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## ECONOMIC COMMISSION FOR EUROPE INLAND TRANSPORT COMMITTEE

Joint Meeting of the RID Safety Committee and the  
Working Party on the Transport of Dangerous Goods  
(Geneva, 11-15 September 2006)  
Agenda item 2

### TANKS

#### Special Provisions of 6.8.4.

Transmitted by the Government of Portugal

#### 1. Introduction

The September 2005 Joint Meeting's working group on tanks discussed the documents TRANS/WP.15/AC.1/2005/55 submitted by Germany and INF 48 submitted by Belgium on the marking of special provisions on tanks. The documents were intensively discussed, but no solution could be found at this meeting. Some members of the working group referred again to problems that had occurred in practice. In the opinion of the majority of members, it would only be possible to achieve a standard procedure by clarifying the "If ... then" special provisions, since problems of interpretation still existed when these special provisions were applied (see report TRANS/WP.15/AC.1/100/Add.1. paragraph 9).

It is intended with this document to encourage wide reaching discussion of the interpretation and application of the special provisions and to foster harmonization in their use. Our focus is only in those special provisions that in our view must be clarified.

The origin of the special provisions of equipment (TE) were the equipment prescriptions defined in versions prior the 2001 restructured RID/ADR. For this reason, this document uses the last version of the RID/ADR (1999) prior to restructuring in order to establish a parallel between the special provisions (TE) and those equipment prescriptions.

#### 2. Special provisions of thermal insulation

Examining the special provisions (TE) we can see that there are four special provisions on thermal insulation which we reproduce below:

**"TE4** *Shells shall be equipped with thermal insulation made of materials which are not readily flammable."*

**"TE5** *If shells are equipped with thermal insulation, such insulation shall be made of materials which are not readily flammable."*

**"TE13** *Tanks shall be thermally insulated and fitted with a heating device on the outside."*

**"TE14** *Tanks shall be equipped with thermal insulation. The thermal insulation directly in contact with the shell shall have an ignition temperature at least 50 °C higher than the maximum temperature for which the tank was designed."*

## 2.1 TE4

The special provision TE4 is required only for class 4.1 substances (flammable solids, self-reactive substances and solid desensitized explosives) which are as follows:

UN N°	CLASS	P. G.	NAME AND DESCRIPTION	TANK CODE	SPECIAL PROV.
2304	4.1	III	NAPHTHALENE, MOLTEN	LGBV	TU27;TE6
2448	4.1	III	SULPHUR, MOLTEN	LGBV(+)	TU27;TE6
3176	4.1	II	FLAMMABLE SOLID, ORGANIC, MOLTEN, N.O.S.	LGBV	TU27;TE6
3176	4.1	III	FLAMMABLE SOLID, ORGANIC, MOLTEN, N.O.S.	LGBV	TU27;TE6

Examining in RID/ADR 1999 the prescriptions that were the origin of that special provision, we can see that the substances UN 2304 and UN 2448 belong to the item 5°, and the UN 3179 belong to the item 15° of marginal 2401. It can also be seen that marginal 211434 which applies to these substances, has precisely the same wording as the current TE4. It can also be seen that the text of this marginal doesn't apply for other substances carried at elevated temperatures.

The term “*not readily flammable*” is not clearly defined. Does it mean that if the thermal insulation directly in contact with the shell shall have an ignition temperature at least 50 °C higher than the maximum temperature for which the tank was designed, is not readily flammable?

## 2.2 TE5

The special provision TE5 is required for the following substances:

