

**ANNEX B**

**PROVISIONS CONCERNING TRANSPORT EQUIPMENT  
AND TRANSPORT OPERATIONS**



## **PART 8**

### **Requirements for vehicle crews, equipment, operation and documentation**



## CHAPTER 8.1

### GENERAL REQUIREMENTS CONCERNING TRANSPORT UNITS AND EQUIPMENT ON BOARD

#### 8.1.1 Transport units

A transport unit loaded with dangerous goods may in no case include more than one trailer (or semi-trailer).

#### 8.1.2 Documents to be carried on the transport unit

8.1.2.1 In addition to the documents required under other regulations, the following documents shall be carried on the transport unit:

- (a) The transport documents prescribed in 5.4.1, covering all the dangerous goods carried and, when appropriate, the container packing certificate prescribed in 5.4.2;
- (b) The instructions in writing prescribed in 5.4.3, relating to all the dangerous goods carried;
- (c) A copy of the main text of the special agreement(s) concluded in accordance with Chapter 1.5, if carriage is carried out on the basis of such agreement(s);
- (d) Means of identification, which include a photograph, for each crew member, in accordance with 1.10.1.4.

8.1.2.2 Where the provisions of ADR require the following documents to be drawn up, they shall likewise be carried on the transport unit:

- (a) The certificate of approval referred to in 9.1.2 for each transport unit or element thereof;
- (b) The driver's training certificate prescribed in 8.2.1;
- (c) The permit authorizing the transport operation, as prescribed in 5.4.1.2.1 (c), 5.4.1.2.3.3, 2.2.41.1.13 and 2.2.52.1.8.

8.1.2.3 The instructions in writing prescribed in 5.4.3 shall be kept in a readily identifiable form in the driver's cab. The carrier shall ensure that the drivers concerned understand and are capable of carrying out these instructions properly.

8.1.2.4 Instructions in writing which are not applicable to the goods which are on board the vehicle shall be kept separate from pertinent documents in such a way as to prevent confusion.

#### 8.1.3 Placarding and marking

Transport units carrying dangerous goods shall be placarded and marked in conformity with Chapter 5.3.

## 8.1.4 Fire-fighting equipment

8.1.4.1 The following provisions apply to transport units carrying dangerous goods other than those referred to in 8.1.4.2:

- (a) Every transport unit shall be equipped with at least one portable fire extinguisher for the inflammability classes<sup>1</sup> A, B and C, with a minimum capacity of 2 kg dry powder (or an equivalent capacity for any other suitable extinguishing agent) suitable for fighting a fire in the engine or cab of the transport unit;
- (b) Additional equipment is required as follows:
  - (i) for transport units with a maximum permissible mass of more than 7.5 tonnes, one or more portable fire extinguishers for the inflammability classes<sup>1</sup> A, B and C, with a minimum total capacity of 12 kg dry powder (or an equivalent capacity for any other suitable extinguishing agent), of which at least one shall have a minimum capacity of 6 kg;
  - (ii) for transport units with a maximum permissible mass of more than 3.5 tonnes up to and including 7.5 tonnes, one or more portable fire extinguishers for the inflammability classes<sup>1</sup> A, B and C, with a minimum total capacity of 8 kg dry powder (or an equivalent capacity for any other suitable extinguishing agent), of which at least one shall have a minimum capacity of 6 kg;
  - (iii) for transport units with a maximum permissible mass of up to and including 3.5 tonnes, one or more portable fire extinguishers for the inflammability classes<sup>1</sup> A, B and C with a minimum total capacity of 4 kg dry powder (or an equivalent capacity for any other suitable extinguishing agent);
- (c) The capacity of the fire extinguisher(s) required under (a) may be deducted from the minimum total capacity of the extinguishers required under (b).

8.1.4.2 Transport units carrying dangerous goods in accordance with 1.1.3.6 shall be equipped with one portable fire extinguisher for the inflammability classes<sup>1</sup> A, B and C, with a minimum capacity of 2 kg dry powder (or an equivalent capacity for any other suitable extinguishing agent).

8.1.4.3 The extinguishing agent shall be suitable for use on a vehicle and shall comply with the relevant requirements of EN 3 Portable fire extinguishers, Parts 1 to 6 (EN 3-1:1996, EN 3-2:1996, EN 3-3:1994, EN 3-4:1996, EN 3-5:1996, EN 3-6:1995).

If the vehicle is equipped with a fixed fire extinguisher, automatic or easily brought into action for fighting a fire in the engine, the portable extinguisher need not be suitable for fighting a fire in the engine. The extinguishing agents shall be such that they are not liable to release toxic gases into the driver's cab or under the influence of the heat of the fire.

8.1.4.4 The portable fire extinguishers conforming to the provisions of 8.1.4.1 or 8.1.4.2 shall be fitted with a seal verifying that they have not been used.

In addition, they shall bear a mark of compliance with a standard recognized by a competent authority and an inscription at least indicating the date (month, year) of the next recurrent inspection or of the maximum permissible period of use, as applicable.

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<sup>1</sup> For the definition of the inflammability classes, see Standard EN 2:1992 Classification of fires.

The fire extinguishers shall be subjected to periodic inspections in accordance with authorized national standards in order to guarantee their functional safety.

- 8.1.4.5 The fire extinguishers shall be installed on the transport units in a way that they are easily accessible to the vehicle crew. The installation shall be carried out in such a way that the fire extinguishers shall be protected against effects of the weather so that their operational safety is not affected.

### **8.1.5 Miscellaneous equipment**

Every transport unit carrying dangerous goods shall be equipped with:

- (a) The following general purpose safety equipment:
- For each vehicle, at least one chock of a size suited to the weight of the vehicle and to the diameter of the wheels;
  - Two self-standing warning signs (e.g. reflective cones or triangles or flashing amber lights which are independent from the electrical equipment of the vehicle);
  - A suitable warning vest or warning clothing (e.g. as described in European Standard EN 471) for each member of the vehicle crew;
  - A pocket lamp (see also 8.3.4) for each member of the vehicle crew;
- (b) A respiratory protective device in conformity with additional requirement S7 (see Chapter 8.5) if this additional requirement applies according to the indication in Column (19) of Table A of Chapter 3.2;
- (c) The personal protection and the equipment necessary to take the additional and/or special actions referred to in the instructions in writing set out in 5.4.3.



## CHAPTER 8.2

### REQUIREMENTS CONCERNING THE TRAINING OF THE VEHICLE CREW

#### 8.2.1 General requirements concerning the training of drivers

- 8.2.1.1 Drivers of vehicles carrying dangerous goods shall hold a certificate issued by the competent authority or by any organization recognized by that authority stating that they have participated in a training course and passed an examination on the particular requirements that have to be met during carriage of dangerous goods.
- 8.2.1.2 Drivers of vehicles carrying dangerous goods shall attend a basic training course. Training shall be given in the form of a course approved by the competent authority. Its main objectives are to make drivers aware of hazards arising in the carriage of dangerous goods and to give them basic information indispensable for minimizing the likelihood of an incident taking place and, if it does, to enable them to take measures which may prove necessary for their own safety and that of the public and the environment, for limiting the effects of an incident. This training, which shall include individual practical exercises, shall act as the basis of training for all categories of drivers covering at least the subjects defined in 8.2.2.3.2.
- 8.2.1.3 Drivers of vehicles carrying dangerous goods in fixed tanks or demountable tanks with a capacity exceeding 1 m<sup>3</sup>, drivers of battery-vehicles with a total capacity exceeding 1 m<sup>3</sup> and drivers of vehicles carrying dangerous goods in tank-containers, portable tanks or MEGCs with an individual capacity exceeding 3 m<sup>3</sup> on a transport unit, shall attend a specialization training course for carriage in tanks covering at least the subjects defined in 8.2.2.3.3.
- 8.2.1.4 Drivers of vehicles carrying substances or articles of Class 1 (see additional requirement S1 in Chapter 8.5) or certain radioactive material (see special provisions S11 and S12 in Chapter 8.5) shall attend specialization training courses covering at least the subjects defined in 8.2.2.3.4 or 8.2.2.3.5.
- 8.2.1.5 By means of appropriate endorsements on his certificate made every five years by the competent authority or by any organization recognized by that authority, a vehicle driver shall be able to show that he has in the year before the date of expiry of his certificate completed refresher training and has passed corresponding examination. The new period of validity shall begin with the date of expiry of the certificate.
- 8.2.1.6 Initial or refresher basic training courses and initial or refresher specialization training courses may be given in the form of comprehensive courses, conducted integrally, on the same occasion and by the same training organization.
- 8.2.1.7 Initial training courses, refresher courses, practical exercises, examinations and the role of competent authorities shall comply with the provisions of 8.2.2.
- 8.2.1.8 All training certificates conforming to the requirements of this section and issued in accordance with the model shown in 8.2.2.8.3 by the competent authority of a Contracting Party or by any organization recognized by that authority shall be accepted during their period of validity by the competent authorities of other Contracting Parties.
- 8.2.1.9 The certificate shall be prepared in the language or one of the languages of the country of the competent authority which issued the certificate or recognized the issuing organization and, if this language is not English, French or German, also in English, French or German, except where otherwise provided by agreements concluded between the countries concerned with the transport operation.

## **8.2.2 Special requirements concerning the training of drivers**

8.2.2.1 The necessary knowledge and skills shall be imparted by training covering theoretical courses and practical exercises. The knowledge shall be tested in an examination.

8.2.2.2 The training provider shall ensure that the training instructors have a good knowledge of, and take into consideration, recent developments in regulations and training requirements relating to the carriage of dangerous goods. The training shall be practice-related. The training programme shall conform with the approval, on the subjects set out in 8.2.2.3.2 to 8.2.2.3.5. The initial training and refresher training shall also include individual practical exercises (see 8.2.2.4.5).

### **8.2.2.3 *Structure of training***

8.2.2.3.1 Initial and refresher training shall be given in the form of a basic course and, when applicable, specialization courses.

