



Secretariat

Distr.
GENERAL

ST/SG/AC.10/C.3/2004/88
2 September 2004

ENGLISH
Original: FRENCH

**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

Twenty-sixth session, 29 November-3 December 2004
Item 3 (c) of the provisional agenda

OUTSTANDING ISSUES

**Vibration test for design types of packagings intended
for the transport of dangerous goods**

Transmitted by the expert from France

Introduction

1. Following discussions at several previous sessions of the Sub-Committee on the resistance of packagings to vibrations, France submitted at the December 2003 session the report of a study carried out by the "Laboratoire national d'essai" analysing the performance of a sample of packagings in two types of tests:

- Standard ASTM D 4169 (random vibrations);
- Standard ASTM D 999 (vibrations at fixed low frequency - repetitive shocks).

2. This first test report revealed that a number of packagings were not capable of resisting the vibrations during these tests. Some experts pointed out, however, that in view of the rate of failure they found the tests proposed too severe and therefore too far removed from reality. In addition, in the procedures used the packagings were not secured to the vibrating table; in customary conditions of carriage packages are secured and the securing system may affect the test result.

3. In 2004, France carried out a second series of tests in order to obtain additional data to enable the parameters for a vibration test to be set more judiciously.

4. **[TEXT OF PARAGRAPH 3 HAS BEEN REPEATED]**

5. For this second series, test methods based on the following standards were used:

- Standard ASTM D 4169, but with the lowest level of vibration (level III);
- Standard ISO 13355-2003.

Apart from being the most recent internationally accepted standard, a relevant feature of ISO 13355-2003 is that the schema of vibrations for the test was prepared using vibrations measured on roads.

Tests were made on packagings secured on pallets with a stacking load corresponding to real conditions for a package.

6. The two test reports are attached to this document as addenda, as follows:

- Addendum 1: Report 2003;
- Addendum 2: Supplement to the 2003 report;
- Addendum 3: Report 2004.

7. In accordance with the conclusions of the test report submitted in 2004 we consider that the introduction of a vibration test to be performed on design types of packagings for the transport of dangerous goods would be likely to improve safety.

8. The most suitable procedure seems to us to be a test in which the vibration profile is established in accordance with ISO 13355-2003. However, in order to take account of increasing levels of danger in terms of the packing group, the duration of the test, which would normally be 30 minutes as specified in the standard for packing group III, would increase for packing groups I and II in order to enhance its severity (1 and 2 hours respectively).

9. Only packagings or IBCs for liquids with a capacity greater than 60 l would undergo this test, since no problem has been identified with regard to solids, which cushion the vibrations, or packagings with a small capacity, where the energy developed is weaker.

10. The introduction of this new test would be relatively low cost - approximately an additional €500 to 1,000 for a design type - which would be rapidly recouped if the number of packagings manufactured from the design type is taken into consideration.

11. In order to enable this new requirement to be implemented progressively and existing design types adapted, provision is made for a transitional period of five years. This would also be important in harmonizing the situation between transport modes. Lastly, packagings manufactured before the end of the period and not subjected to vibration tests could continue to be used.

12. We accordingly propose that the Sub-Committee should adopt the following amendments:

Proposal

Use of packagings and IBCs: Chapter 4.1

4.1.1.3: Add the following paragraph:

“However, packagings and IBCs manufactured before 1 January 2009 and conforming to a design type which have not passed the vibration test of 6.1.5.7 or 6.5.4.13, whichever is appropriate, may still be used.”

Packagings: Chapter 6.1

6.1.5.2.5: Replace “6.1.5.3, 6.1.5.4, 6.1.5.5 and 6.1.5.6” by “6.1.5.3 to 6.1.5.7”.

Number 6.1.5.7 as 6.1.5.8 and insert the following 6.1.5.7:

“6.1.5.7 Vibration test

As from 1 January 2010, the vibration test shall be carried out on all design types of packagings:

- intended to contain liquids;
- with a maximum capacity strictly greater than 60 litres.

This test is not required for combination packagings.

6.1.5.7.1 *Number of test samples*: three test samples per design type and manufacturer.

