

OTIF



**ORGANISATION INTERGOUVERNEMENTALE POUR
LES TRANSPORTS INTERNATIONAUX FERROVIAIRES**

**ZWISCHENSTAATLICHE ORGANISATION FÜR DEN
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**INTERGOVERNMENTAL ORGANISATION FOR INTER-
NATIONAL CARRIAGE BY RAIL**

OCTI/RID/CE/41/4a)

8 October 2004

(Original: French)

**RID: 41st Session of the Committee of Experts on the Transport of Dangerous Goods
(Meiningen, 15 - 18 November 2004)**

Subject: Protective measures to avoid damage caused by the overriding of buffers

Proposal transmitted by France

SUMMARY

Explanatory summary:

At its 40th session, the RID Committee of Experts adopted the principle of introducing, from 2007, additional protective measures for new-built tank wagons to avoid damage caused by the overriding of buffers.

This document proposes an addition and amendments to the text examined at the 40th session (see Report A 81-03/501.2004, paragraph 32 and Annex 1).

Measures:

The amendments proposed are:

- editorial amendments to clarify the definition of sandwich covers and protective shields;
- to introduce the possibility of using devices to protect against the overriding of buffers as an alternative to the measures examined at the 40th session of the RID Committee of Experts.

Related documents:

Document INF. F1 and Report A 81-03/507.2004 (paragraphs 22 et seq.) of the working group on tank and vehicle technology (Duisburg-Wedau, 24 and 25 June 2004).

Report A 81-03/501.2004 of the 40th session of the RID Committee of Experts, Annex 1.

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Introduction

At the meeting of the working group on tank and vehicle technology (Duisburg-Wedau, 24 and 25 June 2004), SNCF's materials engineering centre (Centre d'ingénierie du matériel de la SNCF) presented the results of a computed simulation in which a realistic collision scenario between two two-wagon sets was reproduced, directly involving an empty flat wagon and a tank wagon.

The computed simulation is described in document INF. F1 referred to above. In the simulation, the flat wagon is fitted with UIC category A buffers and the tank wagon is fitted with buffers equipped with energy absorption elements with an energy absorption capacity of 500 kJ/buffer.

The following general lessons can be drawn from this computed simulation:

- in the head-on collision scenario considered, overriding of the buffers, followed by lifting of the axle, is probable at the point of impact;
 - in the event of buffers overriding, the provisions prescribed at the 40th session of the RID Committee of Experts may not be sufficient to protect tanks;
 - on the other hand, some devices to protect against the overriding of buffers enable the wagons to remain well aligned during the collision and prevent the axle being lifted, which means there is no secondary shock between the chassis of the flat wagon and the tank.
- ⇒ France therefore proposes to include in the list of protective measures to avoid damage caused by the overriding of buffers the possibility of installing devices to protect against the overriding of buffers, which appear to be the most effective device in the event of a head-on collision;
- Technical definition: at present, a technical definition of devices to protect against the overriding of buffers has not been developed to the extent that a final wording can be submitted to the RID Committee of Experts for adoption. France proposes to incorporate in RID the principle of such devices to protect against the overriding of buffers, which will be covered in a "(reserved)" paragraph. The devices would then be finally approved as soon as they had a clear, legally valid technical definition.
 - Compatibility: compatibility must be taken into account in the technical definition of devices to protect against the overriding of buffers. Wagons fitted with devices to protect against the overriding of buffers must be compatible with other wagons, irrespective of whether the latter are not fitted with devices to protect against the overriding of buffers or whether they are fitted with devices in accordance with RID.
 - Fitting existing wagons: in principle, devices to protect against the overriding of buffers are a very promising solution for the retrofitting of existing wagons at reasonable cost. However, it will only be possible to show this once there is a clear and legally valid technical definition. For this reason, this document does not contain a proposal for retrofitting existing wagons.
- ⇒ In addition, the following editorial amendments are proposed in this document:
- Sandwich-cover: the text needs to be supplemented to clarify the method for measuring the specific energy absorption capacity.
 - Protective shield at each end of the wagon: the proposed amendment makes clear the position of the arresting device. It is also proposed to measure the minimum height of the protective shield from the centre-line of the buffers instead of from the top edge of the buffers, as the centre-line of the buffers is a better defined reference.

