

OTIF



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Subject: Position of the wagon in the train (protective distance rule)

Study by the International Union of Railways (UIC)

Introduction

RID 7.5.3 prescribes a “protective distance” for certain dangerous goods of Class 1. This distance is provided by the use of barrier wagons.

At the beginning of the 1990s, several States proposed that the principle of this protective distance be extended to cover other classes of danger, but the RID Committee of Experts opposed this at its 31st session (1995). More recently, at the 42nd session, one State wanted the subject of “barrier wagons” to be studied again and a new request to extend the principle of “barrier wagons” was made at the 43rd session. In 2006, UIC undertook to produce a study on the subject. The study was presented in June 2007 at the meeting of the working group on tank and vehicle technology.

Summary

Together with the accidentology and safety rules in force in railway operations, a detailed examination was made of the theories held by the States wishing to extend the principle of the “protective distance” between certain dangerous goods, as well as the intended aims. The study looks at the “barrier wagon” measure from the point of view of the advantages and disadvantages for safety and from the more global point of view of the cost/benefit ratio with regard to the carriage of dangerous goods by rail.

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The arguments put forward in the past by those who are opposed to extending the rule are still valid and some are even more justified now in view of how railway operations and rail safety management have developed. This measure also has a particularly negative impact from the point of view of the demands for economic balance in rail transport.

The accidentology does not show that the use of a “barrier wagon” is an effective measure for limiting the consequences of major accidents. On the contrary, overall safety in the transport of dangerous goods is weakened by the need to carry out other operations that are the source of risks. It would also be worth assessing the usefulness of the measure in conjunction with the other actions taken by the RID Committee of Experts. Lastly, this measure is particularly negative from the point of view of the economic balance of rail transport.

Summary

This document sets out the main points of the work carried out by UIC. The main arguments concerning the impact of the “barrier wagon” measure are grouped according to the three problem areas in rail transport: technical execution of the measure, its impact on safety and the consequences it has on the economic balance of the activity.

Technical execution

1) Application of the “protective distance” measure in European states is mainly limited to the current provisions of RID 7.5.3. Some States also place a barrier wagon between the locomotive and the first wagon carrying dangerous goods with a view to protecting the locomotive (and hence the driver). Generally, they also prescribe a barrier wagon at the end of the train so that the last wagon is not one carrying dangerous goods (to reduce the consequences in the event of another train hitting the back wagon).

2) When there are two goods wagons judged to be “incompatible” or potentially dangerous to each other in the event of an accident, some States require them to be separated, but one of the States involved backtracked after requiring the barrier wagon to be loaded, as the danger linked to empty barrier wagons was judged to be too great.

3) States that have recently joined the European Union create protective distances with the help of barrier wagons to prevent the risk of explosion and fire. In some cases, they use two or more wagons, but this measure has its origins in the rail operating conditions and is linked in particular to the presence of passenger coaches and the trains’ braking characteristics.

4) The concept of “protective” wagon itself, which is often used for the sake of convenience, is not appropriate in dealing with rail safety, particularly as there is no explanation of what it is protecting against. In an accident, a wagon may in fact be the source of risk for surrounding wagons, whatever load it is carrying. The concept of “barrier” wagon is more appropriate.

5) A barrier wagon is taken to mean a loaded or empty two or four-axle wagon which does not need protecting itself and which is not carrying dangerous goods. This wagon is or the wagons are:

- available in the train and the wagons are classified in such a way that they fulfil their role as barrier wagons;
- not available in the train, and others not being used for another transport operation must be used.

6) As it is not possible to identify the rail traffic that is affected by this measure and how frequently the measure is applied to traffic as a whole, the place it occupies among all the safety measures taken to reduce the probability of accidents and the consequences thereof cannot be assessed.

7) The studies that have been carried out in the past, generally after an accident has occurred all bring to light technical difficulties in providing wagons suitable for use as barrier wagons. These difficulties are more acute now owing to the reductions in wagon fleets as a result of the pressures of the productivity demands placed upon railway undertakings in the transport market.

8) If the measure set out in 7.5.3 were to be extended, this would mean that railway undertakings would have to provide a dedicated fleet of barrier wagons that could be placed in traffic schedule trains and set up new rules for incorporating wagons without having the technical means to observe them. This would make railway operations and train formation more complicated, whether for block trains from the consignor to the consignee or for grouped trains requiring marshalling operations.

9) For special-purpose trains, barrier wagons should be provided at the industrial sites belonging to the railway undertakings' customers or at the dispatching station. This requirement would cause industries and railway undertakings a number of technical problems.

10) The formation of trains in marshalling yards is increasingly automated with computerized pre-registration of wagons on the basis of their destination. Extending the "barrier wagon" rule would require the introduction of a new rule on incorporating wagons into the train or this would have to be done manually by human intervention. The question would also arise as to the field of application of the measure: feeder train (from customers to marshalling yard), inter marshalling-yard trains, distribution trains (from marshalling yard to customers).

Safety impact

The impact on safety of the "barrier wagon" rule has been studied comprehensively, including the negative effects that such a measure might have on safety as a result of the transfer or creation of new risks. As in disease prevention, it is important to understand the efficacy of the therapy in connection with its side effects.