8.2.2.3.2 Subjects to be covered by the basic course will be, at least:

- (a) General requirements governing the carriage of dangerous goods;
- (b) Main types of hazard;
- (c) Information on environmental protection in the control of the transfer of wastes;
- (d) Preventive and safety measures appropriate to the various types of hazard;
- (e) What to do after an accident (first aid, road safety, basic knowledge about the use of protective equipment, etc.);
- (f) Marking, labelling, placarding and orange-coloured plate marking;
- (g) What a driver should and should not do during the carriage of dangerous goods;
- (h) Purpose and the method of operation of technical equipment on vehicles;
- (i) Prohibitions on mixed loading in the same vehicle or container;
- (j) Precautions to be taken during loading and unloading of dangerous goods;
- (k) General information concerning civil liability;
- (l) Information on multimodal transport operations;
- (m) Handling and stowage of packages;
- (n) Instructions on behaviour in tunnels (prevention and safety, action in the event of fire or other emergencies, etc.).

8.2.2.3.3 Special subjects to be covered by the specialization course for carriage in tanks shall be, at least:

- (a) Behaviour of vehicles on the road, including movements of the load;
- (b) Specific requirements of the vehicles;
- (c) General theoretical knowledge of the various and different filling and discharge systems;
- (d) Specific additional provisions applicable to the use of those vehicles (certificates of approval, approval marking, placarding and orange-coloured plate marking, etc.).

8.2.2.3.4 Special subjects to be covered by the specialization course for the carriage of substances and articles of Class 1 shall be, at least:

- (a) Specific hazards related to explosive and pyrotechnical substances and articles;
- (b) Specific requirements concerning mixed loading of substances and articles of Class 1.

8.2.2.3.5 Special subjects to be covered by the specialization course for the carriage of radioactive material of Class 7 shall be, at least:

- (a) Specific hazards related to ionizing radiation;
- (b) Specific requirements concerning packing, handling, mixed loading and stowage of radioactive material;
- (c) Special measures to be taken in the event of an accident involving radioactive material.

#### **8.2.2.4 *Initial training programme***

8.2.2.4.1 The minimum duration of the theoretical element of each initial course or part of the comprehensive course shall be as follows:

Basic course	18 teaching units <sup>1</sup>
Specialization course for carriage in tanks	12 teaching units <sup>1</sup>
Specialization course for carriage of substances and articles of Class 1	8 teaching units
Specialization course for carriage of radioactive material of Class 7	8 teaching units

8.2.2.4.2 The total duration of the comprehensive course may be determined by the competent authority, who shall maintain the duration of the basic course and the specialization course for tanks, but may supplement it with shortened specialization courses for Classes 1 and 7.

8.2.2.4.3 Teaching units are intended to last 45 minutes.

8.2.2.4.4 Normally, not more than eight teaching units are permitted on each day of the course.

8.2.2.4.5 The individual practical exercises shall take place in connection with the theoretical training, and shall at least cover first aid, fire-fighting and what to do in case of an incident or accident.

#### **8.2.2.5 *Refresher training programme***

8.2.2.5.1 Refresher training undertaken at regular intervals serves the purpose of bringing the drivers' knowledge up to date; it shall cover new technical, legal and substance-related developments.

8.2.2.5.2 Refresher training shall have been completed before the period referred to in 8.2.1.5 has expired.

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<sup>1</sup> Additional teaching units are required for practical exercises referred to in 8.2.2.4.5 below which will vary depending on the number of drivers under instruction.

- 8.2.2.5.3 The duration of the refresher training including individual practical exercises shall be of at least two days.
- 8.2.2.5.4 Normally, not more than eight teaching units shall be permitted on each training day.
- 8.2.2.6 *Approval of training***
- 8.2.2.6.1 The training courses shall be subject to approval by the competent authority.
- 8.2.2.6.2 Approval shall only be given with regard to applications submitted in writing.
- 8.2.2.6.3 The following documents shall be attached to the application for approval:
- (a) A detailed training programme specifying the subjects taught and indicating the time schedule and planned teaching methods;
  - (b) Qualifications and fields of activities of the teaching personnel;
  - (c) Information on the premises where the courses take place and on the teaching materials as well as on the facilities for the practical exercises;
  - (d) Conditions of participation in the courses, such as number of participants.
- 8.2.2.6.4 The competent authority shall organize the supervision of training and examinations.
- 8.2.2.6.5 Approval shall be granted in writing by the competent authority subject to the following conditions:
- (a) The training shall be given in conformity with the application documents;
  - (b) The competent authority shall be granted the right to send authorized persons to be present at the training courses and examinations;
  - (c) The competent authority shall be advised in time of the dates and the places of the individual training courses;
  - (d) The approval may be withdrawn if the conditions of approval are not complied with.
- 8.2.2.6.6 The approval document shall indicate whether the courses concerned are basic or specialization courses, initial or refresher courses.
- 8.2.2.6.7 If the training body, after a training course has been given approval, intends to make any alterations with respect to such details as were relevant to the approval, it shall seek permission in advance from the competent authority. This applies in particular to changes concerning the training programme.
- 8.2.2.7 *Examinations***
- 8.2.2.7.1 *Examinations for the initial basic course*
- 8.2.2.7.1.1 After completion of the basic training, including the practical exercises, an examination shall be held on the basic course.
- 8.2.2.7.1.2 In the examination, the candidate has to prove that he has the knowledge, insight and skill for the practice of professional driver of vehicles carrying dangerous goods as provided in the basic training course.

- 8.2.2.7.1.3 For this purpose the competent authority, or the examination body approved by that authority, shall prepare a catalogue of questions which refer to the items summarized in 8.2.2.3.2. Questions in the examination shall be drawn from this catalogue. The candidates shall not have any knowledge of the questions selected from the catalogue prior to the examination.
- 8.2.2.7.1.4 A single examination for comprehensive courses may be held.
- 8.2.2.7.1.5 Each competent authority shall supervise the modalities of the examination.
- 8.2.2.7.1.6 The examination shall take the form of a written examination or a combination of a written and oral examination. Each candidate shall be asked at least 25 written questions. The duration of the examination shall be at least 45 minutes. The questions may be of a varying degree of difficulty and be allocated a different weighting.
- 8.2.2.7.2 *Examinations for initial specialization courses for carriage in tanks or for carriage of explosive substances and articles or radioactive material*
- 8.2.2.7.2.1 After having sat the examination on the basic course and after having attended the specialization course for carriage in tanks or for the carriage of explosive or radioactive material, the candidate shall be allowed to take part in the corresponding examination.
- 8.2.2.7.2.2 This examination shall be held and supervised on the same basis as in 8.2.2.7.1.
- 8.2.2.7.2.3 At least 15 questions shall be asked with respect to each specialization course.
- 8.2.2.7.3 *Examinations for refresher training*
- 8.2.2.7.3.1 After having undertaken refresher training the candidate shall be allowed to take part in the corresponding examination.
- 8.2.2.7.3.2 The examination shall be held and supervised on the same basis as set out in 8.2.2.7.1.
- 8.2.2.7.3.3 In the examination at least 15 questions shall be asked with respect to the refresher training.
- 8.2.2.8 *Certificate of driver's training***
- 8.2.2.8.1 According to 8.2.1.8, the certificate shall be issued:
- (a) After completion of a basic training course, provided the candidate has successfully passed the examination in accordance with 8.2.2.7.1;
  - (b) If applicable, after completion of a specialization course for carriage in tanks or carriage of explosive substances or articles or of radioactive material, or after having acquired the knowledge referred to in special provisions S1 and S11 in Chapter 8.5, provided the candidate has successfully passed an examination in accordance with 8.2.2.7.2.
- 8.2.2.8.2 The certificate shall be renewed if the candidate furnishes proof of his participation in refresher training in accordance with 8.2.1.5 and if he has passed an examination in accordance with 8.2.2.7.3.
- 8.2.2.8.3 The certificate shall have the layout of the model below. It is recommended that the format shall be the same as the European national driving permit, namely A7 (105 mm × 74 mm), or a double sheet that can be folded to that format.

**Model of certificate**

**1**

**2**

ADR - TRAINING CERTIFICATE FOR  
DRIVERS OF VEHICLES CARRYING  
DANGEROUS GOODS

in tanks <sup>1</sup>                      other than in tanks <sup>1</sup>

Certificate No. ....

Distinguishing sign of issuing State .....

Valid for class(es) <sup>1,2</sup>

in tanks                      other than in tanks

- |               |               |
|---------------|---------------|
| 1             | 1             |
| 2             | 2             |
| 3             | 3             |
| 4.1, 4.2, 4.3 | 4.1, 4.2, 4.3 |
| 5.1, 5.2      | 5.1, 5.2      |
| 6.1, 6.2      | 6.1, 6.2      |
| 7             | 7             |
| 8             | 8             |
| 9             | 9             |

until (date) <sup>3</sup> .....

<sup>1</sup> Strike out what does not apply.

<sup>2</sup> For extension to other classes, see page 3.

<sup>3</sup> For renewal, see page 2.

Surname .....

First name(s) .....

Date of birth ..... Nationality .....

Signature of holder .....

Issued by .....

Date .....

Signature <sup>4</sup> .....

Renewed until .....

By .....

Date .....

Signature <sup>4</sup> .....

<sup>4</sup> and/or seal (or stamp) of issuing authority.

**3**

**4**

EXTENDED TO CLASS(ES) <sup>5</sup>

For national regulations only

in tanks

- |               |                                |
|---------------|--------------------------------|
| 1             |                                |
| 2             |                                |
| 3             | Date .....                     |
| 4.1, 4.2, 4.3 |                                |
| 5.1, 5.2      | Signature and/or seal or stamp |
| 6.1, 6.2      | .....                          |
| 7             |                                |
| 8             |                                |
| 9             |                                |

other than in tanks

- |               |                                |
|---------------|--------------------------------|
| 1             |                                |
| 2             |                                |
| 3             | Date .....                     |
| 4.1, 4.2, 4.3 |                                |
| 5.1, 5.2      | Signature and/or seal or stamp |
| 6.1, 6.2      | .....                          |
| 7             |                                |
| 8             |                                |
| 9             |                                |

<sup>5</sup> Strike out what does not apply.

