Sub-Committee of Experts on the Transport of Dangerous Goods
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EXPLOSIVES, SELF-REACTIVE SUBSTANCES AND ORGANIC PEROXIDES

Classification of ammonium nitrate emulsions, suspensions an gels

Further evaluation of the Vented Pipe Test

Transmitted by the expert from Sweden

1. BACKGROUND

During the Madrid Working Group, 18-20 April 2001, on classification of Ammonium Nitrate Emulsions, suspensions or gels, intermediate for blasting explosives (ANE:s), Sweden agreed to coordinate further tests with the Vented Pipe Test.

A small ad-hoc group was formed consisting of both industry and authority representatives from Norway, Spain, Sweden and USA. After a further meeting in Kiruna, 25 April, Finnish industry agreed to join this group.

2. THE AD-HOC GROUP COMMISSION

- Define a reference ANE to use for the further work
  - A reference ANE to be used as a reference between test facilities and countries has been suggested. This is attached as Annex 1.
- Evaluate different fire source, theoretically and in some tests
  - The base should be the 6(c)-test and evaluation of wooden or liquid sources should be made
- Evaluate some variations of the test vessel
  - Size, shall (to begin with) be based upon the US Vented Pipe
  - The strength of the test vessel related to bursting pressure compared with tanks for transportation. (awaiting data)
  - Variations in the orifice size (3" and 5" was tested in November 2000)
  - Length of the venting pipe (or totally stop using a pipe?)

- Evaluate some variations in ANE
  - Different Sodium Nitrate amounts
  - Differences in the Water contents
- Test volume or filling grade of ANE in test vessel
- Test parameters
  - During testing the following should be observed/measured;
    - Video recording, 2 cameras at different angles from the test set-up
    - Meteorological data, such as wind speed, air temperature, relative humidity and air pressure
    - Temperature measurement in the fire (2 gauges) and in the test vessel

3. COMMITMENTS

In Madrid we agreed to:

- That Sweden should co-ordinate tests with the vented pipe
- Present a program for the Ad-hoc group to UN, as a INF-paper, to the July meeting (2001)
- Propose in that program that test results should be available as a formal paper in July 2002

ANNEX 1

Reference emulsion - Vented Pipe Test

Formulation

Oxidizer solution

Ammonium nitrate:	**83%**
Water:	**17%**

Fuel phase

Oil:	**80%**
SMO	**10%**
Atsurf 5000:	**10%**

Emulsion matrix

Oxidizer solution	:	94.4%
Fuel Phase	:	5.6%

Specifications:
The given specifications are recommendations, and other raw materials can be used as long as they have similar properties.

Ammoniumnitrate-liquor:

Producer	Any
Name	AN liquor
pH (1mol/l @25°C)	4,0 – 6,5
Chloride	Max 10 ppm
Fe^{3+}	Max 10 ppm
Sulphate (SO_4^{2-})	Max 10 ppm
Organic matter	Max 15 ppm

Atsurf 5000:

Producer	Uniquema
Polymeric emulsifier, non ionic	
Acid number	29.0-33.0 mg KOH/g

SMO :

Producer	Croda
Name	Anfomul S4
Acid value	6.8 mg KOH/g
Hydroxyl value	211 mg KOH/g
Saponification value	154.7 mg KOH/g
Water content	0.27 % (w/w)

Oil :

Producer: Nynäs or orthers
Name : Nytex 810 or equivalent

		Value	**Method**
Density (15°C)	kg/dm3	0.901	D 4052
Viscosity (40°C)	CSt	22	D 445
Viscosity (100°C)	CSt	3.7	D 445
Flashpoint	°C	178	D 93
Pourpoint	°C	-42	D 97
Neutralisation no	Mg KOH/g	<0.01	D 974
Sulphur	Wt%	0.03	D 2622
Aniline point	°C	74	D 611
Refractive index 20°C		1.493	D1747
VGC		0.860	D 2501
UV abs at 260 nm		1.0	D 2008
Ca	%	16	IR Method
Cn	%	40	IR Method
Cp	%	44	IR Method
Aromatic content	%	10	D 2140
DMSO extracted compounds	%	2	IP 346

Emulsion matrix properties:

Density: 1.4 kg/dm^3
Viscosity: **(To be determined later)** (Brookfield RV or LV, spindle 7, @ 20 rpm @ 20 ^{o}C)

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