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**ECONOMIC COMMISSION FOR EUROPE**

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Working Party on the Transport of Dangerous Goods

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Item 5 of the provisional agenda

**PROPOSALS FOR AMENDMENTS TO ANNEXES A AND B OF ADR**

**Statement and recommendations on the recent ADR amendments regarding tunnels**

**Transmitted by the World Road Association (PIARC)**

**Background**

1. The Organisation for Economic Co-operation and Development (OECD) and the World Road Association (PIARC) jointly carried out a research project on Transport of Dangerous Goods through Road Tunnels between 1995 and 2001. The final report was published in October 2001 and included, among others, proposals for an harmonised system to express road tunnel regulations regarding dangerous goods.
2. The United Nations Economic Commission for Europe (UNECE) established an Ad hoc Multidisciplinary Group of Experts on Safety in Tunnels in 2000, and invited PIARC to take part and vice-chair. In their final report of 10 December 2001, this group recommended to adopt most of the OECD/PIARC proposals, including the harmonised system for dangerous goods regulations (measure 1.07) (Refer to document TRANS/AC.7/9). On 21 February 2002, the Inland Transport Committee approved the report of the ad hoc group and invited its subsidiary bodies to examine the possible incorporation of the recommendations into existing legal instruments, with the most appropriate formulation (resolution No. 249) (See ECE/TRANS/139, annex 1).
3. The Working Party on the Transport of Dangerous Goods (WP.15) has very cleverly re-formulated the proposals of the OECD/PIARC project to incorporate them into the European

Agreement concerning the International Carriage of Dangerous Goods by road (ADR). The corresponding amendments entered into force on 1 January 2007; their provisions have applied since 1 July 2007, but restrictions in accordance with national legislation may continue to be used until 31 December 2009.

4. For the sake of clarity, the present document uses the same wording as ADR, although some different terms were used in the OECD/PIARC report.

#### Statement and recommendations

5. The PIARC Technical Committee on Road Tunnel Operations is delighted that an harmonised regulatory system for dangerous goods through road tunnels has been implemented in ADR, and that this system is based on the proposals of the joint OECD/PIARC research project on Transport of Dangerous Goods through Road Tunnels.

6. Indeed the new tunnel categorisation of ADR brings an answer to the need for harmonised tunnel regulations throughout Europe. The problems posed by the variety and inconsistency of previous regulations had been highlighted by the OECD/PIARC project. The new system is expected to bring beneficial consequences for the organisation of dangerous goods transport and thus for economic development. It should also lead to reduced infringement as far as the new system is known and understood by all players, thanks to appropriate information and education.

7. However, despite the same, clear definition of principles for tunnel categories in ADR 2007, a few changes have been made in the tunnel restriction codes of some dangerous goods, compared to the OECD/PIARC proposals. Some of these changes lead to internal inconsistencies in the system, because the hazards of these goods are generally larger in tunnels than reflected by their tunnel restriction codes. The result will be that tunnel authorities will assign some of their tunnels to a lower category (e.g. E instead of D) to avoid these hazards, which will lead to unnecessary restrictions and detrimental consequences on dangerous goods transport.

8. In order to ensure that the new system bring all its advantages and make it possible to choose tunnel categories which only ban those cargoes that cannot be accepted in a given tunnel, the PIARC Technical Committee on Road Tunnel Operations recommends that these limited inconsistencies be corrected as proposed in annex 1 and that ADR be amended accordingly. The related amendments should enter into force before the new system is compulsory for all tunnel restrictions, i.e. before end of 2009.

9. Annex 2 outlines a few examples of the consequences of the current limited inconsistencies.

Annex 1Proposed changes to ADR

The principles of the tunnel categories, as stated in 1.9.5.2 of ADR, are exactly the same as proposed by the OECD/PIARC project (the only difference is the exceptions in category E, which were not included in the OECD/PIARC proposals).

Table 1 – Principles of the tunnel categories (OECD/PIARC project and ADR)

Category A	No restriction for the transport of dangerous goods
Category B	Restriction for dangerous goods which may lead to a very large explosion
Category C	Restrictions for dangerous goods which may lead to a very large explosion, a large explosion or a large toxic release
Category D	Restrictions for dangerous goods which may lead to a very large explosion, to a large explosion, to a large toxic release or to a large fire
Category E	Restriction for all dangerous goods other than UN Nos. 2919, 3291, 3331, 3359 and 3373

It appears that the current tunnel restriction codes of the few dangerous goods mentioned in Table 2 do not fit with the above principles and should be corrected.

Table 2 – Proposed changes to the ADR tunnel restriction codes

Class	Classification code	Packing group	Tunnel restriction code 2007	Proposed restriction code	Comments
2	10		E	D1E	These are compressed gases, so that there is no risk of “very large” or “large” explosion. However, these are oxidizing gases (e.g. O <sub>2</sub> ): when suddenly released in a tunnel (confined atmosphere, high concentration), they may lead to generalised self-ignition near the accident and thus to a “large fire”.
2	2A & 20 3A & 30		E	C1E	These are liquefied gases (classification code 2) or refrigerated liquefied gases (classification code 3). They may lead to a “large explosion” (cold BLEVE: mechanical explosion with no fireball), which is very hazardous in some tunnels, e.g. immersed tunnels.