**8.2.3 Training of persons other than the drivers holding a certificate in accordance with 8.2.1, involved in the carriage of dangerous goods by road**

Persons whose duties concern the carriage of dangerous goods by road shall have received training in the requirements governing the carriage of such goods appropriate to their responsibilities and duties according to Chapter 1.3. This requirement shall apply to individuals such as personnel who are employed by the road vehicle operator or the consignor, personnel who load or unload dangerous goods, personnel in freight forwarding or shipping agencies and drivers of vehicles other than drivers holding a certificate in accordance with 8.2.1, involved in the carriage of dangerous goods by road.



## **CHAPTER 8.3**

### **MISCELLANEOUS REQUIREMENTS TO BE COMPLIED WITH BY THE VEHICLE CREW**

#### **8.3.1 Passengers**

Apart from members of the vehicle crew, no passengers may be carried in transport units carrying dangerous goods.

#### **8.3.2 Use of fire-fighting appliances**

The crew of the vehicle shall know how to use the fire-fighting appliances.

#### **8.3.3 Prohibition on opening packages**

A driver or a driver's assistant may not open a package containing dangerous goods.

#### **8.3.4 Portable lighting apparatus**

A vehicle may not be entered by persons carrying lighting apparatus comprising a flame. In addition, the lighting apparatus used shall not exhibit any metal surface liable to produce sparks.

#### **8.3.5 Prohibition on smoking**

Smoking shall be prohibited during handling operations in the vicinity of vehicles and inside the vehicles.

#### **8.3.6 Running the engine during loading or unloading**

Except where the engine has to be used to drive the pumps or other appliances for loading or unloading the vehicle and the laws of the country in which the vehicle is operating permit such use, the engine shall be shut off during loading and unloading operations.

#### **8.3.7 Use of the parking brake**

No transport unit carrying dangerous goods may be parked without the parking brakes being applied.



## CHAPTER 8.4

### REQUIREMENTS CONCERNING THE SUPERVISION OF VEHICLES

Vehicles carrying dangerous goods in the quantities shown in special provisions S1 (6) and S14 to S21 of Chapter 8.5 for a given substance according to Column (19) of Table A of Chapter 3.2 shall be supervised or alternatively may be parked, unsupervised, in a secure depot or secure factory premises. If such facilities are not available, the vehicle, after having been properly secured, may be parked in an isolated position meeting the requirements of (a), (b) or (c) below:

- (a) A vehicle park supervised by an attendant who has been notified of the nature of the load and the whereabouts of the driver;
- (b) A public or private vehicle park where the vehicle is not likely to suffer damage from other vehicles; or
- (c) A suitable open space separated from the public highway and from dwellings, where the public does not normally pass or assemble.

The parking facilities permitted in (b) shall be used only if those described in (a) are not available, and those described in (c) may be used only if facilities described in (a) and (b) are not available.



## CHAPTER 8.5

### ADDITIONAL REQUIREMENTS RELATING TO PARTICULAR CLASSES OR SUBSTANCES

In addition to the requirements of Chapters 8.1 to 8.4, when reference is made to them in Column (19) of Table A of Chapter 3.2, the following requirements shall apply to the carriage of the substances or articles concerned. In the event of conflict with the requirements of Chapters 8.1 to 8.4, the requirements of this Chapter shall take precedence.

**S1: Additional requirements concerning the carriage of explosive substances and articles (Class 1)**

**(1) *Special training of drivers***

- (a) The requirements of 8.2.1 shall apply to drivers of vehicles carrying substances or articles of Class 1;
- (b) Drivers of vehicles carrying substances or articles of Class 1 shall attend a specialization training course covering at least the subjects defined in 8.2.2.3.4;
- (c) If, according to other regulations applicable in the country of a Contracting Party, a driver has followed equivalent training under a different regime or for a different purpose, covering the subjects referred to in (b), the specialization course may be totally or partially dispensed with.

**(2) *Approved official***

If the national regulations so provide, the competent authority of a country contracting party to ADR may require an approved official to be carried in the vehicle at the carrier's expense.

**(3) *Prohibition of fire and naked flame***

The use of fire or naked flame shall be prohibited on vehicles carrying substances and articles of Class 1, in their vicinity and during the loading and unloading of these substances and articles.

**(4) *Places of loading and unloading***

- (a) Loading or unloading of substances and articles of Class 1 shall not take place in a public place in a built-up area without special permission from the competent authorities;
- (b) Loading or unloading of substances and articles of Class 1 in a public space elsewhere than in a built-up area without prior notice thereof having been given to the competent authorities shall be prohibited, unless operations are urgently necessary for reasons of safety;
- (c) If, for any reason, handling operations have to be carried out in a public place, then substances and articles of different kinds shall be separated according to the labels;

- (d) When vehicles carrying substances and articles of Class 1 are obliged to stop for loading or unloading operations in a public place, a distance of at least 50 m shall be maintained between the stationary vehicles.

**(5) *Convoys***

- (a) When vehicles carrying substances and articles of Class 1 travel in convoy, a distance of not less than 50 m shall be maintained between each transport unit and the next;
- (b) The competent authority may lay down rules for the order or composition of convoys.

**(6) *Supervision of vehicles***

The requirements of Chapter 8.4 shall be applicable only when substances and articles of Class 1 having a total mass of explosive substance of more than 50 kg are carried in a vehicle.

In addition, these substances and articles shall be supervised at all times in order to prevent any malicious act and to alert the driver and the competent authorities in the event of loss or fire.

Empty uncleaned packagings are exempted.

**S2: Additional requirements concerning the carriage of flammable liquids or gases**

**(1) *Portable lamps***

Closed vehicles carrying liquids having a flash-point of not more than 61 °C or flammable substances or article of Class 2, shall not be entered by persons carrying lighting apparatus other than portable lamps so designed and constructed that they cannot ignite any flammable vapours or gases which may have penetrated into the interior of the vehicle.

**(2) *Operation of combustion heaters during loading or unloading***

The operation of combustion heaters of vehicles of type FL (see Part 9) is forbidden during loading and unloading and at loading sites.

**(3) *Precautions against electrostatic charges***

In the case of vehicles of type FL (see Part 9), a good electrical connection from the vehicle chassis to earth shall be established before tanks are filled or emptied. In addition, the rate of filling shall be limited.

**S3: Special provisions concerning the carriage of infectious substances**

For transport units carrying dangerous substances of Class 6.2, the requirements of 8.1.4.1 (b) and 8.3.4 shall not apply.

**S4: Additional requirements concerning carriage under controlled temperatures**

Maintenance of the prescribed temperature is essential for safe carriage. In general, there shall be:

- thorough inspection of the transport unit prior to loading;
- instructions to the carrier about the operation of the refrigeration system, including a list of the suppliers of coolant available en route;
- procedures to be followed in the event of loss of control;
- regular monitoring of operating temperatures; and
- availability of a back-up refrigeration system or spare parts.

The temperature of the air space within the transport unit shall be measured by two independent sensors and the output shall be so recorded that temperature changes are readily detectable.

The temperature shall be checked every four to six hours and logged.

If the control temperature is exceeded during carriage, an alert procedure shall be initiated involving any necessary repairs to the refrigeration equipment or an increase in the cooling capacity (e.g. by adding liquid or solid coolant). There shall also be frequent checking of the temperature and preparations for implementation of the emergency procedures. If the emergency temperature (see also 2.2.41.1.17 and 2.2.52.1.15 to 2.2.52.1.18) is reached, the emergency procedures shall be set in operation.

*NOTE: This provision S4 does not apply to substances referred to in 3.1.2.6 when substances are stabilized by the addition of chemical inhibitors such that the SADT is greater than 50 °C. In this latter case, temperature control may be required under conditions of carriage where the temperature may exceed 55 °C.*

**S5: Special provisions common to the carriage of radioactive material of Class 7 in excepted packages (UN Nos. 2908, 2909, 2910 and 2911) only**

The requirements of the instructions in writing of 8.1.2.1 (b) and of 8.2.1, 8.3.1 and 8.3.4 shall not apply.

**S6: Special provisions common to the carriage of radioactive material of Class 7 other than in excepted packages**

The provisions of 8.3.1 shall not apply to vehicles carrying only packages, overpacks or containers bearing category I-WHITE labels.

The provisions of 8.3.4 shall not apply provided there is no subsidiary risk.

**Other additional requirements or special provisions**

**S7:** When gases or articles designated with letters T, TO, TF, TC, TFC, TOC are being carried, each member of the vehicle crew shall be provided with a respiratory protective device enabling them to escape (e.g. escape hood or mask with a combined gas/particle cartridge A1B1E1K1-P1 or A2B2E2K2-P2, as described in European standard EN 141).

