Table C: Vehicle activity limits for LSA material and SCO in industrial packages or unpackaged

Nature of material or object	Activity limit for vehicle
LSA-I	No limit
LSA-II and LSA-III non-combustible solids	No limit
LSA-II and LSA-III combustible solids, and all liquids and gases	100 A_2
SCO	100 A_2

(3) *Stowage during carriage and storage in transit*

(3.1) Consignments shall be securely stowed.

(3.2) Provided that its average surface heat flux does not exceed 15 W/m² and that the immediately surrounding cargo is not in bags, a package or overpack may be carried or stored among packaged general cargo without any special stowage provisions except as may be specifically required by the competent authority in an applicable certificate of approval.

(3.3) Loading of containers and accumulation of packages, overpacks and containers shall be controlled as follows:

(a) Except under the condition of exclusive use, and for consignments of LSA-I material, the total number of packages, overpacks and containers aboard a single vehicle shall be so limited that the total sum of the transport indexes aboard the vehicle does not exceed the values shown in Table D below;

(b) The dose rate under routine conditions of carriage shall not exceed 2 mSv/h at any point on the external surface of the vehicle or container, and 0.1 mSv/h at 2 m from the external surface of the vehicle or container, except for consignments carried under exclusive use, for which the dose rate limits around the vehicle are set forth in (3.5) (b) and (c);

(c) The total sum of the criticality safety indexes in a container and aboard a vehicle shall not exceed the values shown in Table E below.

Table D: Transport Index limits for containers and vehicles not under exclusive use

Type of container or vehicle	Limit on total sum of transport indexes in a container or aboard a vehicle
Small container	50
Large container	50
Vehicle	50

Table E: Criticality Safety Index for containers and vehicles containing fissile material

Type of container or vehicle	Limit on total sum of criticality safety indexes	
	Not under exclusive use	Under exclusive use
Small container	50	n.a.
Large container	50	100
Vehicle	50	100

(3.4) Any package or overpack having either a transport index greater than 10, or any consignment having a criticality safety index greater than 50, shall be carried only under exclusive use.

(3.5) For consignments under exclusive use, the dose rate shall not exceed:

(a) 10 mSv/h at any point on the external surface of any package or overpack, and may only exceed 2 mSv/h provided that:

(i) The vehicle is equipped with an enclosure which, during routine conditions of carriage, prevents the access of unauthorized persons to the interior of the enclosure;

(ii) Provisions are made to secure the package or overpack so that its position within the vehicle enclosure remains fixed during routine conditions of carriage, and

(iii) There is no loading or unloading during the shipment;

(b) 2 mSv/h at any point on the outer surfaces of the vehicle, including the upper and lower surfaces, or, in the case of an open vehicle, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load, and on the lower external surface of the vehicle; and

(c) 0.1 mSv/h at any point 2 m from the vertical planes represented by the outer lateral surfaces of the vehicle, or, if the load is carried in an open vehicle, at any point 2 m from the vertical planes projected from the outer edges of the vehicle.

(4) *Additional requirements relating to carriage and storage in transit of fissile material*

(4.1) Any group of packages, overpacks, and containers containing fissile material stored in transit in any one storage area shall be so limited that the total sum of the CSIs in the group does not exceed 50. Each group shall be stored so as to maintain a spacing of at least 6 m from other such groups.

(4.2) Where the total sum of the criticality safety indexes on board a vehicle or in a container exceeds 50, as permitted in Table E above, storage shall be such as to maintain a spacing of at least 6 m from other groups of packages, overpacks or containers containing fissile material or other vehicles carrying radioactive material.

(4.3) Fissile material meeting one of the provisions (a) to (f) of 2.2.7.2.3.5 shall meet the following requirements:

(a) Only one of the provisions (a) to (f) of 2.2.7.2.3.5 is allowed per consignment;

(b) Only one approved fissile material in packages classified in accordance with 2.2.7.2.3.5 (f) is allowed per consignment unless multiple materials are authorized in the certificate of approval;

(c) Fissile material in packages classified in accordance with 2.2.7.2.3.5 (c) shall be carried in a consignment with no more than 45 g of fissile nuclides;

(d) Fissile material in packages classified in accordance with 2.2.7.2.3.5 (d) shall be carried in a consignment with no more than 15 g of fissile nuclides;

(e) Unpackaged or packaged fissile material classified in accordance with 2.2.7.2.3.5 (e) shall be carried under exclusive use on a vehicle with no more than 45 g of fissile nuclides.

(5) *Damaged or leaking packages, contaminated packagings*

(5.1) If it is evident that a package is damaged or leaking, or if it is suspected that the package may have leaked or been damaged, access to the package shall be restricted and a qualified person shall, as soon as possible, assess the extent of contamination and the resultant dose rate of the package. The scope of the assessment shall include the package, the vehicle, the adjacent loading and unloading areas, and, if necessary, all other material which has been carried in the vehicle. When necessary, additional steps for the protection of people, property and the environment, in accordance with provisions established by the competent authority, shall be taken to overcome and minimize the consequences of such leakage or damage.

