

OTIF



ORGANISATION INTERGOUVERNEMENTALE POUR
LES TRANSPORTS INTERNATIONAUX FERROVIAIRES

ZWISCHENSTAATLICHE ORGANISATION FÜR DEN
INTERNATIONALEN EISENBAHNVERKEHR

INTERGOVERNMENTAL ORGANISATION FOR INTER-
NATIONAL CARRIAGE BY RAIL

OTIF/RID/CE/2006/3

19 July 2006

Original: German

RID: 43rd Session of the Committee of Experts on the Transport of Dangerous Goods
(Helsinki, 2 – 5 October 2006)

Subject: Section 6.8.4 (b) Special provision TE 25
Measures to prevent and limit damage caused by the overriding of buffers; methods
for measuring the effectiveness of sandwich covers.

Information transmitted by Germany

Introduction

The RID Committee of Experts adopted measures to prevent and limit damage caused by the overriding of buffers; these are contained in special provision TE 25. They will enter into force in 2007 and also anticipate the use of a sandwich cover as a means of protection.

The applicability of the test method in standard EN 13094 for determining the specific energy absorption capacity was again discussed at the 42nd session of the RID Committee of Experts in Madrid and further treatment of the subject was transferred to the working group on tank and vehicle technology (report A 81-03/501.2006, paragraph 67).

At the meeting of the working group in London (6 and 7 April 2006), the representative of Germany reported on an alternative to the quasi-static test method used in standard EN 13094. He was subsequently asked to submit a more developed document to the RID Committee of Experts containing considerations on a test method and the future work. This document was also to contain an estimate of the costs of the tests required (report A 81-03/504.2006, paragraph 9).

For reasons of cost, only a limited number of copies of this document have been made. Delegates are asked to bring their own copies of documents to meetings. OTIF only has a small number of copies available.

Alternative test method

On the basis of the discussions in the RID Committee of Experts and the working group on tank and vehicle technology, further research was carried out in Germany, the purpose of which was to allow comparison of static and dynamic stresses of uninsulated tank walls (tank ends) and sandwich covers. The results of research from earlier investigations were taken into account.

For the purpose of comparison, the testing apparatus prescribed in standard EN 13094 was used without any modifications and the device for providing the required energy was replaced by an impact testing machine with an appropriate mass (pictures 1 and 2).

Initial tests

For the initial tests using this device, the sample restraint set out in the standard was selected (bolted assembly and spacer on a sandwich construction method). The results confirmed the assumption that the dynamic stresses would lead to low values for the energy absorption capacity. Depending on the mass/speed ratio, the reduction with mild steel was around 10-15%, and with sheets made of austenitic materials, around 20%.

The influence of the sample restraint and the comparison with real penetrations of tank ends in incidents or accidents must be investigated further. In the initial tests, the buckled samples with the restraint selected in the standard showed a good correlation with real damage patterns.

With sandwich covers, in addition to the properties of the material and the combinations of materials, the type and thickness of the insulation and the distance between the covering material and the shell walls is of significance. In the dynamic tests, 3mm thick austenitic sheets and 6 mm thick mild steel were used as the sample in all cases; in the tests, they were sheets without covering and for the comparison with various insulating materials they were covered.

Estimate of the cost of the test

In order to carry out the tests, instrumented devices for providing the forces and energies are required (universal testing devices, impact testing machines, drop test devices). According to our estimates, irrespective of the test method selected (static/dynamic), the costs of the test are around 300 to 400 Euros per sample.

Findings so far

It can be concluded from both test methods that the specific energy absorption capacity of a 6 mm thick shell made of mild steel corresponds to that of a 3 mm thick shell made of austenitic steel.

The sandwich cover can be optimised such that the properties required (mechanical protection, thermal insulation or a combination of both types of protection) are achieved. In our view, the construction of a sandwich cover using mild steel as mechanical protection makes no sense, as in this case, the "protective shield" saves more material according to special provision TE 25. Further comparative tests are required for the introduction of a dynamic test method and a suitable evaluation procedure of the values measured.



Picture 1 Quasi-static testing device



Picture 2 Dynamic testing apparatus
