



**Economic and Social
Council**

Distr.
GENERAL

TRANS/WP.29/GRRF/2004/10
2 January 2004

ENGLISH ONLY

ECONOMIC COMMISSION FOR EUROPE

INLAND TRANSPORT COMMITTEE

World Forum for Harmonization of Vehicle Regulations (WP.29)

Working Party on Brakes and Running Gear (GRRF)
(Fifty-fifth session, 3-6 February 2004,
agenda item 1.1.)

PROPOSAL FOR DRAFT AMENDMENT TO DOCUMENT TRANS/WP.29/GRRF/2004/8
(REGULATION No. 13)

(Braking)

Transmitted by the expert from Denmark

Note: The text reproduced below was prepared by the expert from Denmark in order to prohibit the use of full trailers with inertia (overrun) braking system.

Note: This document is distributed to the Experts on Brakes and Running Gear only.

A. PROPOSAL

Paragraph 5.2.2.2., amend to read:

"5.2.2.2. Trailers of category O₂ must be equipped with a service braking system either of the continuous or semi-continuous or the inertia (overrun) type. The latter type shall be authorized only for **centre-axled trailers**. However, electrical braking systems conforming to the requirements of Annex 14 to this Regulation shall be permitted **on centre-axled trailers**."

Proposed new paragraphs 5.3. to 5.3.3.3. should be deleted.

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B. JUSTIFICATION

The above-mentioned text will forbid full trailers with overrun brakes, and will make the requirements for full trailers with other braking systems clearer.

Full trailers with two or three axles are potentially unstable. The problem is, that there is a tendency that the vehicle combination will jack-knife under braking, especially when braking during cornering.

The root of the problem basically goes back to the fact that a full trailer with inertia brakes does not have a load compensating system to take care of different load distributions and different frictions on the road.

On a centre-axled trailer with inertia brakes there is no problem with load distribution, because there is only one axle (or axle-group). In addition, it is common knowledge that the load must be placed so that there is a load on the coupling of 50-100 kg.

Semi trailers, centre axle trailers and full trailers above 3,500 kg must have anti lock brakes (ABS) and then the stability problem is not there anymore.

Lorries and buses must also have ABS, and soon all passenger cars will have ABS.

That leaves (a) the vans and (b) the trailers with inertia brakes behind as the vehicles with the lowest grade brakes.

Inertia brakes are very low tech compared to other vehicles. On centre-axled trailers that is not serious but on full trailers the stability problems are important.

A full trailer with inertia brakes will have a tendency to jack-knife under braking. This tendency is exaggerated when:

- The towing vehicle is braking very well (especially passenger cars are now braking very well, often 10 m/s^2).
- The friction on the road is low and the front axle of the trailer tends to lock first due to limited load transfer toward the front axle.
- The friction on the road is different left and right.
- The trailer brake distribution is front biased.
- When braking in a turn.
- When the load on the trailer is placed at the rear with little front axle weight.
- The trailer is three-axled with two rear axles.

When the limit for braking is reached with the full trailer, it will not only get longer braking distance or instability as with other vehicles, it will also damage both the rear of the towing vehicle, the coupling and the front of the trailer.

A front lock up on the inertia braked full trailer is critical. When deciding the brake distribution, it should go for no front lock up – also at low μ – but that will result in poor braking and premature rear lock up when braking at high μ . All the calculations can be put to no use, if the load is not distributed evenly, because the braking system will not – unlike other trailer types – compensate for that.

Full trailers with inertia brakes have never been allowed in Denmark due to the above-mentioned problems. However, there has never been a full investigation of the problem. Last year there was a small investigation (test with two vehicle combinations), and this test supported that the above-mentioned problems exist, and that modern vehicles' better brakes have made the problems bigger.