(5.2) Packages damaged or leaking radioactive contents in excess of allowable limits for normal conditions of carriage may be removed to an acceptable interim location under supervision, but shall not be forwarded until repaired or reconditioned and decontaminated.

(5.3) A vehicle and equipment used regularly for the carriage of radioactive material shall be periodically checked to determine the level of contamination. The frequency of such checks shall be related to the likelihood of contamination and the extent to which radioactive material is carried.

(5.4) Except as provided in paragraph (5.5), any vehicle, or equipment or part thereof which has become contaminated above the limits specified in 4.1.9.1.2 in the course of carriage of radioactive material, or which shows a dose rate in excess of 5 μSv/h at the surface, shall be decontaminated as soon as possible by a qualified person and shall not be re-used unless the following conditions are fulfilled:

(a) The non-fixed contamination shall not exceed the limits specified in 4.1.9.1.2;

(b) The dose rate resulting from the fixed contamination shall not exceed 5 μSv/h at the surface.

(5.5) A container or vehicle dedicated to the carriage of unpackaged radioactive material under exclusive use shall be excepted from the requirements of the previous paragraph (5.4) and in 4.1.9.1.4 solely with regard to its internal surfaces and only for as long as it remains under that specific exclusive use.

(6) *Other provisions*

Where a consignment is undeliverable, the consignment shall be placed in a safe location and the competent authority shall be informed as soon as possible and a request made for instructions on further action.

CV34 Prior to carriage of pressure receptacles it shall be ensured that the pressure has not risen due to potential hydrogen generation.

CV35 If bags are used as single packagings, they shall be adequately separated to allow for the dissipation of heat.

CV36 Packages shall preferably be loaded in open or ventilated vehicles or open or ventilated containers. If this is not feasible and packages are carried in other closed vehicles or containers, gas exchange between the load compartment and the driver's cab shall be prevented and the cargo doors of the vehicles or containers shall be marked with the following in letters not less than 25 mm high:

"WARNING
NO VENTILATION
OPEN WITH CAUTION"

This shall be in a language considered appropriate by the consignor.

For UN Nos. 2211 and 3314 this mark is not required when the vehicle or container is already marked according to special provision 965 of the IMDG Code[3].

CV37 Before loading, these by-products shall be cooled to ambient temperature, unless they have been calcined to remove moisture. Vehicles and containers containing bulk loads shall be adequately ventilated and protected against ingress of water throughout the journey. The cargo doors of the closed vehicles and closed containers shall be marked with the following in letters not less than 25 mm high:

"WARNING
CLOSED MEANS OF CONTAINMENT
OPEN WITH CAUTION"

This shall be in a language considered appropriate by the consignor.

CV38 The load compartments shall have no sharp internal edges (internal steps, etc.) capable of tearing container-bags during unloading. They shall be inspected before any loading operation.

The container-bags shall be placed in the load compartments for carriage prior to any filling. The outer component of the container-bags shall be positioned so that the slider of the zipper is placed on the front side of the load compartment when closed. After filling, the container-bags shall be closed in accordance with the manufacturer's instructions.

Once loaded, the container-bags shall not be lifted or transferred from one load compartment to another. Multiple filled container-bags shall not be loaded into the same load compartment.

After any filling operation and after closing, the outer surfaces of the container-bags shall be decontaminated.

Container-bags carried in removable load compartments shall be unloaded with the latter placed on the ground.

The unloading of container-bags filled with roadworks waste or with soil contaminated with free asbestos by tipping the load compartment is authorized, provided that an unloading protocol agreed jointly between the carrier and the consignee is respected to prevent the container-bags from tearing during unloading. The protocol shall ensure that the container-bags do not fall or tear during the unloading operation.

[3] *Warning mark including the words "CAUTION – MAY CONTAIN FLAMMABLE VAPOUR" with lettering not less than 25 mm high, affixed at each access point in a location where it will be easily seen by persons prior to opening or entering the vehicle or container.*

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 driver's cab of the transport unit:

(a) The transport documents prescribed in 5.4.1, covering all the dangerous goods carried;

(b) The instructions in writing prescribed in 5.4.3;

(c) *(Reserved)*;

(d) Means of identification, which include a photograph, for each member of the vehicle crew, 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 driver's cab of the transport unit:

(a) The certificate of approval referred to in 9.1.3 for each transport unit or element thereof;

(b) The driver's training certificate prescribed in 8.2.1;

(c) A copy of the competent authority approval, when required in 5.4.1.2.1 (c) or (d) or 5.4.1.2.3.3.