- S8:** When a transport unit is loaded with more than 2 000 kg of these substances, stops for service requirements shall as far as possible not be made near inhabited places or frequented places. A longer stop near such places is permissible only with the consent of the competent authorities.
- S9:** During the carriage of these substances, stops for service requirements shall as far as possible not be made near inhabited places or frequented places. A longer stop near such places is permissible only with the consent of the competent authorities.
- S10:** During the period April to October, when a vehicle is stationary, the packages shall, if the legislation of the country in which the vehicle is halted so requires, be effectively protected against the action of the sun, e.g. by means of sheets placed not less than 20 cm above the load.
- S11:**
- (1) The requirements of 8.2.1 shall apply.
  - (2) Drivers shall attend a specialization training course covering at least the subjects defined in 8.2.2.3.5.
  - (3) If, according to other regulations applicable in the country of a Contracting Party, a driver has followed equivalent training under a different regime or for a different purpose covering the subjects referred to in (2), the specialization course may be totally or partially dispensed with.
- S12:** If the total number of packages containing radioactive material carried does not exceed 10, and the sum of the carriage indices does not exceed 3, special provision S11 need not be applied. However, drivers shall then receive appropriate training, commensurate with and appropriate to their duties, which provides them with an awareness of the radiation hazards involved in the carriage of radioactive material. Such awareness training shall be confirmed by a certificate provided by their employer.
- S13:** When a consignment cannot be delivered, it shall be placed in a safe place; the competent authority should be informed as soon as possible and requested for instructions on how to proceed.
- S14:** The provisions of Chapter 8.4 concerning the supervision of vehicles shall apply when the total mass of these substances in the vehicle exceeds 100 kg.
- S15:** The provisions of Chapter 8.4 concerning the supervision of vehicles shall apply to substances of hazard group 4 whatever their mass and to substances of hazard group 3 when the total mass of such substances in the vehicle exceeds 100 kg. However, the provisions of Chapter 8.4 need not be applied when the loaded compartment is locked and the packages carried are otherwise protected against any illicit unloading.
- S16:** The provisions of Chapter 8.4 concerning the supervision of vehicles shall apply when the total mass of these substances in the vehicle exceeds 500 kg.
- In addition, vehicles carrying more than 500 kg of these substances shall be subject at all times to supervision to prevent any malicious act and to alert the driver and competent authorities in the event of loss or fire.
- S17:** The provisions of Chapter 8.4 concerning the supervision of vehicles shall apply when the total mass of these substances in the vehicle exceeds 1 000 kg.
- S18:** The provisions of Chapter 8.4 concerning the supervision of vehicles shall apply when the total mass of such substances in the vehicle exceeds 2 000 kg.

- S19:** The provisions of Chapter 8.4 concerning the supervision of vehicles shall apply when the total mass of such substances in the vehicle exceeds 5 000 kg.
- S20:** The provisions of Chapter 8.4 concerning the supervision of vehicles shall apply when the total mass of these substances in the vehicle exceeds 10 000 kg.
- S21:** The provisions of Chapter 8.4 concerning the supervision of vehicles shall apply to all material, in whatever mass. In addition, these goods shall be subject at all times to supervision to prevent any malicious act and to alert the driver and the competent authorities in the event of loss or fire. However, the provisions of Chapter 8.4 need not be applied where:
- (a) The loaded compartment is locked or the packages carried are otherwise protected against illicit unloading; and
  - (b) The dose rate does not exceed  $5\mu\text{Sv/h}$  at any accessible point on the outer surface of the vehicle.



## **PART 9**

# **Requirements concerning the construction and approval of vehicles**



## CHAPTER 9.1

### SCOPE, DEFINITIONS AND REQUIREMENTS FOR THE APPROVAL OF VEHICLES

#### 9.1.1 Scope and definitions

##### 9.1.1.1 *Scope*

The requirements of Part 9 shall apply to vehicles of categories N and O, as defined in Annex 7 of the Consolidated Resolution on the Construction of Vehicles (R.E.3)<sup>1</sup>, intended for the carriage of dangerous goods.

These requirements refer to vehicles, as regards their construction, type approval, ADR approval and annual technical inspection.

##### 9.1.1.2 *Definitions*

For the purposes of Part 9:

*"Vehicle"* means any vehicle, whether complete, incomplete or completed, intended for the carriage of dangerous goods by road;

*"EX/II vehicle"* or *"EX/III vehicle"* means a vehicle intended for the carriage of explosive substances and articles (Class 1);

*"FL vehicle"* means:

- (a) a vehicle intended for the carriage of liquids having a flash-point of not more than 61°C (with the exception of diesel fuel complying with standard EN 590:1993, gas oil, and heating oil (light) - UN No. 1202 - with a flash-point as specified in standard EN 590:1993) in fixed tanks or demountable tanks with a capacity exceeding 1 m<sup>3</sup> or in tank-containers or portable tanks with an individual capacity exceeding 3 m<sup>3</sup>; or
- (b) a vehicle intended for the carriage of flammable gases in fixed tanks or demountable tanks with a capacity exceeding 1 m<sup>3</sup> or in tank-containers, portable tanks or MEGCs with an individual capacity exceeding 3 m<sup>3</sup>; or,
- (c) a battery-vehicle with a total capacity exceeding 1 m<sup>3</sup> intended for the carriage of flammable gases;

*"OX vehicle"* means a vehicle intended for the carriage of hydrogen peroxide, stabilized or hydrogen peroxide, aqueous solution stabilized with more than 60% hydrogen peroxide (Class 5.1, UN No. 2015) in fixed tanks or demountable tanks with a capacity exceeding 1 m<sup>3</sup> or in tank-containers or portable tanks with an individual capacity exceeding 3 m<sup>3</sup>;

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<sup>1</sup> Document of the United Nations Economic Commission for Europe, TRANS/WP.29/78/Rev.1, as amended.

*"AT vehicle"* means:

- (a) a vehicle, other than FL or OX, intended for the carriage of dangerous goods in fixed tanks or demountable tanks with a capacity exceeding 1 m<sup>3</sup> or in tank-containers, portable tanks or MEGCs with an individual capacity exceeding 3 m<sup>3</sup>; or
- (b) a battery-vehicle with a total capacity exceeding 1 m<sup>3</sup> other than a FL vehicle;

*"Complete vehicle"* means any vehicle which does not need any further completion (e.g. one stage built vans, lorries, tractors, trailers);

*"Incomplete vehicle"* means any vehicle which still needs completion in at least one further stage (e.g. chassis-cab, trailer chassis);

*"Completed vehicle"* means any vehicle which is the result of a multi-stage process (e.g. chassis or chassis-cab fitted with a bodywork);

*"Type-approved vehicle"* means any vehicle which has been approved in accordance with ECE Regulation N. 105<sup>2</sup> or Directive 98/91/EC<sup>3</sup>;

*"ADR approval"* means certification by a competent authority of a Contracting Party that a single vehicle intended for the carriage of dangerous goods satisfies the relevant technical requirements of this Part as an EX/II, EX/III, FL, OX, or AT vehicle.

## 9.1.2 Approval of EX/II, EX/III, FL, OX and AT vehicles

**NOTE:** *No special certificates of approval shall be required for vehicles other than EX/II, EX/III, FL, OX and AT vehicles, apart from those required by the general safety regulations normally applicable to vehicles in the country of origin.*

### 9.1.2.1 General

EX/II, EX/III, FL, OX and AT vehicles shall comply with the relevant requirements of this Part.

Every complete or completed vehicle shall be subjected to a first inspection by the competent authority in accordance with the administrative requirements of this Chapter to verify conformity with the relevant technical requirements of Chapters 9.2 to 9.7.

The conformity of the vehicle shall be certified by the issue of a certificate of approval in accordance with 9.1.3.

When vehicles are required to be fitted with an endurance braking system, the manufacturer of the vehicle or his duly accredited representative shall issue a declaration of conformity with the relevant prescriptions of Annex 5 of ECE Regulation No. 13<sup>4</sup>. This declaration shall be presented at the first technical inspection.

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<sup>2</sup> ECE Regulation No. 105 (Uniform provisions concerning the approval of vehicles intended for the carriage of dangerous goods with regard to their specific constructional features).

<sup>3</sup> Directive 98/91/EC of the European Parliament and of the Council of 14 December 1998 relating to motor vehicles and their trailers intended for the transport of dangerous goods by road and amending Directive 70/156/EEC relating to the type approval of motor vehicles and their trailers (Official Journal of the European Communities No. L 011 of 16.01.1999, p. 0025 – 0036).

<sup>4</sup> ECE Regulation No. 13 (Uniform provisions concerning the approval of vehicles of categories M, N and O with regards to braking).

### **9.1.2.2**      *Requirements for type-approved vehicles*

At the request of the vehicle manufacturer or his duly accredited representative, vehicles subject to ADR approval according to 9.1.2.1 may be type-approved by a competent authority. The relevant technical requirements of Chapter 9.2 shall be considered to be fulfilled if a type approval certificate has been issued by a competent authority in accordance with ECE Regulation No. 105<sup>2</sup> or Directive 98/91/EC<sup>3</sup> provided that the technical requirements of the said Regulation or the said Directive correspond to those of Chapter 9.2 of this Part and provided that no modification of the vehicle alters its validity.

This type approval, granted by one Contracting Party, shall be accepted by the other Contracting Parties as ensuring the conformity of the vehicle when the single vehicle is submitted for inspection for ADR approval.

At the inspection for ADR approval, only those parts of the type-approved incomplete vehicle which have been added or modified in the process of completion shall be inspected for compliance with the applicable requirements of Chapter 9.2.

### **9.1.2.3**      *Annual technical inspection*

EX/II, EX/III, FL, OX and AT vehicles shall be subject to an annual technical inspection in their country of registration to make sure that they conform to the relevant requirements of this Part, and to the general safety regulations (concerning brakes, lighting, etc.) in force in their country of registration; if these vehicles are trailers or semi-trailers coupled behind a drawing vehicle, the drawing vehicle shall be subject to technical inspection for the same purposes.

The conformity of the vehicle shall be certified either by the extension of validity of the certificate of approval or by the issue of a new certificate of approval in accordance with 9.1.3.

## **9.1.3**      **Certificate of approval**

9.1.3.1      Conformity of EX/II, EX/III, FL, OX and AT vehicles with the requirements of this Part is subject to a certificate of approval (certificate of ADR approval) issued by the competent authority of the country of registration for each vehicle whose inspection yields satisfactory results.

9.1.3.2      A certificate of approval issued by the competent authority of one Contracting Party for a vehicle registered in the territory of that Contracting Party shall be accepted, so long as its validity continues, by the competent authorities of the other Contracting Parties.

9.1.3.3      The certificate of approval shall have the same layout as the model shown in 9.1.3.5. Its dimensions shall be 210 mm × 297 mm (format A4). Both front and back may be used. The colour shall be white, with a pink diagonal stripe.

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<sup>2</sup>      *ECE Regulation No 105 (Uniform provisions concerning the approval of vehicles intended for the carriage of dangerous goods with regard to their specific construction features).*

<sup>3</sup>      *Directive 98/91/EC of the European Parliament and of the Council of 14 December 1998 relating to motor vehicles and their trailers intended for the transport of dangerous goods by road and amending Directive 70/156/EEC relating to the type approval of motor vehicles and their trailers (Official Journal of the European Communities No L011 of 16.01.1999, p. 0025-0036).*

It shall be drawn up in the language or one of the languages of the country issuing it. If that language is not English, French or German, the title of the certificate of approval and any remarks under No. 11 shall also be drawn up in English, French or German.

