

UN/SCETDG/18/INF.12 (E)

COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS

Sub-Committee of Experts on the
Transport of Dangerous Goods
(Eighteenth session, 3-14 July 2000,
agenda item 6 (c))

United Nations/ILO Working Group on the Harmonisation of the Classification Criteria for Physical Hazards

Proposal transmitted from the European Aerosol Federation (FEA)

Flammability of Aerosols

Following the outcome of the seventeenth session of the Sub-Committee of Experts (Geneva, 6-15 December 1999), the European Aerosol Federation (FEA) and the Chemical Specialty Manufacturers' Association (CSMA) have jointly prepared three harmonised test methods for classification of aerosols for inclusion in the Manual of Tests and Criteria. These have been jointly submitted for consideration at the eighteenth session of the Sub-Committee (ST/SG/AC.10/C.3/2000/34).

Both sides have worked hard to harmonise the test methods. Over the last 6 months a considerable amount of time and effort has also been expended to try to reach agreement on harmonised criteria to be applied to the test results.

Despite FEA attending a meeting in the USA with CSMA during March 2000 and three extended conference calls between members of the two organisations, with intensive discussion in between, FEA was unaware beforehand that CSMA planned to submit its paper (ST/SG/AC.10/C.3/2000/49).

The CSMA paper is based on the FEA proposal which was under discussion between the two parties but proposes criteria which have not been harmonised.

FEA is therefore submitting this proposal which has the advantage of being simple and straightforward to apply, since it allows a simple yes/no to the question 'did ignition occur?'

No interpretation of results is required, nor complex cut-off values which extensive tests, both in the USA and in Europe, do not fully substantiate because of the large variety of aerosol formulations and valve configurations. Instead we have preferred to take the responsible approach which is the most cautious – an aerosol which ignites during the tests is classified as flammable.

1. Aerosols with no, or with a nominal amount of 1% flammable contents (following the definition of a flashpoint of 93°C or less) would automatically be classed as non flammable and in sub-division 2.2 for Transport. The 1% limit is not based on data but is a cautious approach following a similar principle to that adopted by the UN in Class 3 - Flammable Liquids, where 2.3.1.3. takes account of liquids which do not sustain combustion. It prevents the overclassification of formulations, such as a water based preparation containing a small amount of perfume, without the need for testing.
2. All other aerosols would be regarded as flammable (i.e. in sub-division 2.1 for Transport) unless they meet simple criteria in the harmonised tests.

To arrive at this scheme, we have considered the application of the test methods to both Transport and Supply & Use. In doing so, FEA has taken into consideration the following

- Current classification criteria based on:
 - Transport: percentage of flammable contents
 - Supply and Use: consideration of whether the aerosol contains any flammable material, supported by test methods to determine if there is any risk of ignition under 'normal or reasonably foreseeable conditions of use', which is the basis of the risk assessment approach intrinsic to the European Aerosol Directive 75/324/EEC, amended by 94/1/EC after a serious consumer accident.

This acknowledges that consumers may not always use an aerosol strictly according to the instructions and that experience should guide manufacturers in their classification of a product to take account of known behaviour.

It also acknowledges that the valve technology of an aerosol product can substantially affect the actual level of flammability in use and that classification by flashpoint is therefore not representative of the real risk in use.

- Are current classification criteria still valid?
 - Support for the 45% flammable content limit used in Transport was not readily available from recent test data.
 - Consideration of validation tests performed by the independent test laboratory CNPP (Centre National de Prévention et de Protection, Saint Marcel, France) on behalf of the European Commission and FEA on a range of products with varying ranges of flammable contents, both propellants and solvents. The report carried out in 1994 is attached in support of our view that cut-off values or calculation methods for Supply & Use are not fully supportable by the evidence.
 - Experience and data from all FEA members with respect to commercial products and development products.

Following the comments of the Sub-Committee at its meeting in December 1999, FEA has considered again in detail the issue of whether a single classification is appropriate for Transport and for Supply & Use. The European industry still strongly believes that separate classification criteria are necessary in order to take account of different levels of risk.

The primary hazard of any aerosol arises from the fact that aerosols are pressurised containers. In Transport, this is taken into account by including aerosols in Class 2 of the UN recommendations and by requiring pressure and leak testing. In Supply & Use, most international regulations similarly take this hazard into account by requiring that aerosols are pressure and leak tested during manufacture, including at elevated temperatures after filling.