UN N°	CLASS	P. G.	NAME AND DESCRIPTION	TANK CODE	SPECIAL PROV.
1389	4.3	I	ALKALI METAL AMALGAM, LIQUID	L10BN(+)	TU1;TT3;TM2
1391	4.3	I	ALKALI METAL DISPERSION or ALKALINE EARTH METAL DISPERSION	L10BN(+)	TU1;TT3;TM2
1392	4.3	I	ALKALINE EARTH METAL AMALGAM, LIQUID	L10BN(+)	TU1;TT3;TM2
1407	4.3	I	CAESIUM	L10CH(+)	TU2;TU14;TE21
1415	4.3	I	LITHIUM	L10BN(+)	TU1;TT3;TM2
1420	4.3	I	POTASSIUM METAL ALLOYS, LIQUID	L10BN(+)	TU1;TT3;TM2
1421	4.3	I	ALKALI METAL ALLOY, LIQUID, N.O.S.	L10BN(+)	TU1;TT3;TM2
1422	4.3	I	POTASSIUM SODIUM ALLOYS, LIQUID	L10BN(+)	TU1;TT3;TM2
1423	4.3	I	RUBIDIUM	L10CH(+)	TU2;TU14;TE21
1428	4.3	I	SODIUM	L10BN(+)	TU1;TT3;TM2
2257	4.3	I	POTASSIUM	L10BN(+)	TU1;TT3;TM2
3401	4.3	I	ALKALI METAL AMALGAM, SOLID	L10BN(+)	TU1;TT3;TM2
3402	4.3	I	ALKALINE EARTH METAL AMALGAM, SOLID	L10BN(+)	TU1;TT3;TM2
3403	4.3	I	POTASSIUM METAL ALLOYS, SOLID	L10BN(+)	TU1;TT3;TM2
3404	4.3	I	POTASSIUM SODIUM ALLOYS, SOLID	L10BN(+)	TU1;TT3;TM2

According to RID/ADR 1999, all these substances, with the exception of UN 3401, 3402, 3403 and 3404 which at the time were not classified, belonged to item 11° a) of marginal 2471. It can also be seen that marginal 211435 which applies to these substances, has precisely the same wording as the current TE5.

This provision does not require tanks to be fitted with thermal insulation. It prescribes the condition of “not readily flammable” where insulation is fitted, which raises the above issue referred to TE4.

- How is one able to assert that a tank complies with the special provision TE5? When it “*shall be equipped with thermal insulation made of materials which are not readily flammable*” or when it is not fitted with insulation?
- In the latter case, what should be written in 9.6 of the vehicle approval certificate (ADR Certificate)?
- What measures should the inspecting authorities adopt regarding the transport of one of these substances if TE5 is not referred to the ADR Certificate?

### 2.3. TE14

TE14 is only required for the following substance:

UN N°.	CLASS	P. G.	NAME AND DESCRIPTION	TANK CODE	SPECIAL PROVISIONS
3257	9	III	ELEVATED TEMPERATURE LIQUID, N.O.S., at or above 100 °C and below its flashpoint (including molten metals, molten salts, etc.)	LGAV	TU35;TC7;TE6;TE18;TE24

This substance was only classified in RID/ADR since 1997. According to marginal 2901 of RID/ADR 1999, it is classified as 20° c). Marginal 211932, which applies to these substances, has the same wording as the current TE14, which does not, in our view, raise any doubts as to its interpretation.

For transport in tanks, this substance also requires compliance with special provisions TE6 and TE18, which we’ll examine ahead.

### 2.4. TE13

The TE13 applies only to the UN 1829 substance.

UN NO.	CLASS	P. G.	NAME AND DESCRIPTION	TANK CODE	SPECIAL PROVISIONS
1829	8	I	SULPHUR TRIOXIDE, STABILIZED	L10BH	TU32;TT5;TM3

This special provision has its origin in marginal 211833 of RID/ADR 1999. The type of insulation is not specified.

In any case, this does not raise any issues in our view.

## 3. Special provisions on valves

There are also other situations of overlap of special provisions, such as TE6 with TE23, and TE9 with TE11, as follows:

### 3.1. TE6 and TE23

“**TE6** Tanks may be equipped with a device of a design which precludes its obstruction by the substance carried and which prevents leakage and the build-up of excess overpressure or underpressure.”

“**TE23** Tanks shall be equipped with a device of a design which precludes its obstruction by the substance carried and which prevents leakage and the build-up of excess overpressure or underpressure.”

These two special provisions relate to the same device. The difference is that in TE23 the device is compulsory, while in TE6 it is optional. Let us now examine the substances covered by each of the special provisions:

### 3.1.1 TE6

TE6 is required for the following substances:

UN N°.	CLASS	P. G.	DESCRIPTION	TANK CODE	SPECIAL PROVISIONS
2304	4.1	III	NAPHTHALENE, MOLTEN	LGBV	TU27;TE4
2448	4.1	III	SULPHUR, MOLTEN	LGBV(+)	TU27;TE4
3176	4.1	II	FLAMMABLE SOLID, ORGANIC, MOLTEN, N.O.S.	LGBV	TU27;TE4
3176	4.1	III	FLAMMABLE SOLID, ORGANIC, MOLTEN,	LGBV	TU27;TE4
3257	9	III	ELEVATED TEMPERATURE LIQUID, N.O.S., at or above 100 °C and below its flashpoint (including molten metals, molten salts, etc.)	LGAV	TU35;TC7;TE14;TE18;TE24

The text of TE6 was amended in the 2005 version of the RID/ADR. Originally (RID/ADR 2001), it has the same wording as marginal 211436 of RID/ADR 1999 which was as follows: “*Shells...may be equipped with valves opening automatically inwards or outwards under the effect of a difference of pressure of between 20 kPa and 30 kPa (0.2 bar and 0.3 bar).*” In relation to UN 3257, this same text was inserted in marginal 211932.