The certificate of approval for a vacuum-operated waste tank-vehicle shall bear the following remark: "vacuum-operated waste tank-vehicle".

9.1.3.4

The validity of a certificate of approval shall expire not later than one year after the date of the technical inspection of the vehicle preceding the issue of the certificate. The next approval term shall, however, be related to the last nominal expiry date, if the technical inspection is performed within one month before or after that date.

However, in the case of tanks subject to compulsory periodic inspection this provision shall not mean that tightness (leakproofness) tests, hydraulic pressure tests or internal inspections of tanks have to be carried out at intervals shorter than those laid down in Chapters 6.8 and 6.9.

**9.1.3.5 Model for certificate of approval for vehicles carrying certain dangerous goods**

<b>CERTIFICATE OF APPROVAL FOR VEHICLES CARRYING CERTAIN DANGEROUS GOODS</b>			
This certificate testifies that the vehicle specified below fulfils the conditions prescribed by the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR).			
<b>1. Certificate No.:</b>	<b>2. Vehicle manufacturer:</b>	<b>3. Vehicle Identification No.:</b>	<b>4. Registration number (if any):</b>
<b>5. Name and business address of carrier, operator or owner:</b>			
<b>6. Description of vehicle:</b> <sup>1</sup>			
<b>7. Vehicle designation(s) according to 9.1.1.2 of ADR:</b> <sup>2</sup>			
EX/II	EX/III	FL	OX                      AT
<b>8. Endurance braking system:</b> <sup>3</sup>			
<input type="checkbox"/> Not applicable <input type="checkbox"/> The effectiveness according to 9.2.3.1.2 of ADR is sufficient for a total mass of the transport unit of ____ t <sup>4</sup>			
<b>9. Description of the fixed tank(s)/battery-vehicle (if any):</b>			
9.1 Manufacturer of the tank:			
9.2 Approval number of the tank/battery-vehicle:			
9.3 Tank manufacturer's serial number/Identification of elements of battery-vehicle:			
9.4 Year of manufacture:			
9.5 Tank code according to 4.3.3.1 or 4.3.4.1 of ADR:			
9.6 Special provisions according to 6.8.4 of ADR (if applicable):			
<b>10. Dangerous goods authorised for carriage:</b>			
The vehicle fulfils the conditions required for the carriage of dangerous goods assigned to the vehicle designation(s) in No. 7.			
10.1 In the case of an EX/II <input type="checkbox"/> goods of Class 1 including compatibility group J or EX/III vehicle <sup>3</sup> <input type="checkbox"/> goods of Class 1 excluding compatibility group J			
10.2 In the case of a tank-vehicle/battery-vehicle <sup>3</sup>			
<input type="checkbox"/> <input type="checkbox"/> only the substances permitted under the tank code and any special provisions specified in No. 9 may be carried <sup>5</sup> or <input type="checkbox"/> only the following substances (Class, UN number, and if necessary packing group and proper shipping name) may be carried:			
Only substances which are not liable to react dangerously with the materials of the shell, gaskets, equipment and protective linings (if applicable) may be carried.			
<b>11. Remarks:</b>			
<b>12. Valid until:</b>		Stamp of issuing service	
		Place, Date, Signature	

<sup>1</sup> According to the definitions for power-driven vehicles and for trailers of categories N and O as defined in Annex 7 of the Consolidated Resolution on the Construction of Vehicles (R.E.3) or in Directive 97/27/EC.

<sup>2</sup> Strike out what is not appropriate.

<sup>3</sup> Mark the appropriate.

<sup>4</sup> Enter appropriate value. A value of 44t will not limit the "registration / in-service maximum permissible mass" indicated in the registration document(s).

<sup>5</sup> Substances assigned to the tank code specified in No. 9 or to another tank code permitted under the hierarchy in 4.3.3.1.2 or 4.3.4.1.2, taking account of the special provision(s), if any.

**13. Extensions of validity**

Validity extended until

Stamp of issuing service, place, date, signature:

**NOTE:** *This certificate shall be returned to the issuing service when the vehicle is taken out of service; if the vehicle is transferred to another carrier, operator or owner, as specified in No. 5; on expiry of the validity of the certificate; and if there is a material change in one or more essential characteristics of the vehicle.*

## CHAPTER 9.2

### REQUIREMENTS CONCERNING THE CONSTRUCTION OF VEHICLES

9.2.1 EX/II, EX/III, FL, OX and AT vehicles shall comply with the requirements of this Chapter, according to the table below.

For vehicles other than of EX/II, EX/III, FL, OX and AT:

- the requirements of 9.2.3.1.1 (Braking equipment in accordance with ECE Regulation No. 13 or Directive 71/320/EEC) are applicable to all vehicles first registered (or which entered into service if the registration is not mandatory) after 30 June 1997;
- the requirements of 9.2.5 (Speed limitation device in accordance with ECE Regulation No. 89 or Directive 92/6/EEC) are applicable to all motor vehicles with a maximum mass exceeding 12 tonnes first registered after 31 December 1987.

		VEHICLES					COMMENTS
TECHNICAL SPECIFICATIONS		EX/II	EX/III	AT	FL	OX	
<b>9.2.2</b>	<b>ELECTRICAL EQUIPMENT</b>						
9.2.2.2	Wiring		X	X	X	X	
9.2.2.3	Battery master switch						
9.2.2.3.1			X <sup>a</sup>		X <sup>a</sup>		<sup>a</sup> The last sentence of 9.2.2.3.1 is applicable to vehicles first registered (or which entered into service if registration is not mandatory) as from 1 July 2005.
9.2.2.3.2			X		X		
9.2.2.3.3					X		
9.2.2.3.4			X		X		
9.2.2.4	Batteries	X	X		X		
9.2.2.5	Permanently energized circuits						
9.2.2.5.1					X		
9.2.2.5.2			X				
9.2.2.6	Electrical installation at rear of cab		X		X		
<b>9.2.3</b>	<b>BRAKING EQUIPEMENT</b>						
9.2.3.1	General provisions	X	X	X	X	X	
	Anti-lock braking system		X <sup>b, d</sup>	X <sup>b, d</sup>	X <sup>b, d</sup>	X <sup>b, d</sup>	<sup>b</sup> Applicable to vehicles first registered (or which entered into service if the registration is not mandatory) after 30 June 1993 in respect of motor vehicles (tractors and rigid vehicles) having a maximum mass exceeding 16 tonnes and trailers (i.e. full trailers, semi-trailers and centre-axle trailers) with a maximum mass exceeding 10 tonnes. Applicable to motor vehicles authorized to tow trailers with a maximum mass exceeding 10 tonnes, first registered after 30 June 1995. Applicable to all vehicles which are first approved in accordance with 9.1.2 after 30 June 2001 regardless of the date on which they were first registered. <sup>d</sup> Mandatory compliance for all vehicles as from 1 January 2010.

		VEHICLES					COMMENTS
TECHNICAL SPECIFICATIONS		EX/II	EX/III	AT	FL	OX	
	Endurance braking system		X <sup>c, g</sup>	X <sup>c, g</sup>	X <sup>c, g</sup>	X <sup>c, g</sup>	<sup>c</sup> Applicable to motor vehicles first registered after 30 June 1993 having a maximum mass exceeding 16 tonnes or authorized to tow a trailer with a maximum mass exceeding 10 tonnes. <sup>g</sup> Mandatory compliance for all motor vehicles as from 1 January 2010.
9.2.3.2	Emergency braking devices for trailers						
9.2.3.2.1		X					
9.2.3.2.2			X				
<b>9.2.4</b>	<b>PREVENTION OF FIRE RISKS</b>						
9.2.4.2	Vehicle cab					X	
9.2.4.3	Fuel tanks	X	X		X	X	
9.2.4.4	Engine	X	X		X	X	
9.2.4.5	Exhaust system	X	X		X		
9.2.4.6	Vehicle endurance braking		X	X	X	X	
9.2.4.7	Combustion heaters						
9.2.4.7.1 9.2.4.7.2 9.2.4.7.5		X <sup>e</sup>	X <sup>e</sup>	X <sup>e</sup>	X <sup>e</sup>	X <sup>e</sup>	<sup>e</sup> Applicable to motor vehicles equipped after 30 June 1999. Mandatory compliance by 1 January 2010 for vehicles equipped before 1 July 1999 .
9.2.4.7.3 9.2.4.7.4					X <sup>e</sup>		<sup>e</sup> Applicable to motor vehicles equipped after 30 June 1999. Mandatory compliance by 1 January 2010 for vehicles equipped before 1 July 1999.
9.2.4.7.6		X	X				
<b>9.2.5</b>	<b>SPEED LIMITATION DEVICE</b>	X <sup>f</sup>	X <sup>f</sup>	X <sup>f</sup>	X <sup>f</sup>	X <sup>f</sup>	<sup>f</sup> Applicable to motor vehicles with a maximum mass exceeding 12 tonnes first registered after 31 December 1987.
<b>9.2.6</b>	<b>COUPLING DEVICE OF TRAILERS</b>	X	X				

## **9.2.2 Electrical equipment**

### **9.2.2.1 General provisions**

The electrical installation as a whole shall meet the provisions of 9.2.2.2 to 9.2.2.6 in accordance with the table of 9.2.1.

### **9.2.2.2 Wiring**

9.2.2.2.1 The size of conductors shall be large enough to avoid overheating. Conductors shall be adequately insulated. All circuits shall be protected by fuses or automatic circuit breakers, except for the following:

- from the battery to the cold start and stopping systems of the engine;
- from the battery to the alternator;
- from the alternator to the fuse or circuit breaker box;
- from the battery to the starter motor;
- from the battery to the power control housing of the endurance braking system (see 9.2.3.1.2), if this system is electrical or electromagnetic;
- from the battery to the electrical lifting mechanism for lifting the bogie axle.

