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**ECONOMIC COMMISSION FOR EUROPE**

INLAND TRANSPORT COMMITTEE

Ad hoc Multidisciplinary Group  
of Experts on Safety in Tunnels

**RECOMMENDATIONS OF THE GROUP OF  
EXPERTS ON SAFETY IN ROAD TUNNELS**

**FINAL REPORT**

**( E X C E R P T )**

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**C.4 VEHICLES  
as factor influencing safety in road tunnels**

**C.4.1 Principles**

**Technological developments**

With respect to the safety of road vehicles, there have been rapid technological developments over the past 10 to 15 years, with the result that motor vehicles (cars and trucks) are now safer than ever before.

In the course of these developments it has also proved possible to further reduce the risk of fire resulting from an accident (e.g. through requirements in respect to the impact of a crash and the associated safe placement of fuel tanks). Fires due to mechanical or electrical defects now occur less frequently and carrying out periodical checks on vehicles can minimize the risk.

The drawback of these technological developments and the resulting greater reliability of vehicles is that many drivers now have a false sense of increased safety and fail to observe existing physical laws and limits (e.g. vehicle mass, centrifugal force, braking distances, etc.).

Although vehicles now have a high standard of safety, adequate attention needs to be paid to their maintenance, especially of heavy goods vehicles. Periodical services and inspections should be carried out to ensure that brakes, turbochargers, electrical systems, etc. function correctly. It is essential to make sure that there are no leaks in fuel and oil feeds that could result in a fire.

### **International legal instruments**

Several legal instruments at the international level regulate vehicles. The main ones are the following:

#### *1968 Vienna Convention on Road Traffic*

In accordance with the international Convention on road traffic dated 8 November 1968, all contracting parties are required to admit to their territories all motor vehicles and trailers from other countries which meet the technical conditions laid down in annex 5 of the Convention.

*Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be fitted and/or be used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals granted on the basis of these Prescriptions, of 20 March 1958.*

One of the purposes of this Agreement, which is completed by over 110 technical Regulations is to facilitate the use on the territory of a Contracting Party of vehicles, equipment and parts approved according to these prescriptions by the competent authorities of another Contracting Party.

#### *Agreement on Periodical Technical Inspections*

The international agreement dated 13 November 1997 on the adoption of Uniform Conditions for Periodical Technical Inspections of Vehicles and their Reciprocal Recognition foresees that motor vehicles with a weight of more than 3.5 t and which are used for international passenger or goods transport, will be required to undergo an annual technical inspection. At the EU level, Directive 96/96/EC of 20 December 1996 on the approximation of the laws of member States relating to roadworthiness tests for motor vehicles and their trailers defines types of vehicles submitted to technical inspections and the periodicity of those inspections.

### **Assessment of miscellaneous items**

#### *Fire extinguishers / fire-fighting systems*

Reliable fire extinguishers and fire-extinguishing systems are widely available on the market today. While extinguishers are fairly inexpensive, the installation of automatic fire-extinguishing systems in vehicles is more complex and costly. The degree of efficiency depends on the type and location of the fire. In order to ensure that fire extinguishers and fire-extinguishing systems remain functional, they need to be periodically checked by qualified specialists.

#### *Requirements regarding fuel tanks and their location in the vehicle*

In modern vehicles, fuel tanks are positioned so as to ensure the greatest possible degree of safety in the event of a collision. Fuel containers have to be installed so that they are protected against the impact of a collision at the front or rear of the vehicle.

ECE Regulation No. 34 on uniform provisions concerning the approval of vehicles with regard to the prevention of fire risks is the basic requirement for liquid fuel tanks. This regulation is now being amended to strengthen its prescriptions and to extend its scope to all categories of vehicles. The Regulation once amended will not only be equivalent in scope to Directive 70/221/EEC of 20 March 1970, on the approximation of the laws of member States relating to liquid fuel tanks and rear

protective devices for motor vehicles and their trailers, last amended by Directive 2000/8/EC, but introduce additional requirements such as frontal and lateral collision test procedures according to ECE Regulations No. 94 and 95.