Proposal

6.8.4 (b) Insert new special requirement TE xx (left-hand column only) as follows:

"TE xx Shells of tank wagons shall also be protected ~~against damage caused by the overriding of buffers by means of~~ **by** at least one of the following or equivalent measures to avoid the overriding of buffers **and derailment or, failing that, to limit damage when buffers override:**

1. Measures to avoid overriding

(a) Device to protect against the overriding of buffers

(reserved) (until a legally valid technical definition is available)

2. Measures to limit damage when buffers override

- (a) Increasing the wall thickness of the tank ends or using other materials with a greater energy absorption capacity.

In this case, the wall thickness of the tank ends shall be at least 12 mm.

- (b) Sandwich cover for tank ends

If protection is provided by a sandwich cover, it shall cover the entire area of the tank ends and shall have a specific energy absorption capacity of at least 22 kJ (corresponding to a wall thickness of 6 mm), **which shall be measured in accordance with the method described in Annex B to EN standard 13094 "Tanks for the transport of dangerous goods - Metallic tanks with a working pressure not exceeding 0.5 bar - Design and construction"**.

- (c) Protective shield at each end of the wagon

If a protective shield is used at each end of the wagon, the following requirements shall apply:

- the protective shield shall protect the whole width of the tank;
- the protective shield shall protect ~~either two-thirds of the tank diameter, or at least 1000 mm of its height,~~ **beginning from the centre-line of the buffers and shall be equipped with an arresting device for climbing buffers;**
- the protective shield shall be equipped with an arresting device for climbing buffers. **Except in particular cases permitted by the body responsible for approval, the arresting device shall not be placed more than 650 mm above the centre-line of the buffers;**
- the protective shield shall have a minimum wall thickness of 6 mm;

- the protective shield and its attachment points shall be such that the possibility of the tank ends being penetrated by the protective shield itself is minimized.

The wall thicknesses specified in (a), (b) and (c) above relate to reference steel. If other materials are used, except if mild steel is used, the equivalent thickness shall be calculated in accordance with the formula in 6.8.2.1.18. The values of R_m and A to be used shall be specified minimum values according to material standards."

Justification

1. Remarks concerning terminology

(Concerns French text only).

2. Technical remarks concerning the measures prescribed by RID

- *Devices to protect against the overriding of buffers:* the benefit of such devices is clearly shown in the computed simulations referred to in the introduction. Unfortunately, it is not possible at present to propose a precise technical definition of devices to protect against the overriding of buffers. However, in order to illustrate this concept, a draft text for such devices to protect against the overriding of buffers is set out below:

1. Measures to avoid the overriding of buffers

(a) Device to protect against the overriding of buffers

This device shall be designed to withstand the raising of half the total mass of the wagon and to support a static load of at least 150 kN per buffer distributed at the contact point of this device and to limit vertical displacement in both directions.

In the event of a collision, this device shall come into effect as quickly as possible and shall remain effective in the event of vertical misalignment of the opposite buffers up to a value of 100 mm.

In the event of a collision with a wagon without a device to protect against the overriding of buffers or with a wagon fitted with devices to protect against the overriding of buffers in accordance with this special provision TE xx, the device shall remain effective.

These provisions shall be deemed to be met if the device is in conformity with UIC leaflet xxx.

- *Sandwich covers for tank ends:* it is proposed to refer specifically to Annex B, "Methods for measuring the specific energy absorption capacity" of EN standard 13094, "Tanks for the transport of dangerous goods - Metallic tanks with a working pressure not exceeding 0.5 bar - Design and construction". However, this standard only deals with metallic materials; it might be useful to set out certain conditions of use for composite materials.
- *Protective shield at each end of the wagon:* the position of the arresting device for climbing buffers should be specified; it should not be too high and should not exceed, in relation to the top edge of the buffers, the height of a buffer beam (it seems to us that over 650 mm above the centre-line of the buffers, there is a risk of this shield slewing and the arresting device thus becoming inoperable). In addition, it would be better to measure the minimum height of the protective shield from the centre-line of the buffers rather than from the top edge of the buffer

beam, as the centre-line of the buffers is a better defined reference. As the top edge of the buffer beam is usually 80 to 150 mm above the centre-line, it is proposed that the value of 900 mm be raised to 1000 mm correlatively.
