Vented Pipe Test.**

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| ST/SG/AC.10/C.3/2005/11 (Spain) | Procedure and criteria for the modified vented pipe test |
| UNSCETDG/27/INF.7 (Sweden) | Test Series 8; Comments on documents ST/SG/AC.10/C.3.2005/11 and ST/SG/AC.10/C.3.2005/14 |

The expert from Sweden presented the work done in Finland by four companies to establish an acceptable vent size in the MPVT, based on current commercialised formulations.

Eleven tests were performed, nine with formulations falling within the specifications given in SP309.

Vent sizes of 87, 90 and 100 mm were used. In two cases a detonation was observed, one with a formulation according to SP309 and a vent size 87 mm and one sensitised with glass micro balloons.

Observations made during tests performed in Australia, Sweden and Finland were given, such as the size of the test site needed, changing weather conditions during the tests (wind direction), difficulties with fire bans due to drought, low ambient temperature, release of toxic gases, environmental problems, inconsistencies, hazardous fragmentation and difficulties with aborted tests.

The work demonstrated that a vent diameter of 87 mm for Test Series 8(d) may cause problems if the test is applied to commercial formulations that fall inside the ranges of SP 309 of UN 3375. It is suggested that emulsion viscosity may affect the outcome. The result presented may indicate that there are still factors not managed in the test which can potentially alter the outcome of the test.

The expert from Spain is of the opinion that the Modified Vented Pipe Test as proposed in document .../C.3.2005/11 is reproducible and discriminatory. He showed test results of 8 tests performed with the same formulation giving consistent results (within a certain margin of error). It was also found that the limiting diameter for a certain formulation is inversely proportional to the water content (in case of emulsions) and proportional to the MAN content (in case of suspensions). Furthermore, for a given formulation the viscosity is related to the particle size of the emulsion, as is the stability. More stable emulsions have a higher limiting diameter in the MVPT. This may explain the dependence of viscosity as stated in the Swedish proposal. He had further analysed the different behaviour of the samples tested in Finland. The differences are limited to different event times, which is not a criterion, but that the test results were the same.

The working group discussed the matter of viscosity in detail. Products with higher viscosity tend to have localised heating and have a tendency to 'cook over' landing in the fire and adding additional heat input. Since this seems to be an almost random process, this may explain the differences observed in the triplicate tests.

Substances with a higher viscosity also have a much more intimate mixing of fuel and oxidiser.

The expert from Germany pointed out that there is not much experience at all in venting such viscous substances and cautioned the group not to set the vent diameter too high since all formulations would pass the test.

The expert from Norway recalled the full scale tests done in Scandinavia in aluminium tanks melting after seven minutes thus preventing confinement.

Several experts recalled that the 8(d) test is not for classification purposes and that it may not be surprising that sensitised formulations can pass this test, since this sensitisation relies on a shock for initiation.

The work done in Japan and Canada to develop a smaller scale test was mentioned as a potential alternative for the future and both countries are encouraged to continue the work.

It was suggested to investigate whether the ranges in the formulations given in SP 309 could be narrowed.

The expert from the UK suggested the possibility to use Test Series F to assess bulk transport as is done for self-reactive substances of Division 4.1 and organic peroxides of Division 5.2.

The chairman summarised three options:

1. delete test 8(d) from Test Series 8;
2. leave the current test as it is; or
3. accept the Spanish proposal in square brackets.

The general view of the working group was that a large scale test is necessary.

However, the group could not take a decision. It is recognised that the issue of vent size has not been resolved and it is proposed to postpone a decision until the July 2006 meeting, awaiting additional test results.