Class	Classification code	Packing group	Tunnel restriction code 2007	Proposed restriction code	Comments
3	All, except D and F2	III	E	D1E	For class 3, packing group III: <ul style="list-style-type: none"> <li>- Liquid desensitized explosives (classification code D, not considered here) have tunnel restriction code B, which does not call for comments.</li> <li>- Liquids carried at elevated temperature (classification code F2, not considered here) have tunnel restriction code D1E, which does not call for comments.</li> <li>- All other goods have tunnel restriction code E. Although these goods do not ignite easily in the open (e.g. diesel fuel), they are very likely to ignite in a tunnel if there is a pre-existing fire, which will lead to a "large fire". They should have tunnel restriction code D1E.</li> </ul>
6.1	All, except TF1 and TFC	I	D1E or E	C1E	For class 6.1, packing group I: <ul style="list-style-type: none"> <li>- Goods with classification code TF1 and TFC have tunnel restriction code C1D, which does not call for comments.</li> <li>- Goods with classification code TF2 and TW1 have tunnel restriction code D1E, and the others have tunnel restriction code E. Among these other goods, some are highly toxic by inhalation (e.g. UN No. 1541: acetone cyanohydrin), which would call for tunnel restriction code C1E.</li> </ul>
6.1	All	II	D1E or E	D1E	For class 6.1, packing group II: <ul style="list-style-type: none"> <li>- Goods with classification code TF1, TF2, TFC and TW1 have tunnel restriction code D1E, which does not call for comments.</li> <li>- Goods with other classification codes have tunnel restriction code E. Among these other goods, some are toxic by inhalation, which would call for tunnel restriction code D1E.</li> </ul>

Annex 2Examples of the consequences of current ADR inconsistenciesExample 1: Immersed tunnel not designed for explosions  
with current ADR: category E  
after corrections: category C

As a large majority of immersed tunnels, this example tunnel has not been designed for explosions. It may fail, at least locally, in case of:

- a “very large explosion” (“hot BLEVE”, typically the explosion followed by a fireball of a tank carrying liquefied LPG, when heated by a fire),
- a “large explosion” (including “cold BLEVE”, typically the mechanical explosion of a tank carrying an inert liquefied gas, heated by a fire).

A local failure will lead to a sudden flooding of the tunnel, with possible extensive loss of human lives and destruction of the tunnel.

On the other hand, this tunnel has two tubes, effective longitudinal ventilation, no risk of congestion, and its structure is protected against heat. A “large fire” can be managed with consequences not worse than on the open alternative routes. These alternative routes are longer and lead to more impact on the environment (either natural or urban).

In this example, the tunnel authorities want to ban all goods that may lead to a “very large” or a “large” explosion and want the corresponding goods to use an alternative open route. On the other hand, they are prepared to accept goods which may lead to a “large fire” (e.g. tanks carrying flammable liquids).

The goods which may lead to a “very large explosion” have tunnel classification code B when carried in tanks. Those which may lead to a “large explosion” should have tunnel classification code C when carried in tanks.

However, in ADR 2007, liquefied asphyxiant and oxidising gases (class 2, classification codes 2A, 2O, 3A, 3O) have tunnel classification code E, although they can lead to a “cold BLEVE”.

The goods which may lead to a “large fire” have tunnel classification code D.

Using the current ADR tunnel restriction codes, the tunnel authorities will assign the tunnel to category E, in order to ban vehicles carrying liquefied asphyxiant and oxidising gases in tanks. This will result in all dangerous goods being banned.

If the proposals of Annex 1 above are implemented, this tunnel will be assigned to category C, and the majority of dangerous goods will go through. This will be beneficial to both dangerous goods transport and the environment.

Remark:

The same situation would occur with a tunnel build under other buildings and, as most tunnels, not designed to resist explosions.

Example 2: Tunnel not designed for large fires

with current ADR: category E

after corrections: category D

This rather frequent example could for instance be a two-way tunnel, or a one-way congested tunnel. It is designed to manage usual fires without dangerous goods, but cannot effectively deal with a “large fire”, e.g. the fire of a tank of liquid hydrocarbons. The risk analysis shows that such vehicles lead to a much lower risk on the alternative open route. On the other hand, all other dangerous goods with tunnel classification code E do not lead to more severe risks on the tunnel route than on the alternative open route. The alternative open route is longer and leads to worse impact on the environment (e.g. natural environment, or crossing of urban areas).

As a consequence, the tunnel authorities want to ban goods which may lead to a “large fire” but are ready to allow those with a lower risk.

All dangerous goods which can lead to a “large fire” should have classification code B, C or D.

However, in ADR 2007, flammable liquids of packing group III (except classification codes D and F2) have classification code E. In a tunnel fire, these goods (e.g. diesel fuel or heating oil) are very likely to catch fire: this was observed in all large road tunnel fires such as Mont Blanc, Tauern, Gotthard, etc. If they are carried in tank, they will lead to a “large fire” (similar to the fire of a tank carrying motor spirit, which is in packing group II and has tunnel classification code D1E).

Using the current ADR tunnel restriction codes, the tunnel authorities will assign the tunnel to category E, in order to ban all vehicles which may lead to a “large fire”. This will result in all dangerous goods being banned.

If the proposals of Annex 1 above are implemented, this tunnel will be assigned to category D, and a number of dangerous goods will go through. This will be beneficial to both dangerous goods transport and the environment.

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