Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals

27 June 2017

Sub-Committee of Experts on the Transport of Dangerous Goods

Fifty-first session

Geneva, 3-7 July 2017
Item 2 (e) of the provisional agenda
Explosives and related matters: stability tests for industrial nitrocellulose

Stability tests for industrial nitrocellulose

Transmitted by the Sporting Arms & Ammunition Manufacturers' Institute

Discussion

1. In ST/SG/AC.10/C.3/2017/3, Germany proposes to require quality assurance testing on nitrocellulose. Some of these tests are already used by industry or appear as considerations for nitrocellulose in ADR. SAAMI supports this proposal in principle.

2. The proposal suggests adoption of the Bergmann-Junk stability test, a commonly used quality control test. However, SAAMI prefers the use of a different method which we feel is more appropriate to our purposes - the 134.5 °C Heat test (Methyl Violet Paper Test). Both tests are included as options in the US military specification ("mil spec") for nitrocellulose, MIL-DTL-244C. We could support adoption of the Bergmann-Junk test with the caveat that the 134.5 °C Heat test is adopted simultaneously as an option. SAAMI can provide the 40-page US mil spec to delegations upon request.

3. There is one other test in the German proposal relating to auto-ignition temperature, which currently exists in ADR, and which raises concerns:

(a) We agree with Germany's concern with part of the current approach in ADR, and we add that this approach in general should be reconsidered and not used directly for proposed adoption. ADR sections 2.3.2.1 – 2.3.2.3 only set out a capability requirement that NC must be able to pass a qualitative stability test, which is a visual check for fumes. Quantitative testing is only required "when differences of opinion arise", which seems unusual. SAAMI doubts whether the qualitative visual test or the quantitative 180°C test are being consistently performed, as there is no mandatory requirement for either test in ADR.

(b) SAAMI is concerned that the ignition test at 180°C may fail nitrocellulose of high quality. Some products made from well-stabilized nitrocellulose ignite well below 180°C depending on the duration, and it is our understanding that the results are not particularly dependent on the nitrogen content of the nitrocellulose. The ignition of nitrocellulose is based on a time-temperature relationship, where the time that a sample spends at a given temperature is a key factor. The rate of temperature rise in the proposed test is rapid and may result in erroneous conclusions. The temperature of 180°C is far above the 65°C temperature that Germany mentions may

be encountered in transport, and greatly exceeds a healthy safety margin. We question whether other dangerous goods would pass a test at 180°C without a dangerous reaction; e.g. flammable liquids have a threshold of 60°C for classification as dangerous goods. Lastly, this test could be hazardous to perform, as it involves constant surveillance of a sample for explosion in a laboratory setting.

(c) With regard to the ignition test, rather than introduce a new test into the UN Manual of Tests & Criteria, an alternative is to create a capability requirement applying the existing Test 3(c)(i) which uses a temperature of 75°C for 48 hours, and is commonly used for testing smokeless powder. The Sub-Committee might also benefit from research of nitrocellulose stability in the equivalent 3(c)(ii) SBAT test, which is an option for Test Series 3(c); if that test is also acceptable, then the requirement could just reference Test Series 3(c). Since Test Series 3(c) is used to classify explosives for transport, it should provide an acceptable level of safety for classifying desensitized explosives. The use of this test series for solid desensitized explosives is already inferred by UNMTC 33.2.3.2: "New products which are thermally stable and have, or are suspected of having, explosive properties should first be considered for Class 1 and the Class 1 acceptance procedure and, if necessary, the assignment procedure applied." In the context of this proposal, perhaps either referencing this requirement and/or making it more explicit could be part of a solution.

Proposal

4. SAAMI requests that the technical details of the German paper be discussed in the explosives working group. Time should be allotted during this biennium for further technical examination so that these new requirements can be approved in an appropriate way without unintended consequences.