The first step in the UIC study was to examine the public documents dealing with the accidentology of the carriage of dangerous goods and the data provided by the railways. As accidents are rare, the field of investigation was widened to cover all the available data, including those from the United States and Canada. The fact that the investigations dealt mainly with the consequences of accidents and not with the prevention of railway accidents lends credibility to the widened scope of the investigations, despite the differences in the regulations between North America and Europe, particularly with regard to public safety.

The quality of the information does not always make it possible to draw conclusive lessons. The statistics give little information on the real consequences of accidents, apart from the number of victims, and it is often very difficult to find out in detail what happened in the course of the accident. It is the accident research studies that are the most interesting. They generally cover major accidents. However, the information available within railway undertakings is often quite precise and enables investigations to be taken further by placing major accidents in the wider context of traffic and all the events that occurred.

11) Main European sources:

Report EUR 14549 EN – 1914-1990 – Collection of transport accidents involving dangerous goods, 1992.

INERIS (France) – "Global" Study – 2007

BARPI - ARIA database – 1990-2006 – Major accidents

UIC data

12) At the end of 2006, the international accidentology available in the ARIA database of the Bureau for Analysis of Industrial Risk and Pollution (BARPI) contained around 1100 accidents. 112 of these were extracted for study. Among these accidents, 64 involved 2 or more dangerous goods wagons. 32 accidents entailed serious personal consequences (deaths, serious injuries and mass evacuations). Six accidents could have degenerated into major accidents, but did not, thanks in two cases to the intervention of the emergency services.

13) The examination of these 112 cases does not allow us to confirm that placing barrier wagons between wagons carrying flammable goods and wagons carrying toxic gases would have reduced the seriousness of these accidents significantly. This finding dovetails with the study carried out by Sweden (Doc. INF. S 1, 31.3.2006 of the working group on tank and vehicle technology).

14) In 1994, a study was carried out in France at the request of the Ministry of Transport to verify whether the formation of homogeneous groups of wagons could make it easier to incorporate barrier wagons. This study was carried out following an accident in 1992. It shows that this arrangement, while on the face of it easier to do, was not a good solution for reducing risks. Accidents involving homogeneous groups of wagons are in fact more serious than accidents involving heterogeneous groups of wagons or isolated wagons.

15) Placing barrier wagons in a train is itself a source of risk because it requires additional manoeuvres for block trains and for trains with groups of wagons formed in marshalling yards. Even at slow speeds, these manoeuvres can be the source of sideways impacts, which are more dangerous for tanks than derailments or low speed collisions. In Europe, manoeuvres are carried out at a maximum speed of 30 or 40 km/h. In the studies available, the risk of a wagon derailing is generally calculated at 10^{-6} . The risk of a sideways impact, collision or derailment generated by implementing the measure would increase by a factor of at least 10.

16) The principle of the barrier wagon also poses safety management problems at railway sites where manoeuvres are carried out to incorporate wagons into trains, because it does not satisfy the logic of railway safety, which is to prevent risks in the best operating conditions in such a way as to achieve the maximum reduction in the frequency of incidents requiring external intervention which can lead to a deterioration in the regularity of rail traffic and hence in safety.

17) From the point of view of safety, it is important to examine the efficacy of this measure in the light of the other measures adopted or envisaged by the RID Committee of Experts, particularly with regard to the protection of tank-wagons.

18) Lastly, special operating measures complicate operations. Dangerous goods are carried on the same railway lines as goods and passenger trains. The basic principle of rail safety is to provide unified organization and to ensure that preventive measures benefit all traffic.

Economic aspects

Dangerous goods' share of the rail transport market varies from 5% to 20%, depending on the country, and the railways encounter serious difficulties in assuring their economic balance, particularly for grouped trains. This situation is linked to the special characteristics of mass transport, which is not always adapted to the needs of customers and to competition from road transport.

19) The study by Sweden (2006) shows that barrier wagons placed at the front and back of a train generate higher costs than the theoretical benefits linked to accidents avoided a priori. For mixed trains, the costs correspond to the highest benefits, i.e. to the most serious accident avoided.

20) In view of the technical constraints indicated above, it is clear that the measure is a source of not insignificant costs linked to the need for a dedicated fleet of barrier wagons, as trains may not necessarily have wagons that are suitable for use as barrier wagons. It is important to add to this the operational costs linked directly to the additional manoeuvres that have to be organized in marshalling yards or at customers' premises.

21) It can be imagined that companies that hire out wagons are not interested in this measure and that railway undertakings would be obliged to manage a fleet of wagons dedicated to this function.

22) The impact of this measure on the customers of railway undertakings could be particularly negative and discriminatory in the face of competition from the other transport modes. The cost of the measure should be offset by the price.

23) When they are not themselves loaded with goods for the same destination, the presence of barrier wagons in trains would pose a considerable economic problem, as the productivity of the wagon fleet is reduced, as is that of the trains. Any barrier wagons present might prevent the movement of goods trains.

Proposal

UIC requests that the RID Committee of Experts should not endorse the proposal to extend and impose the requirement for a “protective distance” in section 7.5.3 of RID to other danger classes.