The issues raised by special provision TE5 also apply to this provision, i.e.

- How is one able to assert that a tank complies with this special provision? When it is fitted with or not fitted with the device?
- In the latter case, what should be written in 9.6 of the vehicle approval certificate (ADR Certificate)?
- What measures should the inspecting authorities adopt regarding the transport of one of these substances if TE6 is not referred to the ADR Certificate? We must not overlook the fact that the use of such a device is not compulsory.

Another issue that appears relevant to us is the definition of over-pressure. Is over-pressure defined in relation to atmospheric pressure, maximum working pressure or tank design pressure?

### 3.1.2 TE23

TE23 is required for the following substances:

UN NO.	CLASS	P. G.	NAME AND DESCRIPTION	TANK CODE	SPECIAL PROVISIONS
3375	5.1	II	AMMONIUM NITRATE EMULSION OR SUSPENSION or GEL, intermediate for blasting explosives, liquid	LGAV(+)	TU3;TU12;TU26; TU39;TE10;TA1;T A3
3375	5.1	II	AMMONIUM NITRATE EMULSION OR SUSPENSION or GEL, intermediate for blasting explosives, liquid	SGAV(+)	TU3;TU12;TU26; TU39;TE10;TA1;T A3

These substances were not classified in RID/ADR 1999, only being classified in RID/ADR 2003, but they could not be carried in tanks. In the RID/ADR 2005 version, the substances are described in the above table. This special provision does not raise any issues other than the issue of over-pressure referred to in relation to TE6.

### 3.2. TE9 and TE11

**“TE9** Tanks shall be fitted in their upper part with a shut-off device preventing any build-up of excess pressure inside the shell due to the decomposition of the substances carried, any leakage of liquid, and any entry of foreign matter into the shell”.

**“TE11** Shells and their service equipment shall be so designed as to prevent the entry of foreign matter, leakage of liquid or any building up of dangerous excess pressure inside the shell due to the decomposition of the substances carried”.

These two special provisions relate to the same device. The difference is that in TE9 the device must necessarily be fitted in the upper part of the tank, while in TE11 fitting it in this location is optional. In practice however, it is only possible to locate this device in contact with the gaseous phase or the vapours from the substance, i.e. in the upper part of the tank. Let us now examine the substances covered by each of these provisions:

#### 3.2.1 TE9

This special provision is required for the following materials:

UN N°	CLASS	P. G.	NAME AND DESCRIPTION	TANK CODE	SPECIAL PROVISIONS
2015	5.1	I	HYDROGEN PEROXIDE, AQUEOUS SOLUTION, STABILIZED with more than 70% hydrogen peroxide	L4DV(+)	TU3;TU28;TC2; TE8;TT1
2015	5.1	I	HYDROGEN PEROXIDE, AQUEOUS SOLUTION, STABILIZED with more than 60% hydrogen peroxide and not more than 70% hydrogen peroxide	L4BV(+)	TU3;TU28;TC2; TE8;TT1
2426	5.1		AMMONIUM NITRATE, LIQUID, hot concentrated solution, in a concentration of more than 80% but not more than 93%	L4BV(+)	TU3;TU2;TU29 ; TC3;TE10;TA1

This special provision has its origin in paragraph 1 of marginal 211532 of RID/ADR 1999 and does not raise any issues in our view other than the issue of over-pressure already referred to in relation to TE23 and TE6.

