

## 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

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#### EXPLOSIVES, SELF-REACTIVE SUBSTANCES AND ORGANIC PEROXIDES

##### Test series 8

Comments on documents ST/SG/AC.10/C.3/2005/11 and ST/SG/AC.10/C.3/2005/14

Transmitted by the expert from Sweden

### **Introduction**

After the informal Working Group Meeting on Ammonium Nitrate Emulsions (ANE), Suspensions and Gels and Test Series 8 in February 2005, a series of tests on different ANE-formulations were made using the modified vented pipe test (MVPT) proposed as Test Series 8d.

These tests were made in Finland, 18 – 22 April 2005. The different ANEs came from the companies Orica Mining Services, Kimit AB, Forcit OY and Dyno Nobel ASA. Personnel from these companies were also present during the tests.

### **Test results**

A total of twelve tests were made. In one test (FEM5) the ANE was out of specification and this test is thereby discarded. Of the remaining eleven tests 6 tests were made by two formulations (i.e. 3 tests per formulation), these were FEM1, 2 and 12 in one group and FEM3, 6 and 7 in another group.

In two of the tests detonations occurred, i.e. those ANEs did not pass the test. However a number of those that passed the test were very close to failure.

Two interesting observations can be made from these tests:

- (1) Viscosity seems to be a vital parameter, formulations with low viscosity passes the test easier than those with high viscosity.
- (2) Identical samples (i.e. from the same formulation) can behave differently as shown by both event time and observation of test 3, 6 and 7. The event time had values between 83 and 107 minutes!

A summary of the tests is shown in table 1, annex A.

### **Conclusions**

Sweden still believes that a large-scale 8d test is necessary. However in view of the latest test results we doubt that the MVPT is correct for this purpose.

### **Proposal**

Sweden therefore proposes that the MVPT is not accepted as the 8d test.

Table 1

Test	Code of emulsion / composition	Viscosity (Pa*s)	Vent (mm)	Heating rate (C/min)	Observations	Event time (min)	Vessel state	Pictures / plot
1	<b>FEM1</b> ; AN (76-79), water (16-18), Oil (4.5-5.5), emulsifier (1.0-2.0)	370	90	3.4	Fuming vigorously and venting	94	Undamaged	10
2	<b>FEM2</b> ; Same as 1	370	87	3.4	Fuming vigorously and venting	85	Undamaged	11
3	<b>FEM3</b> ; AN (68-72), SN (8-11), water (13-17), Oil (4.0-5.5), emulsifier (1.0-2.0)	355	87	3.4	Fuming vigorously - material ejected in chunks	83	Undamaged	14
4	<b>FEM4</b> AN (66-69), SN (13-16), water (11-13), Oil (4.8-5.2), emulsifier (1.6-2.3)	900	90		Material out of specification			
5	<b>FEM5</b> ; AN (61-65), SN (10-14), water (14-16), Oil (3.2-4.1), emulsifier (1.05-1.5)	450	87	3.3	Detonation	98	Fragmented	18
6	<b>FEM6</b> ; Same as 3	355	87	3.5	Vented - frost on propane bottles	107	Undamaged	15
7	<b>FEM7</b> ; Same as 3	355	87	3.5	Vented	97	Undamaged	16
8	<b>FEM8</b> ; AN (61-65%), SN (10-14), water (14-16), Oil (3.2-4.1), emulsifier (1.05-1.5)	1270	87	3.5	Detonation - strong fuming, MB* Sensitised	78	Fragmented	19
9	<b>FEM9</b> ; AN (61-65), SN (10-14), water (14-16), Oil (3.2-4.1), emulsifier (1.05-1.5)	670	87	3.5	Fumes and fire – aluminised product	88	Undamaged	20
10	<b>FEM10</b> ; AN (73-76), water (17-19), Oil (5.05-5.5), emulsifier (1.5-2.5)	280	100	3.5	Strong venting - red fumes	95	Undamaged	13
11	<b>FEM11</b> ; AN (66-70), SN (3-6); water (16-20), Oil (4.5-5.5), emulsifier (0.9-1.5)	460	100	3.5	Strong fuming, then venting and noise	69	Undamaged	17
12	<b>FEM12</b> ; Same as 1	370	87	3.5	Just strong fuming for 10 minutes	82	Undamaged	12

Viscosity was measured with Helipath spindle D @1.0 rpm, MB\* - Microballoons