

**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)**

Agenda item 3c

## **OUTSTANDING ISSUES**

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

#### **Transmitted by the expert from France**

1. The expert from France takes note of the comments provided by ICDM (INF11), SEFEL (INF17) and Germany (INF18). He regrets that after all the progress made on this issue and all the information provided there are still documents questioning the principle of such work.
2. The principle decision was made in 1999 and that was a result of a clear vote. The efforts of the subcommittee should then constructively focus on the way to apply this principle decision concretely.
3. The only argument put forward against the inclusion of this new test is a supposed lack of technical data both concerning the incidents and the way research test have been performed. It is regrettable to see that after all the data and results provided some people just keep on repeating that there are no justifications without giving any technical arguments to support their view or even responding to the content of the data and results provided to support of the inclusion of the vibration test.
4. The expert from France would like to make the following comments to clarify and summarize the existing situation.

#### **On the general argumentation concerning the accident/incident data.**

5. It was dishonest from the very beginning to expect data coming from the accident data bases. Because it is well known that these databases are not detailed enough to allow the study of these phenomena.
6. Knowing this, there are basically two methods to analyse the behaviour of packaging in relation to vibrations. The first one consists in conducting a specific collection of failure data focused on this specific aspect, the second is to subject a sample of packages to vibrations simulating those encountered in reality.
7. France has followed the second way, By conducting a series of tests on a sample of approved packagings taken randomly from the market. More than 120 packagings corresponding to 15 different design types have been tested, according to three different test methods.
8. The judgement if the test method was simulating reality was first based on the way the vibrations were designed (and it is not questionable that in the ISO test the vibration design results from measurements on real road trips). The results of the test allow then to confirm this initial hypothesis. The tests also allow to compare the different methods to select the more suitable.

9. It has to be noted that the French delegation was not part of the ones who initiated the discussion on this vibration test and it was only after conducting this test campaign impartially that we defined our position. Because, especially after having the results of the test conducted according to the ISO standard, it is not questionable that some approved packagings on the market are not able to withstand vibrations encountered under normal conditions of transport.

10. Nethertheless it is true that because of a limited budget we had to make choices focusing our research on some packages where problems were more likely to happen. So mainly single packages for liquid were tested. And of course not all the packages on the market could be tested. So if the fact that there is a problem is not questionable the extent of this problem in real life is not precisely measured by the above mentioned study, and it is perfectly clear that the failure percentage during real trips is not measurable by these results.

11. Fortunately we have other data to evaluate the latter. Australia submitted an INF38 document at the last session of the subcommittee (France commented on this INF 38 in INF91). In this document the result of a study specifically focused on package failure were presented. The data were collected during 400000 road trips, and the conclusion showed a rate of 40 on one million trips packages failure under normal transport conditions of transport where 12 were due to vibration.

12. It is particularly interesting to note that the initial intention of this document was to show that a vibration test was not necessary because of the low failure rate. But there are results and their interpretation. 40 on one million or even 12 on one million are not to be considered as low or insignificant numbers.

13. In France only we have more than 5,6 million of such trips every year. If we trust the Australian study, that means that every year there are 224 failures where 67 are due to vibration. That makes it something happening every week. This is only for road transport in one country. An extension of that to all modes and the whole world makes it a problem happening almost once a day, if not more.

14. It is not serious from our committee not to react to a problem that is now proven to be of that extend.

15. In addition to these quantitative assessments, we also had many qualitative examples such as those given by the expert of Spain. It is, in particular a big concern to us, hearing that a manufacturer of metal drums asked for an exemption to the prescription of having the marking embossed on the bottom because the metal was so thin, that it could not resist to that operation, and Nethertheless the drums was able to pass the current performance tests.

### **Comments on specific point of the proposal in document ST/SG/AC10/C3/2004/88**

16. In addition to these general comments ICDM raises specific points presented as weaknesses in the argumentation from paper 2004/88.

These need to be answered:

- a) (point 2). There is an objection to reduce the scope of this test to a limited number of packaging types (single packages for liquids containing more than 60 litres).

ANSWER: we intended to make a balanced proposal. Only the types where problems have been revealed for sure are proposed to be subject to this additional vibration test. That doesn't exclude further developments in the future. This objection seems very strange and self contradicting the rest of the paper: one cannot object to take a decision that is not founded on one side and criticise the fact that this careful approach has been followed on the other side.

In addition there is a technical explanation why package containing solids show a better resistance: the solid substance plays a cushioning role.

Also smaller packages show a better resistance simply because the energy involved is low due to a lower mass of product involved.

A closer reading of the paper would have permitted to ICDM to find an answer to her objection.

- b) (points 3 and 4) This objection is difficult to understand because the proposal is not limited to metal drums. It is a fact that the metal drums tested resisted less than plastic drums. But not all did fail. Concerning the sturdiness of the packaging tested, different drums types with different wall thickness were chosen.
- c) (point 5) The second test run in Add3 was performed only to check the behaviour of packages what were fastened to the vibration platform as presented for transport in pallets. This was performed on drums that failed the first test (not fastened) only, in order to check if they would behave in a better way. It has to be noted that the bottom failed quicker but the wall did not suffer from the stacking. Therefore we propose to perform the test with packages not bound vertically. This was also performed to answer a comment from Germany on this subject at the december 2003 meeting
- d) (point 6) One point needs to be corrected the ISO test is a little bit more severe than the ASTM test level III which is the lowest level of this test corresponding to good quality roads. Compared to level I and II the ISO test is much easier to pass. In fact even compared to the ASTM level III only the highest frequency vibrations are at a higher energy level. The severity of the test depend on two factors the vibration design per se (acceleration density per frequency range) and the duration. It is perfectly in line with the regulation to act like in the other tests, and having increased requirement for higher packing groups. But the details of the proposal can be refined in the future.
- e) (Point 7) All the tests have been performed on UN marked packaging whose design types have been approved by RID/ADR competent authorities and manufactured under quality insurance control. The conformity of these is not questionable. One must understand that it is not reasonable to ask for further details what could allow to identified the manufacturer. This has never been the case before in this subcommittee. Concerning the test conditions such as location of the package, a closer look at the document would have shown to ICDM that the relevant information are already contained in it but we can give further details if necessary.
- f) (point 8) It is true that the machine for performing the random vibration test is more expensive than a mechanical one. But the cost of the test is actually not so high compared to the number of drums what are going to be manufactured on the basis of one design type. As shown in the document it is finally a very cost effective way to improve safety.

## Conclusion

Given all the data provided it is not reasonable to say that the existing regime for performance testing of the dangerous goods packaging is satisfactory. It appears that packagings are now constructed to withstand the tests under 6.1 and 6.5 but these are not a guarantee for withstanding all the transport conditions (even non accidental).

We welcome the support from ICCR in INF29. Our proposal could certainly be improved and we are ready to work further with other delegations and organisations ready to consider this in a constructive way.

We invite the sub committee to confirm that a vibration test will be included in the regulations and to concentrate on constructive input on that subject.