The above unprotected circuits shall be as short as possible.

9.2.2.2.2 Cables shall be securely fastened and positioned in such a way that the conductors are adequately protected against mechanical and thermal stresses.

### **9.2.2.3 Battery master switch**

9.2.2.3.1 A switch for breaking the electrical circuits shall be placed as close to the battery as practicable. If a single pole switch is used it shall be placed in the supply lead and not in the earth lead.

9.2.2.3.2 A control device to facilitate the disconnecting and reconnecting functions of the switch shall be installed in the driver's cab. It shall be readily accessible to the driver and be distinctively marked. It shall be protected against inadvertent operation by either adding a protective cover, by using a dual movement control device or by other suitable means. Additional control devices may be installed provided they are distinctively marked and protected against inadvertent operation. If the control device(s) are electrically operated, the circuits of the control device(s) are subject to the requirements of 9.2.2.5.

9.2.2.3.3 The switch shall have a casing with protection degree IP 65 in accordance with IEC Standard 529.

9.2.2.3.4 The cable connections on the switch shall have protection degree IP 54. However, this does not apply if these connections are contained in a housing which may be the battery box. In this case it is sufficient to insulate the connections against short circuits, for example with a rubber cap.

#### 9.2.2.4 **Batteries**

The battery terminals shall be electrically insulated or covered by an insulating battery box cover. If the batteries are not located under the engine bonnet, they shall be fitted in a vented box.

#### 9.2.2.5 **Permanently energized circuits**

9.2.2.5.1 (a) Those parts of the electrical installation including the leads which shall remain energized when the battery master switch is open, shall be suitable for use in hazardous areas. Such equipment shall meet the general requirements of IEC 60079, parts 0 and 14<sup>1</sup> and the additional requirements applicable from IEC 60079, parts 1, 2, 5, 6, 7, 11, 15 or 18<sup>2</sup>;

(b) For the application of IEC 60079 part 14<sup>1</sup>, the following classification shall be used:

Permanently energized electrical equipment including the leads which is not subject to 9.2.2.3 and 9.2.2.4 shall meet the requirements for Zone 1 for electrical equipment in general or meet the requirements for Zone 2 for electrical equipment situated in the driver's cab. The requirements for explosion group IIC, temperature class T6 shall be met.

However, for permanently energized electrical equipment installed in an environment where the temperature caused by non-electrical equipment situated in that environment exceeds the T6 temperature limit, the temperature classification of the permanently energized electrical equipment shall be at least that of the T4 temperature class.

(c) The supply leads for permanently energised equipment shall either comply with the provisions of IEC 60079, part 7 ("Increased safety") and be protected by a fuse or automatic circuit breaker placed as close to the source of power as practicable or, in the case of "intrinsically safe equipment", they shall be protected by a safety barrier placed as close to the source of power as practicable.

9.2.2.5.2 Bypass connections to the battery master switch for electrical equipment which must remain energized when the battery master switch is open shall be protected against overheating by suitable means, such as a fuse, a circuit breaker or a safety barrier (current limiter).

#### 9.2.2.6 **Provisions concerning that part of the electrical installation situated to the rear of the driver's cab**

The whole installation shall be so designed, constructed and protected such that it cannot provoke any ignition or short-circuit under normal conditions of use of vehicles and that these risks can be minimized in the event of an impact or deformation. In particular:

##### 9.2.2.6.1 *Wiring*

The wiring located to the rear of the driver's cab shall be protected against impact, abrasion and chafing during normal vehicle operation. Examples of appropriate protection are given in figures 1, 2, 3 and 4 below. However, the sensor cables of anti-lock braking devices do not need additional protection.

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<sup>1</sup> *The requirements of IEC 60079 part 14 do not take precedence over the requirement of this Part.*

<sup>2</sup> *As an alternative, the general requirements of EN 50014 and the additional requirements of EN 50015, 50016, 50017, 50018, 50019, 50020, 50021 or 50028 may be used*

**FIGURES**

Figure N°1

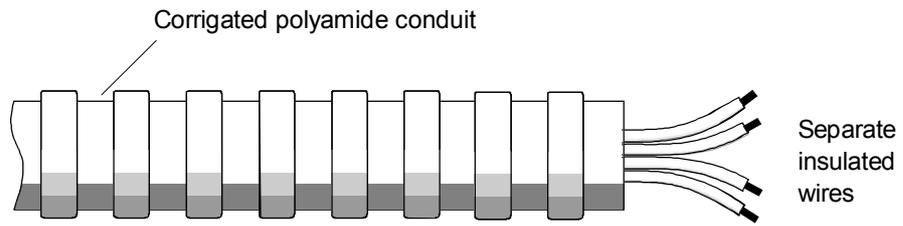


Figure N°2

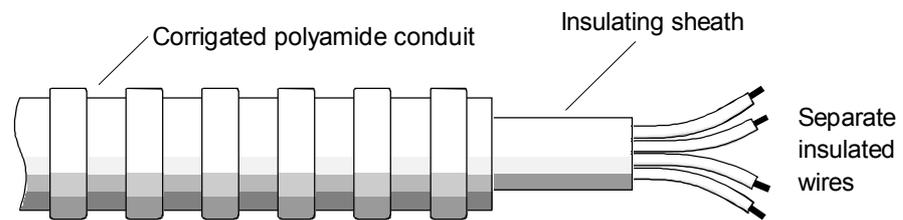


Figure N°3

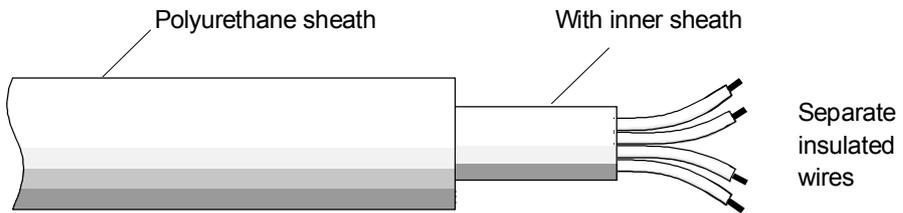
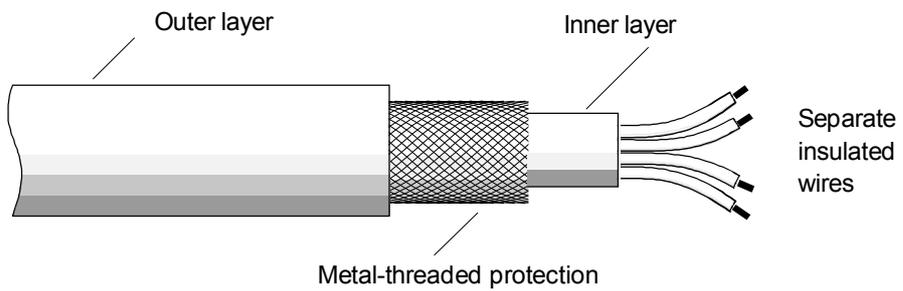


Figure N°4



#### 9.2.2.6.2 *Lighting*

Lamp bulbs with a screw cap shall not be used.

#### 9.2.2.6.3 *Electrical connections*

Electrical connections between motor vehicles and trailers shall have a protection degree IP54 in accordance with IEC standard 529 and be designed to prevent accidental disconnection. Examples of appropriate connections are given in ISO 12 098:1994 and ISO 7638:1985.

### **9.2.3 Braking equipment**

#### **9.2.3.1 *General provisions***

9.2.3.1.1 Motor vehicles and trailers intended for use as transport units for dangerous goods shall fulfil all relevant technical requirements of ECE Regulation No.13<sup>3</sup> or Directive 71/320/EEC<sup>4</sup>, as amended, in accordance with the dates of application specified therein.

9.2.3.1.2 EX/III, FL, OX and AT vehicles shall fulfil the requirements of ECE Regulation No.13<sup>3</sup>, Annex 5.

#### **9.2.3.2 *Emergency braking devices for trailers***

9.2.3.2.1 Trailers shall be equipped with an effective system for braking or restraining them if they become detached from the motor vehicle towing them.

9.2.3.2.2 Trailers shall be fitted with an effective braking device which acts on all the wheels, is actuated by the drawing vehicle's service-brake control and automatically stops the trailer in the event of breakage of the coupling.

### **9.2.4 Prevention of fire risks**

#### **9.2.4.1 *General provisions***

The following technical provisions shall apply in accordance with the table of 9.2.1.

#### **9.2.4.2 *Vehicle cab***

Unless the driver's cab is made of materials which are not readily flammable, a shield made of metal or other suitable material of the same width as the tank shall be fitted at the rear of the cab. Any windows in the rear of the cab or in the shield shall be hermetically closed and made of fire-resistant safety glass with fire-resistant frames. Furthermore, there shall be a clear space of not less than 15 cm between the tank and the cab or the shield.

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<sup>3</sup> ECE Regulation No. 13 (Uniform provisions concerning the approval of vehicles of categories M, N and O with regard to braking).

<sup>4</sup> Directive 71/320/EEC (originally published in the Official Journal of the European Communities No. L202 of 6.9.1971).

#### **9.2.4.3**      *Fuel tanks*

The fuel tanks for supplying the engine of the vehicle shall meet the following requirements:

- (a) In the event of any leakage, the fuel shall drain to the ground without coming into contact with hot parts of the vehicle or the load;
- (b) Fuel tanks containing petrol shall be equipped with an effective flame trap at the filler opening or with a closure enabling the opening to be kept hermetically sealed.

#### **9.2.4.4**      *Engine*

The engine propelling the vehicle shall be so equipped and situated to avoid any danger to the load through heating or ignition. In the case of EX/II and EX/III vehicles the engine shall be of compression-ignition construction.

#### **9.2.4.5**      *Exhaust system*

The exhaust system (including the exhaust pipes) shall be so directed or protected to avoid any danger to the load through heating or ignition. Parts of the exhaust system situated directly below the fuel tank (diesel) shall have a clearance of at least 100 mm or be protected by a thermal shield.