#### 3.2.2 TE11

This special provision is required for the following substances:

UN N°	CLASS	P. G.	DESCRIPTION	TANK CODE	SPECIAL PROVISIONS
1791	8	II	HYPOCHLORITE SOLUTION	L4BV(+)	
1791	8	III	HYPOCHLORITE SOLUTION	L4BV(+)	
1908	8	II	CHLORITE SOLUTION	L4BV(+)	
1908	8	III	CHLORITE SOLUTION	L4BV(+)	
2014	5.1	II	HYDROGEN PEROXIDE, AQUEOUS	L4BV(+)	TU3;TC2;TE8;

			SOLUTION with not less than 20% but not more than 60% hydrogen peroxide (stabilized as necessary)		TT1
2984	5.1	III	HYDROGEN PEROXIDE, AQUEOUS SOLUTION with not less than 8% but less than 20% hydrogen peroxide (stabilized as necessary)	LGBV	TU3;TC2;TE8; TT1
3149	5.1	II	HYDROGEN PEROXIDE AND PEROXYACETIC ACID MIXTURE with acid(s), water and not more than 5% peroxyacetic acid, STABILIZED	L4BV(+)	TU3;TC2;TE8; TT1

Special provision TE11 has its origin in paragraph 2 of marginal 211532 and in marginal 211834 of RID/ADR 1999, and does not raise any further issues.

### 3.3. TE18

*“TE18 Tanks intended for the carriage of substances filled at a temperature higher than 190 °C shall be equipped with deflectors placed at right angles to the upper filling openings, so as to avoid a sudden localized increase in wall temperature during filling.”*

TE18 is only required for the following substance:

UN NO.	CLASS	P. G.	DESCRIPTION	TANK CODE	SPECIAL PROVISIONS
3257	9	III	ELEVATED TEMPERATURE LIQUID, N.O.S., at or above 100 °C and below its flashpoint (including molten metals, molten salts, etc.)	LGAV	TU35;TC7;TE6;TE14;TE24

This is a special provision exclusive to UN 3257 substance, which may be carried at a temperature below 190 °C, even if the tank has been designed for a higher temperature. In this case, must the tank approval document contain provision TE18 or not? Must the tank have deflectors or not? And what if it has deflectors but the material was loaded at a temperature below 190 °C?

In order to solve the problem, the French Government submitted a proposal to separate UN 3257 substances into two (see document TRANS/WP.15/AC.1/2005/63). This proposal was accepted and forms part of the amendments already approved for RID/ADR 2007, as follows.

(1)	(2)	(13)
3257	ELEVATED TEMPERATURE LIQUID, N.O.S., at or above 100 °C and below its flash-point (including molten metals, molten salts, etc.), filled at a temperature higher than 190 °C.	TU35 TC7 TE6 TE14 TE18 TE24
3257	ELEVATED TEMPERATURE LIQUID, N.O.S., at or above 100 °C and below its flash-point (including molten metals, molten salts, etc.), filled at or below 190 °C.	TU35 TC7 TE6 TE14 TE24

(Ref. Doc.: TRANS/WP.15/AC.1/2005/63)

As we stated at the RID/ADR meeting in September 2005 when the proposal was presented, we believe that it is not possible for the competent authorities to monitor the filling temperature of the substances.

In addition, if the fitting of deflectors is designed to protect the tank against thermal shock at the time of

filling, why are these devices not required for other substances that are filled at elevated temperatures?

It is also necessary to bear in mind that deflectors are not like other types of device such as valves, which can be easily fitted to and removed from a tank. Deflectors are welded to the shell of the tank and are fitted when the tank is constructed. For this reason, these devices have the same useful life as the tank since their removal could cause significant damage to the tank shell.

This being so, should not deflectors be regarded as a special provision for the construction "TC" of these tanks, and apply to all substances transported at elevated temperatures?

#### **4. Conclusions**

As recognised at the RID/ADR Joint Meeting in September 2005, there are certain situations that could rise different interpretations. The use of expressions such as "may" are vague and should be avoided. There are also certain special provisions which are redundant, and their merger with others or possible elimination should be considered.

For example, are the 4 special provisions on thermal insulation really necessary? Could not thermal insulation in itself be a construction requirement, having regard for example to paragraph 6.8.2.1.24? The same comment can be made in relation to TE18.

Is there not an overlap between TE6 and TE23? The same comment can be made in relation to TE9 and TE11.

Certain concepts such as "over-pressure" or "not readily flammable" need to be clarified so that there is harmonisation and clarity in their application.

The special provisions will only be able to perform their role of complementing the tank code effectively if they are clear and unambiguous. Only in this way will the competent authorities be able to write with total certainty on the approval document, and in the tank plate, only those provisions that the tank demonstrably complies with.

All comments on this matter, and in particular on this document, would be welcome.

If the Joint Meeting is in favour of the discussion of this matter, Portugal will submit a comprehensive proposal by the next session.

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