

**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

Ammonium nitrate emulsions, suspensions and gels

Comments on documents UN/SCETDG/24/INF.44 and UN/SCETDG/24/INF.45 (Australia)

Transmitted by the expert from Spain

Introduction

At its December 2002 meeting, the Committee of Experts on the Transport of Dangerous Goods approved the inclusion of the Series 8 tests in the Manual of Tests and Criteria. Tests 8(a), 8(b) and 8(c) were introduced to establish if an ANE candidate could be assigned to Division 5.1 (UN 3375). Test 8(d) - Vented pipe test was included in this series as one method to evaluate the suitability for the transport in tanks, and is not intended for classification purposes.

Several studies had shown that Test 8(d) is not reproducible or discriminatory. One of the reasons suggested for this behaviour is the lack of definition of the fire to which the sample is subjected. In the July 2002 ANE Working Group, Australia presented a modified test using a gas burner as a well-defined source of heat. The Working Group established that this modified test be developed in the next two years (July 2002 to July 2004), and both Australia and Spain committed themselves to providing studies on this matter.

In the Sub-Committee session of July 2003, the Spanish Delegation presented the study carried out by UEE on the Modified Vented Pipe Test applied to suspensions and emulsions (4). The critical vented diameter at which the vessel broke was determined for different suspension and emulsion compositions, the trial being continued until the product was fully consumed. A correlation was found between this critical diameter and that corresponding to the Koenen Test. According to the results shown in this report, the suspensions analysed passed the proposed test with the above-mentioned criterion since the critical vented diameters were always less than 75 mm (according to the procedure presented in July 2002, the test is carried out with a vented diameter of 87 mm).

During this time, Orica has developed a precise and reliable experimental device for this test. However, the latest procedure and criterion which has been developed, and which the Australian CA has proposed (1) to pass this test, is susceptible to broad and significant objections. Given the explosion of some emulsions when a vented diameter of 75 mm was used, Orica proposed increasing this to 81 mm (2). It was later observed that even with this diameter there were explosions when testing some emulsions and it was proposed to increase the diameter even more to 87 mm and to introduce the "run time" concept (3). In this first procedure proposal, besides setting the vented diameter at 87 mm, it was established the following criterion: the substance will only be heated for a certain period of time ("run time"), about 1 hour. If the recipient breaks in this time, the substance was not suitable for transport in portable tanks, if it did not break, then it was suitable.

In this way, all emulsions tested except those containing high levels of perchlorate passed the test. It is true that when using a vented diameter of 87 mm the standard emulsions do not break the recipient when the trial continues until the emulsion reacts in masse, as reflected in the study undertaken by UEE (4). However, Orica was faced with a problem when it was confirmed that some commercial emulsions tested gave rise to a clear explosion (5).

In this way, according to the new criterion, it is not sufficient that the pipe does not break before the end of the "run time", but in addition the substance should not consume itself before the end of the "run time".

Comments

Analysing the final wording of the procedure and criterion proposed by Orica for the Modified Vented Pipe Test which was intended to be used instead of the current Test 8(d), it seems that the reasons that led the Sub-Committee of Experts to introduce Test 8(d) have been forgotten or undervalued: the aim of the Test 8 (d) is to ascertain whether a substance classified as UN 3375 is suitable for transport in portable tanks.

The aim of the ANE Working Group was to improve the test to make it totally reproducible and thus offer Competent Authorities a reliable criterion, but without distorting its essence.

Test 8(d) should give information on the possibility of an explosion of a UN 3375 substance that is submitted to external fire when transported in a portable tank. The procedure and criterion proposed in (4) evade this information.

It is paradoxical that in the proposed test great importance is given to the generation of toxic smoke, which is usual for example in any fertilizer fire, or that the product spills without actually exploding and, in contrast, no importance is given to the fact that some emulsions that pass the test according to this criterion, do detonate if the test is taken to the limit. The fact that the test is interrupted before all the product is consumed makes us uncertain about the reaction of these substances in a real fire.

Conclusion

The procedure and criterion for the Modified Vented Pipe Test proposed by Australia causes us uncertainties and we do not think it a suitable substitute for the current Test 8 (d).

References

- (1) UN/SCETDG/24/INF.44, "Proposed Procedure and Criterion for the Modified vented Pipe Test".
 - (2) "The Modified Vented Pipe Test", Kennedy, D.L., Orica Explosives and Dyno Nobel, 14 June 2002
 - (3) WP 3, UN/SCETDG/21/INF.69, Annex 1, "Manual of Tests and Criteria. Test 8(d) - Vented Pipe Test".
 - (4) UN/SCETDG/23/INF.32, "Preliminary results of Modified Vented Pipe Test (Australian procedure) on Ammonium Nitrate Emulsions and Suspensions (ANE)".
 - (5) UN/SCETDG/24/INF.45, "A review of the modified vented pipe test".
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