#### **9.2.4.6**      *Vehicle endurance braking*

Vehicles equipped with endurance braking systems emitting high temperatures placed behind the rear wall of the driver's cab shall be equipped with a thermal shield securely fixed and located between this system and the tank or load so as to avoid any heating, even local, of the tank wall or the load.

In addition, the thermal shield shall protect the braking system against any outflow or leakage, even accidental, of the load. For instance, a protection including a twin-shell shield shall be considered satisfactory.

#### **9.2.4.7**      *Combustion heaters*

9.2.4.7.1      Combustion heaters shall comply with the relevant technical requirements of Directive 2001/56/EC<sup>5</sup> in accordance with the dates of application specified therein and the provisions of 9.2.4.7.2 to 9.2.4.7.6 applicable according to the table in 9.2.1.

9.2.4.7.2      The combustion heaters and their exhaust gas routing shall be designed, located, protected or covered so as to prevent any unacceptable risk of heating or ignition of the load. This requirement shall be considered as fulfilled if the fuel tank and the exhaust system of the appliance conform to provisions similar to those prescribed for fuel tanks and exhaust systems of vehicles in 9.2.4.3 and 9.2.4.5 respectively.

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<sup>5</sup>      *Directive 2001/56/EC of the European Parliament and of the Council of 27 September 2001 relating to heating systems for motor vehicles and their trailers (initially published in the Official Journal of the European Communities No. L292 of 9 November 2001).*

- 9.2.4.7.3 The combustion heaters shall be put out of operation by at least the following methods:
- (a) Intentional manual switching off from the driver's cab;
  - (b) Stopping of the vehicle engine; in this case the heating device may be restarted manually by the driver;
  - (c) Start up of a feed pump on the motor vehicle for the dangerous goods carried.
- 9.2.4.7.4 After running is permitted after the combustion heaters have been put out of operation. For the methods of 9.2.4.7.3 (b) and (c) the supply of combustion air shall be interrupted by suitable measures after an afterrunning cycle of not more than 40 seconds. Only heaters shall be used for which proof has been furnished that the heat exchanger is resistant to the reduced afterrunning cycle of 40 seconds for the time of their normal use.
- 9.2.4.7.5 The combustion heater shall be switched on manually. Programming devices shall be prohibited.
- 9.2.4.7.6 Combustion heaters with gaseous fuels are not permitted.

## 9.2.5 Speed limitation device

Motor vehicles (rigid vehicles and tractors for semi-trailers) with a maximum mass exceeding 12 tonnes, shall be equipped with a speed limitation device according to the technical requirements of ECE Regulation No. 89<sup>6</sup>, as amended. The device shall be set in such a way that the speed cannot exceed 90 km/h, bearing in mind the technological tolerance of the device.

## 9.2.6 Coupling devices of trailers

Coupling devices of trailers shall comply with the technical requirements of ECE Regulation No. 55<sup>7</sup> or Directive 94/20/EC<sup>8</sup>, as amended, in accordance with the dates of application specified therein.

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<sup>6</sup> ECE Regulation No. 89: uniform provisions concerning the approval of:

- I. Vehicles with regard to limitation of their maximum speed;
- II. Vehicles with regard to the installation of a speed limitation device (SLD) of an approved type;
- III. Speed limitation devices (SLD).

*As an alternative, the corresponding provisions of directive 92/6/EEC of the Council of 10 February 1992 (originally published in the Official Journal of the European Communities No. L 057 of 02.03.1992) and directive 92/24/EEC of the Council of 31 March 1992 (originally published in the Official Journal of the European Communities No. L 129 of 14.05.1992), as amended, may apply provided that they have been amended in accordance with the latest amended form of ECE Regulation No. 89 applicable at the time of the vehicle approval.*

<sup>7</sup> ECE Regulation No. 55 (Uniform provisions concerning the approval of mechanical coupling components of combinations of vehicles).

<sup>8</sup> Directive 94/20/EC of the European parliament and of the Council of 30 of May 1994 (originally published in the Official Journal of the European Communities No. L 195 of 29.07.1994).



## CHAPTER 9.3

### ADDITIONAL REQUIREMENTS CONCERNING COMPLETE OR COMPLETED EX/II OR EX/III VEHICLES

#### 9.3.1 Materials to be used in the construction of vehicle bodies

No materials likely to form dangerous compounds with the explosive substances carried shall be used in the construction of the body.

#### 9.3.2 Combustion heaters

9.3.2.1 Combustion heaters may only be installed on EX/II and EX/III vehicles for heating of the driver's cab or the engine.

9.3.2.2 Combustion heaters shall meet the requirements of 9.2.4.7.1, 9.2.4.7.2, 9.2.4.7.5 and 9.2.4.7.6.

9.3.2.3 The switch of the combustion heater may be installed outside the driver's cab.

It is not necessary to prove that the heat exchanger is resistant to the reduced after running cycle.

9.3.2.4 No combustion heaters or fuel tanks, power sources, combustion air or heating air intakes as well as exhaust tube outlets required for the operation of the combustion heater shall be installed in the load compartment.

#### 9.3.3 EX/II vehicles

The vehicles shall be designed, constructed and equipped so that the explosives are protected from external hazards and the weather. They shall be either closed or sheeted. Sheetting shall be resistant to tearing and be of impermeable material, not readily flammable<sup>1</sup>. It shall be tautened so as to cover the loading area on all sides.

All openings in the load compartment of closed vehicles shall have lockable, close-fitting doors or rigid covers. The driver's compartment shall be separated from the load compartment by a continuous wall.

#### 9.3.4 EX/III vehicles

9.3.4.1 The vehicles shall be designed, constructed and equipped so that the explosives are protected from external hazards and the weather. These vehicles shall be closed. The driver's compartment shall be separated from the load compartment by a continuous wall. The loading surface shall be continuous. Load restraint anchorage points may be installed. All joints shall be sealed. All openings shall be capable of being locked. They shall be so constructed and placed as to overlap at the joints.

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<sup>1</sup> In the case of flammability, this requirement will be deemed to be met if, in accordance with the procedure specified in ISO standard 3795:1989 'Road vehicles, and tractors and machinery for agriculture and forestry - Determination of burning behaviour of interior materials', samples of the sheetting have a burn rate not exceeding 100 mm/min.

9.3.4.2 The body shall be made from heat and flame resistant materials with a minimum thickness of 10 mm. Materials classified as Class B-S<sub>3</sub>-d<sub>2</sub> according to standard EN 13501-1: 2002 are deemed to fulfil this requirement.

If the material used for the body is metal, the complete inside of the body shall be covered with materials fulfilling the same requirement.

### **9.3.5 Engine and load compartment**

The engine propelling an EX/II or EX/III vehicle shall be placed forward of the front wall of the load compartment; it may nevertheless be placed under the load compartment, provided this is done in such a way that any excess heat does not constitute a hazard to the load by raising the temperature on the inner surface of the load compartment above 80 °C.

### **9.3.6 External heat sources and load compartment**

The exhaust system of EX/II and EX/III vehicles or others parts of these complete or completed vehicles shall be so constructed and situated that any excess heat shall not constitute a hazard to the load by raising the temperature on the inner surface of the load compartment above 80 °C.

### **9.3.7 Electrical equipment**

9.3.7.1 The rated voltage of the electrical system shall not exceed 24V.

9.3.7.2 Any lighting in the load compartment of EX/II vehicles shall be on the ceiling and covered, i.e. with no exposed wiring or bulb.

In the case of Compatibility Group J, the electrical installation shall be at least IP65 (e.g. flame-proof Eex d). Any electrical equipment accessible from the inside of the load compartment shall be sufficiently protected from mechanical impact from the inside.

9.3.7.3 The electrical installation on EX/III vehicles shall meet the requirements of 9.2.2.2, 9.2.2.3, 9.2.2.4, 9.2.2.5.2 and 9.2.2.6.

The electrical installation in the load compartment shall be dust-protected (at least IP54 or equivalent) or, in the case of Compatibility Group J, at least IP65 (e.g. flame-proof Eex d).

## CHAPTER 9.4

### **ADDITIONAL REQUIREMENTS CONCERNING THE CONSTRUCTION OF THE BODIES OF COMPLETE OR COMPLETED VEHICLES INTENDED FOR THE CARRIAGE OF DANGEROUS GOODS IN PACKAGES (OTHER THAN EX/II AND EX/III VEHICLES)**

- 9.4.1 Combustion heaters shall meet the following requirements:
- (a) The switch may be installed outside the driver's cab;
  - (b) The device may be switched off from outside the load compartment; and
  - (c) It is not necessary to prove that the heat exchanger is resistant to the reduced after running cycle.
- 9.4.2 If the vehicle is intended for the carriage of dangerous goods for which a label conforming to models Nos. 1, 1.4, 1.5, 1.6, 3, 4.1, 4.3, 5.1 or 5.2 is prescribed, no fuel tanks, power sources, combustion air or heating air intakes as well as exhaust tube outlets required for the operation of the combustion heater shall be installed in the load compartment. It shall be ensured that the heating air outlet cannot be blocked by cargo. The temperature to which packages are heated shall not exceed 50° C. Heating devices installed inside the load compartments shall be designed so as to prevent the ignition of an explosive atmosphere under operating conditions.
- 9.4.3 Additional requirements concerning the construction of the bodies of vehicles intended for the carriage of given dangerous goods or specific packagings may be included in Part 7, Chapter 7.2 in accordance with the indications in Column (16) of Table A of Chapter 3.2, for a given substance.



