



Secretariat

Distr.
GENERAL

ST/SG/AC.10/C.3/2002/77
16 September 2002

ORIGINAL: ENGLISH

**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-second session, 2-6 December 2002
agenda item 4 (a))**

NEW PROPOSALS

Outstanding issues

Repetitive Shock Test

Transmitted by the expert from the United States of America

1. At its twenty-first session the Sub-Committee considered the proposal in ST/SG/AC.10/C.3/2002/17 from the United States to include a vibration test in the Model Regulations for small packagings, IBCs and large packagings. The Sub-Committee took note of the previous decision at its seventeenth session where it was decided in principle that a vibration test should be included in the Model Regulations, (see ST/SG/AC.10/C.3/34, paragraph 100). The Sub-Committee also indicated that adoption of a vibration test should be accomplished in the 2001-2002 biennium. On the basis of an 8-8 vote, the proposal in ST/SG/AC.10/C.3/2002/17 was not adopted and the expert from the United States agreed to resubmit a revised proposal taking into account some of the concerns raised. This proposal differs from the earlier proposal in that it:

- proposes a design type test and including the test method in the relevant sections of Chapters 6.1, 6.5 and 6.6;
- proposes an exception from conducting the test for design types that differ in only minor respects to a design type that has successfully passed the test (Note: Demonstration of compliance provisions for Class 7 radioactive materials in 6.4.12 establishes a precedent for this provision);
- provides an exception for bags and flexible IBCs in response to comments from Japan and a review of testing data on flexible packagings;
- removes the specific indication that other equivalent methods are authorized because this is adequately addressed in 6.1.1.2 where it is stated “Methods of testing other than those described in these Regulations are acceptable, provided they are equivalent.”
- more appropriately refers to the test as a repetitive shock test;
- proposes a 2 year transition period and a grandfather provision for previously tested design types; and
- amends the test procedure on the basis of comments received during the previous Sub-Committee session.

Proposal

2. It is proposed that 6.1.5.2.2 be amended to authorize the use of water as the test medium for the repetitive shock test by adding the words “or for the repetitive shock test in 6.1.5.7”.
3. It is proposed that the current 6.1.5.8 be subsequently renumbered and that a new paragraph 6.1.5.8 be added as follows:

6.1.5.8 *Repetitive shock test*

Packaging design types other than bags shall be capable of successfully passing the following repetitive shock test:

6.1.5.7.1 *Number of test samples:* All packagings shall be prepared for testing as specified in 6.1.5.2. Three sample packagings, selected at random, shall be filled and closed as for transport. The samples shall be prepared consistent with the configuration and placement of inner packagings or articles for combination packagings and the methods of closure specified in the instructions provided by the packaging supplier or manufacturer.

6.1.5.7.2 *Test method:* Test specimens may be tested together or individually. The specimen(s) shall be placed on the test machine platform in the normal transport orientation. The test shall be conducted with a machine that utilizes a vertical or rotary motion vibration resulting in a specimen vertical displacement of approximately 25mm \pm 5%. Results obtained from either test method are acceptable. The specimen(s) shall be restrained horizontally to prevent falling off the platform, but shall be left free to move vertically. The restraining devices used to prevent the specimens from moving horizontally off the platform may consist of fences, barricades and other restraints that are adequately secured and of sufficient strength to protect the safety of the operator. The restraining devices shall in no case restrict

vertical movement. Free horizontal movement shall not be restricted to less than 10 mm \pm 5% in any horizontal direction from the initial placement of the specimen on the platform.

The initial frequency should be approximately 2 Hz and shall be steadily increased until the test specimen(s) repeatedly leaves the test surface at the specified vertical displacement. To ensure that the specimen is subjected to constant repetitive shock a steel shim of approximately 50 mm wide and 1.6mm in thickness (e.g. a piece of steel strapping) shall be passed between the specimen and the platform over the full length of the specimen(s). The specimen(s) shall be vibrated at this frequency for a minimum of one hour duration. After the completion of the test the specimen(s) shall be inspected for damage. The specimens shall also be removed from the platform, turned on its side for a minimum duration of five minutes and inspected for any leakage of the test medium. The inspection shall include an examination of any articles, inner packagings and their closures. Any damage, deterioration or leakage shall be recorded.

6.1.5.7.3 *Criteria for passing the test:* There shall be no rupture or leakage from the packaging. No test sample should show any deterioration or any distortion liable to reduce packaging strength that could adversely affect transport safety. Test samples shall not show any indication of leakage of the test medium from the outer packaging. Any leakage shall be considered a failure.

6.1.5.7.4 *Demonstration of compliance:* Packagings that vary from a tested design type in only minor respect may be considered as capable of meeting this test. Packagings may also be considered as capable of meeting the test on the basis of engineering analysis.

6.1.5.7.5 *Transitional period and grandfather provision:* Packaging design types that were successfully tested and approved in accordance with procedures established by the competent authority prior to January 1, 2005 need not be subjected to the repetitive shock test.

