UNITED NATIONS **ST**

Secretariat

Distr.
GENERAL

ST/SG/AC.10/C.3/1998/60
15 April 1998

ENGLISH
Original: FRENCH

COMMITTEE OF EXPERTS ON THE
TRANSPORT OF DANGEROUS GOODS

Sub-Committee of Experts on the
Transport of Dangerous Goods
(Fifteenth session,
Geneva, 29 June-10 July 1998,
agenda item 6 (a))

EXPLOSIVE SUBSTANCES AND ARTICLES (CLASS 1)

Comments on the report of the informal working group on UN test 6 (c), Washington, D.C., 2-6 February 1998

Transmitted by the expert from France

1. The meeting of the working group was the follow-up to its first meeting held in Orlando, Florida, United States of America, from 26 to 28 September 1996 (see document ST/SG/AC.10/R.556).

Essentially, the present description of UN test 6 (c) in the second revised edition of the Manual of Tests and Criteria is based on the 1986 first edition of the Manual, particularly with reference to the criteria for the thermal flux and projections. The reservations or comments by France in the report on the Washington meeting (see document ST/SG/AC.10/C.3/1998/10) are explained below and accompanied by proposals at the end.

2. Thermal flux

The present criterion of 4kW/m^2 at a distance of 15 m, with a correction of the value to correspond to a mass of 100 kg net in the case of substances, comes from studies [1] [2] on fast-burning substances which produce fireballs, such as propellants. For such substances, the use of burning time instead of a flux value does not give rise to any problem.

According to France's experience, the same is not true of certain articles, particularly when they are small, for example, illuminating charges, incendiary, smoke or tear-producing ammunition, expelling explosive charges, oil well cartridges, fireworks, igniters and igniting fuses.

In the case of such articles, when the classification is based as it is at present on the thermal flux, it is almost impossible to distinguish their individual reactions either on the flux recording or on the video recording. The determination of an overall burning time for the content of the packages or unpackaged articles has no relevance in view of the almost simultaneous reaction, in cases where this occurs, of the articles in the fire. The expert from France therefore proposes that the criterion of a thermal flux of 4kW/m^2 at a distance of 15 m should be maintained, as an alternative to measuring burning time. The choice of the mode of assessment - thermal flux or burning time - depends on the decision of the competent authority (paragraph 1.1.2 of the Manual).

3. Projections

3.1. 20 J limit

France proposes the use of a distance/mass-energy ratio with a scale for the number of projections, in order to deal with frequent cases in which the masses and numbers of projections differ to a large extent from present masses and numbers (paragraphs 16.6.1.4.3 (b) and (c) of the Manual). The following example illustrates the principle.

The scale for the number of projections takes account of present numbers - more than 10 projections, each with mass exceeding 25 g thrown more than 50 m and/or one projection with mass exceeding 150 g thrown more than 15 m - and introduces the possibility of leaving numbers between 1 and 10 for projections with masses between 25 g and 150 g.

3.2. Live projections

According to whether these projections function or not, the working group in Orlando had accepted (see document ST/SG/AC.10/R.556, table 5) that the criteria for 1.4 S classification could be:

- functioning no projections at a distance of >5 m

- non-functioning distance $\leq$ 10 m.

In Washington, the working group provisionally maintained (in square brackets) the absence of live projections functioning at a distance greater than 5 m from the fire for the 1.4 S classification of articles. However, it left aside the possibility of non-functioning live projections being thrown up to 10 m.

France opposes this position for a number of reasons:

(a) It is practically impossible to determine from the video recording where functioning small-size live projections actually function;

(b) When firefighters or emergency services fight a fire, there is no particular reason for them to stop advancing at 5 m. The distance depends rather on the individual protective equipment and the firefighting methods brought into play according to the type of intervention: ordinary, hazardous, emergency. In any case, they have to deal with live objects projected at a short distance once the fire has been put out, insofar as they participate almost as a matter of course in the first phase of decontamination of the site;

(c) According to France's experience in carrying out UN test 6 (c) on packaged articles for which a 1.4 S classification is justified, a low to a very low proportion of live articles may be projected 10 m or more from the fire. The competent authority must then determine what is acceptable or not, depending on the nature (family) of the article or the hazard represented by such a live article: cap-type primers with a few milligrams of explosive, mine detonators with approximately 1 g of explosive, cartridges for weapons with a few grams of propellant, etc.

3.3. Fiery projections

First and foremost, the present French and English versions of the Manual do not match exactly in paragraph 16.6.1.4.4 (c). The English version reads: "fiery projections emanating from the product", the product being the substance as a whole and not the article and its packaging, while the French version reads: "des projections de <u>matière</u> enflammée provenant du produit", thus excluding burning pieces of packaging.

In the opinion of the expert from France, the term "fiery projections" needs to be defined; she proposes the adoption of a definition which specifically includes the definition proposed by IGUS (see document ST/SG/AC.10/C.3/R.529).

4. Proposals

These proposals for amendments to the test procedure are made with reference to the text contained in annex 1 of the report of the Washington meeting (see document ST/SG/AC.10/C.3/1998/10).

4.1. Insert a subparagraph (d) in paragraph 16.6.1.4.3 to read:

"metallic projections, each with mass exceeding 25 g and equal to or not exceeding 150 g, are thrown more than 15 m and up to 50 m from the edge of between 1 and 10 packages or unpackaged articles, such that they give rise to a hazard equivalent to the metallic projections referred to in (b) and (c) above".

4.2. In paragraph 16.6.1.4.4 (b) of the English version only, replace "fiery projections emanating from the product" by "fiery projections of substance emanating from the product".

4.3. Paragraph 16.6.1.4.4 (b), end, add:

"(see 16.6.1.4.9: Definition of a fiery projection)".

4.4. Paragraph 16.6.1.4.4 (c), end, add:

"Alternatively, in the case of articles, the irradiance of the burning product exceeds that of the fire by more than 4 kW/m^2 at a distance of 15 m from the edge of the packages or unpackaged articles. The irradiance is measured over 5 seconds, during the period of maximum output".

4.5. Paragraph 16.6.1.4.5 (b), delete the proposed addition in square brackets.

4.6. Add a new paragraph 16.6.1.4.9 to read:

"Definition of a fiery projection

A fiery projection consists of exposed explosive, whether or not emanating from an explosive article, ejected from packages or non-packaged articles and continuing to burn at a specified distance, if it is liable to propagate the fire".

Notes

1. The Characterization and Evaluation of Accidental Explosions, Roger A. Strehlow and Wilfred E. Baker, Prog. Energy Combustion Sci., Vol. 2, pp. 27-60, 1976.

2. Measurement and Prediction of Heat Flux in Propellant Fires, J.P. Lucotte, 20th DOD Explosives Safety Seminar, Norfolk, VA.

- - - - -