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**Joint Meeting of the RID Safety Committee and the
Working Party on the Transport of Dangerous Goods
(Bern, 24-28 March 2003)**

**INFORMATION FROM THE GOVERNMENT OF GERMANY CONCERNING
THE REAR PROTECTION OF BATTERY VEHICLES WITH TUBES**

Submitted by the Government of Germany */

Introduction

Related documents:

- INF 37 of the Joint Meeting (Berne, 18-22 March 2002)
- TRANS/WP.15/AC.1/2002/26 submitted to the RID/ADR Joint Meeting of 9 to 13 September 2002

In battery vehicles typically with 9 to 18 tubes per vehicle, each of 1,200 to 2,600 litres volume, each tube is individually closed. The closing valves are normally installed at the rear end.

In one accident which occurred in Germany, the rear impact was such that it resulted in a release of product from 3 of the 9 tubes. The battery vehicle was equipped with rear protection consisting of a frame whereby no individual valve protection was in place.

*/ Circulated by the Central Office for International Carriage by Rail (OCTI) under the symbol OCTI/RID/GT-III/2003/19.

In order to increase the protection against release of gases in the event of rear collisions, tests have been carried out by BAM.

Tests

In addition to the tests reported in document TRANS/WP.15/AC.1/2002/26, the industry has initiated further tests. In consequence, BAM has carried out destructive static load testing with the following equipment:

brass valves with protective guard
stainless steel valves with protective guard

The valves were mounted on a cylinder neck and held under an internal air pressure of 6 bar during the tests. They were tested by subjecting them to a test force at an angle of 10° in a hydraulic test machine until they failed and the internal pressure dropped to 3 bar. The piston stroke, the test force and the internal pressure were recorded.

Test results

The comparison of the force/deformation curves shows that both the brass valves and the steel valves had a similar force-strain behaviour during the first stage of the deformation of the protective guard. During the second stage, when the deformed protective guard reached the valve, the behaviour was different. The brass valves leaked due to cracks in the valve body and the steel valves leaked internally at the valve seat.

On the basis of the recorded force/deformation curves, the total energy absorption capacity for a battery vehicle with nine tubes can be estimated as follows:

for brass valves with protective guards: >200 kNm

for stainless steel valves with protective guards: >270 kNm

Additionally, the energy absorption capacity of the rear framework has to be taken into account. This framework has to be regarded as primary protection.

Conclusion

Tube battery vehicles with closing valves at the rear end satisfy the requirements as proposed in TRANS/WP.15/1999/15/ Rev.1 "Rear Protection of the Tank" if they are equipped with adequate permanent valve protection e.g. as described above.