### ***Engine power***

Engine power is a risk factor when it comes to safety in tunnels, because vehicles without a strong enough engine are unable to maintain their speed on steep approach roads leading into tunnels in the mountains. This means that they represent an obstacle to other road users by adversely affecting traffic flow thus reducing the capacity of the road and/or leading to risky manoeuvres by other users.

### ***Turbochargers***

The allegation that hot turbochargers are often the cause of vehicle fires has not been confirmed in studies carried out to date. However, technical defects, especially components from which oil or fuel is able to leak out onto hot parts of the engine or exhaust pipe, increase the risk of a vehicle catching fire.

### ***Brakes***

According to surveys carried out by PIARC, hot brakes in heavy motor vehicles are frequently the cause of a fire. It is therefore essential that brakes be properly maintained and serviced by qualified specialists. Correctly adjusted brakes are much less likely to overheat.

### ***Video systems for monitoring freight; smoke detectors***

Video monitoring systems and smoke detectors are widely available on the market. The degree of efficiency of the latter depends on the type of fire concerned. Equipment is expensive and installation is often complex.

### ***Electrical systems***

In modern vehicles, all active electrical components are switched via safety and automatic fuses. If a short circuit should occur, the circuit concerned is automatically switched off and should be repaired as soon as possible.

Special requirements apply to vehicles that are used for the transport of dangerous goods.

### ***Noise reduction/encapsulation***

Modern vehicles have to meet increasingly stringent standards with respect to environmental protection and noise levels, and in addition to improvements in engine and drive design, these lead to the use of complex noise suppression methods such as engine encapsulation. The insulation material used for the latter purpose is fire-resistant, but under certain circumstances it can still catch fire if it remains in contact with hot engine parts or the exhaust system for an extended period of time.

## **C.4.2 Proposed measures for vehicles**

### **Measure 4.01 Fire extinguishing devices**

**It should be made compulsory for all heavy vehicles (heavy goods vehicles, buses and coaches) to be equipped with manual fire extinguisher(s). In addition, studies should be carried out of the possibility of equipping heavy goods vehicles, buses and coaches with heat-detection equipment, or possibly automatic extinguishing equipment.**

In many countries, manual fire extinguishers are already compulsory for these vehicles, in particular for buses, coaches and vehicles carrying dangerous goods. It should be extended to all heavy vehicles travelling in Europe.

### **Measure 4.02 Quantity of fuel carried**

**The quantity of fuel carried by heavy goods vehicles, buses and coaches without it being classified as transport of dangerous goods, should be reduced in order to diminish the potential consequences in the event of a vehicle fire in a tunnel.**

The Working Party on the Transport of Dangerous Goods (WP.15) and the World Forum for Harmonization of Vehicle Regulations (WP.29) of the Inland Transport Committee are invited to determine the maximum quantity of fuel which should be permitted on the basis of a risk reduction analysis in tunnels while also taking into account the need for an adequate driving range for commercial transport purposes.

### **Measure 4.03 Fire resistance of fuel tanks**

**A study should be conducted of the appropriateness and conditions for minimum fire resistance requirements for fuel tanks of heavy goods vehicles, buses and coaches.**

### **Measure 4.04 Weight and dimensions of heavy goods vehicles**

**It is recommended that no further increases be permitted of the width of heavy goods vehicles or of the weight of their cargo, which would lead to increased calorific capacity of heavy goods vehicles.**

The Group of Experts felt that the current tunnel infrastructure in Europe could not support any further increases in the width, length and permissible maximum weight of heavy goods vehicles.

### **Measure 4.05 Use of highly inflammable materials in vehicles**

**A study should be initiated for measures prohibiting the use of highly inflammable materials in the construction of vehicles (including refrigerated vehicles).**

These highly inflammable materials can give off a toxic vapour or accelerate the spread of fire to other vehicles.

### **Measure 4.06 Technical inspections**

**All heavy goods vehicles, buses and coaches should be subject to annual technical inspections, such as defined by the UNECE Agreement of 13 November 1997 or by the European Directive 96/96/EC, particularly for the points contributing to the prevention of vehicle fires.**

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