Many aerosols present a secondary hazard in that they contain flammable components. The risks which then arise are quite different in Transport to those in Supply & Use.

Under normal conditions during Transport:

- The product is not released from the container
- The product is hermetically sealed in small containers (small, limited quantities)
- The risk of release is therefore low, however,
- If the container is damaged, causing it to leak or rupture, the total contents may be released in an uncontrolled manner.

However, under normal conditions arising in Supply & Use:

- The product is designed to be released from the container, usually in relatively small amounts, at a controlled discharge rate.
- Because of the human factor, some chance of misuse should be taken into account (the basis of the Aerosol Directive's 'normal or reasonably foreseeable conditions of use'). The 'normal or reasonably foreseeable conditions of use' are defined by the manufacturer based on experience and in terms of maximum foreseeable application time.

For these reasons, FEA believes that separate classifications are not only entirely justifiable but also necessary to safeguard consumer safety.

Attachment 1 sets out how the test methods might be applied to criteria both for Transport and for Supply & Use. FEA recognises that if similar text were to be adopted by the UN Sub-Committee, it would necessitate amending SP190.

FEA has attempted to harmonise the criteria as much as possible, making use of the harmonised test methods. However, the interpretation of the results is tailored to the different risks inherent in Transport and Supply & Use. For instance, applying results from the Ignition Distance test is appropriate to Supply & Use, where the product is released in a controlled manner but it is 'reasonably foreseeable' that it might be directed towards a source of ignition.

The Ignition Distance test is not appropriate to Transport, where the total contents may be released in an uncontrolled manner if the container is damaged. Consideration of Deflagration Density, which is a measure of the amount required to be released per unit volume to achieve ignition, is appropriate for Transport but not for Supply & Use.

The FEA proposal recommends that if the Deflagration Density is greater than or equal to 600 grams per cubic metre, the aerosols shall be regarded as being in sub-division 2.2. for Transport, otherwise aerosols shall be regarded as being in sub-division 2.1. This is supported by tests carried out by CNPP in September 1999 which are summarised in the table which follows and which are shown in full in the addendum to this proposal. The results indicate that ignition (deflagration) is unlikely to occur for products which contain less than 10% flammable contents in the Enclosed Space Ignition Test. Products containing LPG as the sole flammable material gave Deflagration Density results of just under 600 grams per cubic metre. Therefore FEA has proposed a value of 600 grams per cubic metre based on these data.

DATA FROM CNPP TESTS SEPTEMBER 1999

Aerosols	Total amount of flammable material		Deflagration Density
	Total %	Discharged in test vessel (g/m ³)	g/m ³
6% LPG	6	53	No deflagration observed
4% LPG +2% Ethanol	6	115	No deflagration observed
3% LPG+3% DME	6	114	No deflagration observed
4%LPG+2% n-heptane	6	114	No deflagration observed
4%LPG+2% dodecane	6	69	No deflagration observed
5%LPG+5% Ethanol	10	185	No deflagration observed
Proposed limit value			600
10%LPG	10	60	590
5%LPG+10%DME	15	78	520
10%LPG+5% n-heptane	15	77	510
10%LPG+10%Ethanol	20	88	440
10%LPG+5%DME	15	63	420

10%LPG+10% dodecane	20	85	420
10%LPG+10% n-heptane	20	83	410
15%LPG	15	57	380
20%LPG	20	63	320
10%LPG+10%DME	20	61	300

NB: Abbreviations used for the propellants:

LPG liquefied petroleum gas DME Dimethyl Ether

In preparing the harmonised test methods, FEA and CSMA have also tried to harmonise the criteria which should be applied to them. Whilst some commonality has been achieved, there are still some differences contained in the attached paper compared with the CSMA proposal (ST/SG/AC.10/C.3/2000/49). Most of these arise, we believe, from a fundamental difference in the classification and, more particularly, the legal systems which pertain in the regions where the two organisations operate.

With these inherent differences in approach, it has not been possible to bring the two philosophies in line.

Because of the history of the European legislation, adopted as the model by several major non European aerosol markets such as Australia, South Africa and Argentina, FEA strongly believes that the relaxation in classification which is proposed in the CSMA paper, compared with current practice in Europe (where more than 4.5 billion aerosols are manufactured annually compared with the USA's 3 billion) would potentially have a negative effect on consumer safety.

In the case of an accident it could cause serious legal difficulties for manufacturers whose products had previously been classified more stringently.
