



**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****Fifty-seventh session**

Geneva, 29 June-8 July 2020

Item 2 (a) of the provisional agenda

Explosives and related matters: review of test series 6**Report of the informal correspondence group on the review
of Test 6 (d) (Unconfined package test)****Transmitted by the Sporting Arms & Ammunition Manufacturers'
Institute (SAAMI) on behalf of the informal correspondence group*****Introduction**

1. At the fifty-sixth session SAAMI presented document ST/SG/AC.10/C.3/2019/11 to review the criteria of Test 6 (d) in the Manual of Tests and Criteria (MTC). This is a test having the primary function of limiting explosives which may be assigned Compatibility Group S, the safest explosives classification. The report of the Explosives Working Group (EWG), in informal document INF.55 (fifty-fifth session), indicated that the 6 (d) test is intended to identify hazardous effects outside of the package resulting from an accidental initiation, but that the current criteria may be identifying any effects rather than just hazardous effects. The working group determined that clear guidance is needed on what hazardous effects the 6 (d) test is meant to identify, and the criteria should be reviewed and updated so that they relate solely to hazardous effects as opposed to effects in general. The issue of whether an accidental initiation is possible is excluded from the scope of work. An informal correspondence group was formed to accomplish these tasks, which SAAMI was asked to lead.

2. To accomplish its mission the informal correspondence group on the review of test 6 (d) conducted a survey of the group's opinions on the four current criteria of the 6 (d) test. The group was asked to elaborate individually on each of the four criteria about whether they identify hazardous effects versus any effect. Many responses were received, which presented some identifiable trends helpful to the mission of the group.

Results of the survey

3. Criterion 1: MTC 16.7.1.4 (a) "Denting or perforation of the witness plate beneath the package;":

* 2020 (A/74/6 (Sect.20) and Supplementary, Subprogramme 2.

- (a) The survey responses were unanimous that this criterion evaluates a hazardous effect. Many respondents felt that while perforation was easy to assess, it would be helpful to provide more clarity on what constitutes a dent, e.g., how to differentiate superficial damage such as a scratch. This could provide for greater objectivity in the assessment of this criterion.
 - (b) The criteria for Test 6 (d) should be practical rather than theoretical, e.g., it is not necessary to see the witness plate under a microscope to analyse scratches. Evaluation should be simple.
 - (c) One possible way forward would be to consider the recently agreed language for the use of Test 6 (a) in conjunction with GHS Chapter 2.1: “a significant change in the witness plate shape, such as perforation, gouge, substantial dent or bowing”.
4. Criterion 2: MTC 16.7.1.4 (b) “A flash or flame that ignites an adjacent material such as a sheet of 80 ± 3 g/m² paper at a distance of 25 cm from the package;”:
- (a) A majority of respondents agreed that this criterion evaluates a hazardous effect, but others thought it does not, at least not at the current level of magnitude. This effect shows if the fire of a package will spread to other packages and allows this basis to differentiate between it and other compatibility groups.
 - (b) The relevance of how this effect may accelerate the propagation of reactions from package to package is not scientifically proven. It does, however, segregate those explosives producing a considerable fireball from those only showing some minor flame effects outside the package. Therefore, the criterion could be changed to quantify effects which may enhance propagation between packages (e.g. 1 m distance from package).
 - (c) The procedure could clarify that a flash or flame that does not immediately ignite the witness paper is an effect that can be ignored. For example, sometimes the explosive effect passes the criterion but catches the packaging on fire, and the packaging fire later ignites the witness paper.
 - (d) Additional materials could be added to MTC 16.7.1.2 and setup information to 16.7.1.3.3 or a new paragraph. Thought should be given to aligning the materials with those used in 2.1.3.6.4 (d) of the Model Regulations, for exclusion of explosive articles from Class 1.
5. Criterion 3: MTC 16.7.1.4 (c) “Disruption of the package causing projection of the explosives contents;”:
- (a) All respondents felt that this criterion needs additional consideration. The hazardous effect should be explained and justified, and then this could be implemented more precisely.
 - (b) There is some redundancy between the criteria in (c) and (d). Perhaps they could be consolidated.
 - (c) Bearing in mind that test candidates will already be proven capable of passing the criteria for Division 1.4, some thought that explosive articles lying next to the package should not invalidate an assignment to Compatibility Group S. Contrary to the literal text, the example of detonators in 16.7.1.5 already indicates that a release of explosives is acceptable.
 - (d) A threshold could be developed to allow some minimal energies or distances. The word “projection” is subject to widely varying interpretation, where some felt it automatically implies significant energy, but literally it only means that something leaves the packaging. A projection should be defined or quantified. The construction of the text could be improved, as a disruption does not “cause” a projection.
 - (e) One commenter noted that some explosives classified outside of Class 1 may not pass this criterion.

6. Criterion 4: MTC 16.7.1.4 (d) “A projection which passes completely through the packaging (a projection or fragment retained or stuck in the wall of the packaging is considered as non-hazardous).”:
- (a) All respondents agreed that this criterion evaluates a hazardous effect, but also think that it could be improved by developing a quantified threshold for the energy or distance of a projection.
 - (b) An additional way to differentiate hazardous effects may be to limit the degree of potential hazard. For example, a government expert noted that small arms ammunition (a deflagrating explosive) is of less concern than shaped charges or detonators (detonating explosives). A two-pronged approach might help, where:
 - (i) the existing approach continues to apply to explosives which detonate and disintegrate, because they have a greater potential for effects varying upwards to higher energies, and
 - (ii) a quantitative threshold is applied to deflagrations with less potential energy, e.g., the effects of many power device cartridges.
7. Some general comments were also received:
- (a) The entire procedure should be reviewed to ensure that adequate instructions are provided for the required materials, test set up, and test performance to adequately address the observations described in 16.7.1.3.4 and evaluated in 16.7.1.4.
 - (b) The criteria of the 6 (d) test are intentionally more conservative than the bonfire criteria since the packaging should be capable of more fully mitigating effects when not degraded by fire.
 - (c) One commenter interpreted the wording “Evidence of a hazardous effect outside the package includes” as meaning “includes but is not limited to” the criteria. He recommended that the informal correspondence group evaluate who or what is to be protected by the criteria.

Proposal

8. SAAMI proposes that the informal correspondence group continue its discussion within the next EWG meeting. It would be helpful for the EWG to confirm support for the above summary of the survey results, with edits as necessary. The discussion may also further develop the positions which receive support. At the EWG, the informal correspondence group should confirm its intention to continue the work intersessionally and into the next biennium.
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