## CHAPTER 9.5

### **ADDITIONAL REQUIREMENTS CONCERNING THE CONSTRUCTION OF THE BODIES OF COMPLETE OR COMPLETED VEHICLES INTENDED FOR THE CARRIAGE OF DANGEROUS SOLIDS IN BULK**

- 9.5.1 Combustion heaters shall meet the following requirements:
- (a) The switch may be installed outside the driver's cab;
  - (b) The device may be switched off from outside the load compartment; and
  - (c) It is not necessary to prove that the heat exchanger is resistant to the reduced after running cycle.
- 9.5.2 If the vehicle is intended for the carriage of dangerous goods for which a label conforming to models Nos. 4.1, 4.3 or 5.1 is prescribed, no fuel tanks, power sources, combustion air or heating air intakes as well as exhaust tube outlets required for the operation of the combustion heater shall be installed in the load compartment. It shall be ensured that the heating air outlet cannot be blocked by cargo. The temperature to which the load is heated shall not exceed 50 °C. Heating devices installed inside the load compartments shall be designed so as to prevent the ignition of an explosive atmosphere under operating conditions.
- 9.5.3 The bodies of vehicles intended for the carriage of dangerous solids in bulk shall meet the requirements of Chapter 6.11 and 7.3, as appropriate, including those of 7.3.2 or 7.3.3 which may be applicable in accordance with the indications in columns (10) or (17) respectively of Table A of Chapter 3.2 for a given substance.



## CHAPTER 9.6

### ADDITIONAL REQUIREMENTS CONCERNING COMPLETE OR COMPLETED VEHICLES INTENDED FOR THE CARRIAGE OF TEMPERATURE CONTROLLED SUBSTANCES

- 9.6.1 Insulated, refrigerated and mechanically-refrigerated vehicles intended for the carriage of temperature controlled substances shall conform to the following conditions:
- (a) the vehicle shall be such and so equipped as regards its insulation and means of refrigeration, that the control temperature prescribed in 2.2.41.1.17 and 2.2.52.1.16 and in 2.2.41.4 and 2.2.52.4 for the substance to be carried is not exceeded. The overall heat transfer coefficient shall be not more than  $0.4 \text{ W/m}^2\text{K}$ ;
  - (b) the vehicle shall be so equipped that vapours from the substances or the coolant carried cannot penetrate into the driver's cab;
  - (c) a suitable device shall be provided enabling the temperature prevailing in the loading space to be determined at any time from the cab;
  - (d) the loading space shall be provided with vents or ventilating valves if there is any risk of a dangerous excess pressure arising therein. Care shall be taken where necessary to ensure that refrigeration is not impaired by the vents or ventilating valves;
  - (e) the refrigerant shall not be flammable; and
  - (f) the refrigerating appliance of a mechanically refrigerated vehicle shall be capable of operating independently of the engine used to propel the vehicle.
- 9.6.2 Suitable methods (see V8(3)) to prevent the control temperature from being exceeded are listed in Chapter 7.2 (R1 to R5). Depending on the method used, additional provisions concerning the construction of vehicle bodies may be included in Chapter 7.2.



## CHAPTER 9.7

### **ADDITIONAL REQUIREMENTS CONCERNING FIXED TANKS (TANK-VEHICLES), BATTERY-VEHICLES AND COMPLETE OR COMPLETED VEHICLES USED FOR THE CARRIAGE OF DANGEROUS GOODS IN DEMOUNTABLE TANKS WITH A CAPACITY GREATER THAN 1 M<sup>3</sup> OR IN TANK-CONTAINERS, PORTABLE TANKS OR MEGCs OF A CAPACITY GREATER THAN 3 M<sup>3</sup> (FL, OX AND AT VEHICLES)**

#### **9.7.1 General provisions**

- 9.7.1.1 In addition to the vehicle proper, or the units of running gear used in its stead, a tank-vehicle comprises one or more shells, their items of equipment and the fittings for attaching them to the vehicle or to the running-gear units.
- 9.7.1.2 Once the demountable tank has been attached to the carrier vehicle, the entire unit shall meet the requirements prescribed for tank-vehicles.

#### **9.7.2 Requirements concerning tanks**

- 9.7.2.1 Fixed tanks or demountable tanks made of metal shall meet the relevant requirements of Chapter 6.8.
- 9.7.2.2 Elements of battery-vehicles and of MEGCs shall meet the relevant requirements of Chapter 6.2 in the case of cylinders, tubes, pressure drums and bundles of cylinders and the requirements of Chapter 6.8 in the case of tanks.
- 9.7.2.3 Tank-containers made of metal shall meet the requirements of Chapter 6.8, portable tanks shall meet the requirements of Chapter 6.7 or, if applicable, those of the IMDG Code (see 1.1.4.2).
- 9.7.2.4 Tanks made of fibre-reinforced plastics material shall meet the requirements of Chapter 6.9.
- 9.7.2.5 Vacuum-operated waste tank-vehicles shall meet the requirements of Chapter 6.10.

#### **9.7.3 Fastenings**

Fastenings shall be designed to withstand static and dynamic stresses in normal conditions of carriage, and minimum stresses as defined in 6.8.2.1.2, 6.8.2.1.11 to 6.8.2.1.15 and 6.8.2.1.16 in the case of tank-vehicles, battery-vehicles, and vehicles carrying demountable tanks.

#### **9.7.4 Earthing of FL vehicles**

Tanks made of metal or of fibre-reinforced plastics material of FL tank-vehicles and battery elements of FL battery-vehicles shall be linked to the chassis by means of at least one good electrical connection. Any metal contact capable of causing electrochemical corrosion shall be avoided.

*NOTE: See also 6.9.1.2 and 6.9.2.14.3.*

## **9.7.5 Stability of tank-vehicles**

9.7.5.1 The overall width of the ground-level bearing surface (distance between the outer points of contact with the ground of the right-hand tyre and the left-hand tyre of the same axle) shall be at least equal to 90% of the height of the centre of gravity of the laden tank-vehicle. In an articulated vehicle the mass on the axles of the load-carrying unit of the laden semi-trailer shall not exceed 60% of the nominal total laden mass of the complete articulated vehicle.

9.7.5.2 In addition, tank-vehicles with fixed tanks with a capacity of more than 3 m<sup>3</sup> intended for the carriage of dangerous goods in the liquid or molten state tested with a pressure of less than 4 bar, shall comply with the technical requirements of ECE Regulation No. 111<sup>1</sup> for lateral stability, as amended, in accordance with the dates of application specified therein. The requirements are applicable to tank-vehicles which are first registered as from 1 July 2003.

## **9.7.6 Rear protection of vehicles**

A bumper sufficiently resistant to rear impact shall be fitted over the full width of the tank at the rear of the vehicle. There shall be a clearance of at least 100 mm between the rear wall of the tank and the rear of the bumper (this clearance being measured from the rearmost point of the tank wall or from projecting fittings or accessories in contact with the substance being carried). Vehicles with a tilting shell for the carriage of powdery or granular substances and a vacuum-operated waste tank with a tilting shell with rear discharge do not require a bumper if the rear fittings of the shell are provided with a means of protection which protects the shell in the same way as a bumper.

***NOTE 1:** This provision does not apply to vehicles used for the carriage of dangerous goods in tank-containers, MEGCs or portable tanks.*

***NOTE 2:** For the protection of tanks against damage by lateral impact or overturning, see 6.8.2.1.20 and 6.8.2.1.21 or, for portable tanks, 6.7.2.4.3 and 6.7.2.4.5.*

## **9.7.7 Combustion heaters**

9.7.7.1 Combustion heaters shall meet the requirements of 9.2.4.7.1, 9.2.4.7.2, 9.2.4.7.5 and the following:

- (a) The switch may be installed outside the driver's cab;
- (b) The device may be switched off from outside the load compartment; and
- (c) It is not necessary to prove that the heat exchanger is resistant to the reduced afterrunning cycle.

In addition for FL vehicles, they shall meet the requirements of 9.2.4.7.3 and 9.2.4.7.4.

9.7.7.2 If the vehicle is intended for the carriage of dangerous goods for which a label conforming to models Nos. 3, 4.1, 4.3, 5.1 or 5.2 is prescribed, no fuel tanks, power sources, combustion air or heating air intakes as well as exhaust tube outlets required for the operation of the combustion heater shall be installed in the load compartment. It shall be ensured that the heating air outlet cannot be blocked by cargo. The temperature to which the load is heated shall not exceed 50 °C. Heating devices installed inside the load compartments shall be designed so as to prevent the ignition of an explosive atmosphere under operating conditions.

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<sup>1</sup> ECE Regulation No. 111: Uniform provisions concerning the approval of tank-vehicles of categories N and O with regard to rollover stability.

## 9.7.8 Electrical equipment

9.7.8.1 The electrical installation on FL vehicles for which an approval according to 9.1.2 is required shall meet the requirements of 9.2.2.2, 9.2.2.3, 9.2.2.4, 9.2.2.5.1 and 9.2.2.6.

However additions to or modifications of the electrical installations of the vehicle shall meet the requirements for the electrical apparatus of the relevant group and temperature class according to the substances to be carried.

*NOTE: For transitional provisions, see also 1.6.5.*

9.7.8.2 Electrical equipment on FL vehicles, situated in areas where an explosive atmosphere is, or may be expected to be, present in such quantities as to require special precautions, shall be suitable for use in a hazardous area. Such equipment shall meet the general requirements of IEC 60079 parts 0 and 14 and the additional requirements applicable from IEC 60079 parts 1, 2, 5, 6, 7, 11 or 18<sup>2</sup>. The requirements for the electrical apparatus of the relevant group and temperature class according to the substances to be carried shall be met.

For the application of IEC 60079 part 14<sup>2</sup>, the following classification shall be used:

### ZONE 0

Inside tank compartments, fittings for filling and discharge and vapour recovery lines.

### ZONE 1

Inside cabinets for equipment used for filling and discharge and within 0.5 m of venting devices and pressure relief safety valves.

9.7.8.3 Permanently energized electrical equipment, including the leads, which is situated outside Zones 0 and 1 shall meet the requirements for Zone 1 for electrical equipment in general or meet the requirements for Zone 2 according to IEC 60079 part 14<sup>2</sup> for electrical equipment situated in the driver's cab. The requirements for the relevant group of electrical apparatus according to the substances to be carried shall be met.

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<sup>2</sup> As an alternative, the general requirements of EN 50014 and the additional requirements of EN 50015, 50016, 50017, 50018, 50019, 50020 or 50028 may be used.