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 **2 June 2017**

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Item 2 (e) of the provisional agenda
Explosives and related matters: stability tests for industrial nitrocellulose

Stability tests for Industrial Nitrocellulose

Transmitted by the European Chemical Industry Council (CEFIC) on behalf of the World Nitrocellulose Producers Association (WONIPA)

Introduction

1. The TDG Sub-Committee included the item of stability tests for Industrial Nitrocellulose in its programme of work for 2017-2018 (ST/SG/AC.10/C.3/100) as follows:

> Explosives and related matters (including amendments to the list of dangerous goods, electronic detonators; review of test series 6; review of tests in parts I, II and III of the Manual of Tests and Criteria (including UN standard detonator, minimum burning pressure (MBP) tests as a possible alternate or replacement for the 8(c) and/or the 8(d) tests); guidance for application of Test Series 3 and 4; review of packing instructions for explosives; stability tests for industrial nitrocellulose; application of security provisions to explosives N.O.S.; classification of articles under UN 0349; test N.1 for readily combustible solids; and review of Chapter 2.1 of the GHS);.

2. The GHS Sub-Committee also included the item of stability tests for industrial nitrocellulose in its programme of work for 2017-2018 (ST/SG/AC.10/C.4/64) as follows:

> (e) Stability tests for industrial nitrocellulose
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> Lead country: Germany
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> Focal point: TDG Sub-Committee
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> Mandate/Terms of reference: informal document INF.22 (thirty-second session) and report of the Sub-Committee on its thirty-second session (ST/SG/AC.10/C.4/64, paragraph 67)

3. The expert from Germany proposes in the working paper ST/SG/AC.10/C.3/2017/3 “Stability tests for Industrial nitrocellulose” to implement a worldwide regulation for the stability tests for Industrial Nitrocellulose (UN 2555* and UN 2556 and UN 2557)

* UN 2555 NITROCELLULOSE WITH WATER (not less than 25 % water by mass)
UN 2556 NITROCELLULOSE WITH ALCOHOL , not less than 25 % alcohol by mass, and not more than 12,6 % nitrogen by dry mass)
UN 2557 NITROCELLULOSE, with not more than 12,6 % nitrogen by dry mass, MIXTURE WITH or WITHOUT PLASTICIZER, WITH or WITHOUT PIGMENT

consisting of the self ignition test of the ADR/RID (European Agreement concerning the International Carriage of Dangerous Goods by Road) and the Bergman Junk test for the long term chemical stability.

4. CEFIC, on behalf of the Worldwide Nitrocellulose Producers Association (WONIPA), which represents manufacturers of industrial nitrocellulose and accounts for 80% of the worldwide production (approximately 200.000 tpa), herewith presents the position of WONIPA on the worldwide implementation of the self ignition test of the ADR/RID and the Bergman Junk test for the long term chemical stability.

I. Background

Self-ignition temperature

5. For European land transport, provisions on tests relating to nitrated cellulose mixtures have been incorporated in section 2.3.2 ADR/RID. The ignition temperature test in ADR/RID is a test to determine at what temperature a substance will self-ignite when heated without an external ignition source (a description of the test method is provided in Annex 1 of the working paper ST/SG/AC.10/C.3/2017/3 “Stability tests for Industrial nitrocellulose”). This test is the most important stability test for industrial NC, as it defines the conditions under which the NC can be transported and used without the risk of self-ignition.

6. The self-ignition temperature test in accordance with ADR/RID has been mandatory for NC in Europe for more than 30 years. This test requires that the self-ignition temperature be higher than 180 °C for dry NC (higher than 170 °C for NC with plasticizer). The test is carried out using dry NC to make sure that even dry NC will not self-ignite. If the self-ignition temperature of dry NC is above 180 °C, this ensures that even dry NC will not self-ignite at temperatures of up to 65 °C that may occur in a container.

Long-term chemical stability

7. In addition, a 30-minute qualitative test of the chemical stability at 132 °C is also mandatory for NC products to be permitted for transport in Europe in accordance with ADR/RID. This test has two disadvantages: the test duration of 30 minutes is relatively short and the most important disadvantage is, that this is a qualitative test. The qualitative test criteria is: “It is observed whether nitrous gases in the form of yellowish-brown fumes clearly visible against a white background are given off during 30 minutes”. This test does not give a highly reliable information about the long term chemical stability of the NC.

8. For several decades, the European producers within the European Nitrocellulose Producers Association (ENA) have been using the quantitative Bergmann Junk test, which determines the quantity of NO gas formed within 2 hours at 132 °C. The acceptance limit for this test is a maximum of 2.5 ml NO gas per g of NC (a description of the test method is provided in Annex 2 of the working paper ST/SG/AC.10/C.3/2017/3 “Stability tests for Industrial nitrocellulose”). With these conditions that go even beyond those of the test in ADR/RID, highly reliable information about the long-term chemical stability is obtained.

9. The European ADR/RID regulations for Ind. NC requiring a test of the self ignition temperature for the dry NC and the quantitative Bergmann Junk test for the long term chemical stability have proven during the last 30 years to achieve a highly reliable safety standard avoiding self-ignition of industrial nitrocellulose products during transport, storage and use. In Europe, several 10.000 t per year of Industrial Nitrocellulose are used by the printing ink, wood coating, nail varnish and many other industries.

II. Proposal

10. WONIPA fully supports the worldwide implementation of the self ignition temperature test for the dry NC of the ADR/RID regulations and the quantitative Bergmann Junk test for the long term chemical stability, as they have proven during the last 30 years in Europe to achieve a highly reliable safety standard avoiding self ignition of Industrial Nitrocellulose products during transport, storage, in order to achieve a consistent highly reliable safety standard for industrial Nitrocellulose worldwide.

III. Justification

11. Nitrocellulose producers from all parts of the world deliver their industrial nitrocellulose products to Europe. From the of WONIPA this fact makes it necessary to achieve a worldwide regulation for the stability tests for industrial nitrocellulose to ensure that all industrial nitrocellulose products transported, stored and used in Europe (and also worldwide) have a highly reliable consistent safety standard.