6.1.5.7.2 *Special preparation of test samples for the vibration test*:

The test shall be performed on packagings ready for carriage filled to not less than 98% of maximum capacity with water.

6.1.5.7.3 *Test method and duration:*

The samples may be tested together or individually.

The sample shall be subjected to random vertical vibrations the power spectral density of which is defined in the following table:

Frequency (Hz)	Power spectral density (g^2/Hz)
3	0.000 5
6	0.012
18	0.012
40	0.001
200	0.000 5
Efficient acceleration	0.59 g
Maximum peak factor	3

The sample is placed on the vibrating table according to its normal position for carriage; it is left free to move vertically while its horizontal movements are restricted to prevent it from falling off the table.

The duration of the test is defined in terms of the packing group by the following table:

Packing group I	Packing group II	Packing group III
2 hours	1 hour	30 minutes

6.1.5.7.4 *Criteria for passing the test*

No test sample shall leak. No test sample shall show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength.”

IBCs: Chapter 6.5

6.5.4.2.1: Replace 6.5.4.12 by 6.5.4.13.

6.5.4.2.3: Replace 6.5.4.13 by 6.5.4.14.

6.5.4.3.5 *Design type tests required and sequential order.*

Replace the existing table by the following:

“

Type of IBC	Bottom lift	Top lift ^a	Stacking ^b	Leak-proofness	Hydraulic pressure	Vibration ^e	Drop	Tear	Topple	Righting ^c
Metal:										
11A, 11B, 11N	1st ^a	2nd	3rd	-	-	-	4th ^e	-	-	-
21A, 21B, 21N	1st ^a	2nd	3rd	4th	5th	-	6th ^e	-	-	-
31A, 31B, 31N	1st ^a	2nd	3rd	4th	5th	6th	7th ^e	-	-	-
Flexible ^d	-	x ^c	x	-	-	-	x	x	x	x
Rigid Plastics:										
11H1, 11H2	1st ^a	2nd	3rd	-	-	-	4th	-	-	-
21H1, 21H2	1st ^a	2nd	3rd	4th	5th	-	6th	-	-	-
31H1, 31H2	1st ^a	2nd	3rd	4th	5th	6th	7th	-	-	-
Composite:										
11HZ1, 11HZ2	1st ^a	2nd	3rd	-	-	-	4th ^e	-	-	-
21HZ1, 21HZ2	1st ^a	2nd	3rd	4th	5th	-	6th ^e	-	-	-
31HZ1, 31HZ2	1st ^a	2nd	3rd	4th	5th	6th	7th ^e	-	-	-
Fibreboard	1st	-	2nd	-	-	-	3rd	-	-	-
Wooden	1st	-	2nd	-	-	-	3rd	-	-	-

^a When IBCs are designed for this method of handling.

^b When IBCs are designed to be stacked.

^c When IBCs are designed to be lifted from the top or the side.

^d Required test indicated by x; an IBC which has passed one test may be used for other tests, in any order.

^e Another IBC of the same designed may be used for the test.”

Replace 6.5.4.13 by 6.5.4.14 and insert the following 6.5.4.13:

“6.5.4.13 Vibration test

6.5.4.13.1 *Applicability:* As a test on IBC design types intended to contain liquids (IBCs of type 31), as from 1 January 2010.

6.5.4.13.2 *Preparation of the IBC for test*

The test shall be performed on an IBC ready for carriage filled to not less than 98% of maximum capacity with water.

6.5.4.13.3 *Test method and duration:*

The sample shall be subjected to random vertical vibrations the power spectral density of which is defined in the following table:

Frequency (Hz)	Power spectral density (g ² /Hz)
3	0.000 5
6	0.012
18	0.012
40	0.001
200	0.000 5
Efficient acceleration	0.59 g
Maximum peak factor	3

The sample is placed on the vibrating table according to its normal position for carriage; it is left free to move vertically while its horizontal movements are restricted to prevent it from falling off the table.

The duration of the test is defined in terms of the packing group by the following table:

Packing group II	Packing group III
1 hour	30 minutes

6.5.4.13.4 *Criteria for passing the test*

No leakage, break or tear shall be observed. No test sample shall show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength.”