IBC Test

6. It is proposed that the existing text in 6.5.4.13 and 6.5.4.14 be numbered as 6.5.4.14 and 6.5.4.15 respectively and that a new 6.5.4.13 be inserted as follows:

6.5.4.13 Repetitive shock test

6.5.4.13.1 For all types of IBCs except FIBCs, as a design type test.

6.5.4.13.2 *Preparation of the IBC for testing:* A sample IBC shall be selected at random and shall be filled and closed as for transport. IBCs shall be filled to not less than 98% of their maximum capacity for liquids or 95% for solids. For IBCs intended for the transport of liquids, water may be used as the test medium. For solids the IBC shall be filled to its maximum gross mass.

6.5.4.13.3 *Test method:* The IBC shall be placed on the test machine platform in the normal transport orientation. The test shall be conducted with a machine that utilizes a vertical or rotary motion vibration resulting in a vertical displacement of the IBC of approximately 25mm \pm 5%. Results obtained from either test method are acceptable. The IBC shall be restrained horizontally to prevent it from falling off the platform, but shall be left free to move vertically. The restraining devices used to prevent the IBC from moving horizontally off the platform may consist of fences, barricades and other restraints that are adequately secured and of sufficient strength to protect the safety of the operator. The restraining devices shall in no case restrict vertical movement. Free horizontal movement shall not be restricted to less than 10 mm \pm 5% in any horizontal direction from the initial placement of the specimen on the platform.

The initial frequency should be approximately 2 Hz and shall be steadily increased until the IBC repeatedly leaves the test surface. To ensure that the specimen is subjected to constant repetitive shock a

steel shim of approximately 50 mm wide and 1.6mm in thickness (e.g. a piece of steel strapping) shall be passed between the platform and the IBC and verified on each corner or side of the IBC. The IBC shall be vibrated at this frequency for a at least one hour duration. After the completion of the test the IBC shall be inspected for damage and any leakage of the test medium. The inspection shall include an examination of all of the IBC components including the body and the closures. Any damage, deterioration or leakage shall be recorded.

6.5.4.13.4 *Criteria for passing the test:* There shall be no rupture or leakage of the test medium from the receptacle, if applicable, or the body of the IBC. No IBC should show any deterioration or any distortion liable to reduce packaging strength that could adversely affect transport safety. Any leakage shall be considered a failure.

6.5.4.13.5 *Transitional period and grandfather provision:* IBC design types that were successfully tested and approved in accordance with procedures established by the competent authority prior to January 1, 2005 need not be subjected to the repetitive shock test.

7. Amend the table in 6.5.4.3.5 as follows:

6.5.4.3.5 *Design type tests required and sequential order*

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

The table has been reordered by placing the leakproofness test 1st and keeping the order as shown in the above table with vibration last. This would allow testing laboratories to take the empty IBC and conduct the leakproofness test first and then fill the IBC and conduct the remaining test in the order presented. Currently they have to empty the IBC in the middle of the sequence to conduct the leak test and then fill it back up for the hydro test. This takes a considerable amount of time. Conducting the leakproofness test first, will also serve to verify the sealing qualities of the fittings, valves and closures prior to performing the test on a filled IBC.

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

- b *When IBCs are designed to be stacked.*
- c *When IBCs are designated 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 design may be used for the drop test.*

Large Packaging Test

8. Add a new paragraph 6.6.5.3.5 as follows:

6.6.5.3.5 Repetitive shock test

6.6.5.3.5.1 For all types of large packagings as a design type test.

6.6.5.3.5.2 *Preparation of large packaging for testing*

The large packaging shall be filled in accordance with 6.6.5.2.1.

6.6.5.3.5.3 *Number of test samples:* One large packaging representative of the design type(s) shall be selected at random, filled and closed as for transport including the configuration of inner packagings or articles.

6.6.5.3.5.4 *Test method:* The large packaging shall be placed on the test machine platform in the normal transport orientation. The test shall be conducted with a machine that utilizes a vertical or rotary motion vibration resulting in a vertical displacement of the IBC of approximately 25mm \pm 5%. Results obtained from either test method are acceptable. The large packaging shall be restrained horizontally to prevent it from falling off the platform, but shall be left free to move vertically. The restraining devices used to prevent the large packaging from moving horizontally off the platform may consist of fences, barricades and other restraints that are adequately secured and of sufficient strength to protect the safety of the operator. The restraining devices shall in no case restrict vertical movement. Free horizontal movement shall not be restricted to less than 10 mm \pm 5% in any horizontal direction from the initial placement of the large packaging on the platform.

The initial frequency should be approximately 2 Hz and shall be steadily increased until the large packaging repeatedly leaves the test surface. To ensure that the large packaging is subjected to constant repetitive shock a steel shim of approximately 50 mm wide and 1.6mm in thickness (e.g. a piece of steel strapping) shall be passed between the platform and the large packaging and verified on each corner or side of the IBC. The large packaging shall be vibrated at this frequency for a at least one hour duration. After the completion of the test the large packaging shall be inspected for damage and any leakage of the test medium from the large packaging and from any articles, inner packagings and their closures. Any damage, deterioration or leakage shall be recorded.

6.6.5.3.5.5 *Criteria for passing the test:* There shall be no rupture or leakage of the test medium from the large packaging. The large packaging shall not show any deterioration or any distortion liable to reduce packaging strength that could adversely affect transport safety. Any leakage shall be considered a failure.

6.6.5.3.5.6 *Transitional period and grandfather provision:* Large packagings that were successfully tested and approved in accordance with procedures established by the competent authority prior to January 1, 2005 need not be subjected to the repetitive shock test.