8.1.2.3 The instructions in writing prescribed in 5.4.3 shall be kept readily available.

8.1.2.4 *(Deleted)*

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 table shows the minimum provisions for portable fire extinguishers for the inflammability Classes[1] A, B and C that apply to transport units carrying dangerous goods except for those referred to in 8.1.4.2:

(1) Transport unit maximum permissible mass	(2) Minimum number of fire extinguishers	(3) Minimum total capacity per transport unit	(4) Extinguisher suitable for engine or cab fire. At least one with a minimum capacity of:	(5) Additional extinguisher(s) requirement. At least one extinguisher shall have a minimum capacity of:
≤ 3.5 tonnes	2	4 kg	2 kg	2 kg
> 3.5 tonnes ≤ 7.5 tonnes	2	8 kg	2 kg	6 kg
> 7.5 tonnes	2	12 kg	2 kg	6 kg
The capacities are for dry powder devices (or an equivalent capacity for any other suitable extinguishing agent).				

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[1] 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 portable fire extinguishers shall be suitable for use on a vehicle and shall comply with the relevant requirements of EN 3 Portable fire extinguishers, Part 7 (EN 3-7:2004 + A1:2007).

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 which allows verifying that they have not been used.

The fire extinguishers shall be subjected to inspections in accordance with authorized national standards in order to guarantee their functional safety. They shall bear a mark of compliance with a standard recognized by a competent authority and a mark indicating the date (month, year) of the next inspection or of the maximum permissible period of use, as applicable.

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. During carriage, the date required in 8.1.4.4 shall not have expired.

8.1.5 Miscellaneous equipment and equipment for personal protection

8.1.5.1 Each transport unit carrying dangerous goods shall be provided with items of equipment for general and personal protection in accordance with 8.1.5.2. The items of equipment shall be selected in accordance with the danger label number of the goods loaded. The label numbers can be identified through the transport document.

[1] *For the definition of the inflammability classes, see Standard EN 2:1992 + A1:2004 Classification of fires.*

8.1.5.2 The following equipment shall be carried on board the transport unit:

- For each vehicle, a wheel chock of a size suited to the maximum mass of the vehicle and to the diameter of the wheel;
- Two self-standing warning signs;
- Eye rinsing liquid[2]; and

for each member of the vehicle crew

- A warning vest (e.g. as described in the EN ISO 20471 standard);
- Portable lighting apparatus conforming to the provisions of 8.3.4;
- A pair of protective gloves; and
- Eye protection (e.g. protective goggles).

8.1.5.3 Additional equipment required for certain classes:

- An emergency escape mask[3] for each member of the vehicle crew shall be carried on board the transport unit for danger label numbers 2.3 or 6.1;
- A shovel[4];
- A drain seal[4];
- A collecting container[4].

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[2] *Not required for danger label numbers 1, 1.4, 1.5, 1.6, 2.1, 2.2 and 2.3.*

[3] *For example an emergency escape mask with a combined gas/dust filter of the A1B1E1K1-P1 or A2B2E2K2-P2 type which is similar to that described in the EN 14387:2004 + A1:2008 standard.*

[4] *Only required for solids and liquids with danger label numbers 3, 4.1, 4.3, 8 or 9.*

CHAPTER 8.2

REQUIREMENTS CONCERNING THE TRAINING OF THE VEHICLE CREW

8.2.1 Scope and 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 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. The competent authority may approve basic training courses limited to specific dangerous goods or to a specific class or classes. These restricted basic training courses shall not confer the right to attend the training courses referred to in 8.2.1.4.

8.2.1.3 Drivers of vehicles or MEMUs carrying dangerous goods in fixed tanks or demountable tanks with a capacity exceeding 1 m³, drivers of battery-vehicles with a total capacity exceeding 1 m³ and drivers of vehicles or MEMUs carrying dangerous goods in tank-containers, portable tanks or MEGCs with an individual capacity exceeding 3 m³ 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. The competent authority may approve tank specialization training courses limited to specific dangerous goods or to a specific class or classes. These restricted tank specialization training courses shall not confer the right to attend the training courses referred to in 8.2.1.4.

8.2.1.4 Drivers of vehicles carrying dangerous goods of Class 1, other than substances and articles of Division 1.4, compatibility group S, or Class 7 shall attend specialization training courses covering at least the subjects defined in 8.2.2.3.4 or 8.2.2.3.5, as applicable.

8.2.1.5 All training courses, practical exercises, examinations and the role of competent authorities shall comply with the provisions of 8.2.2.

8.2.1.6 All training certificates conforming to the requirements of this section and issued in accordance with 8.2.2.8 by the competent authority of a Contracting Party shall be accepted during their period of validity by the competent authorities of other Contracting Parties.

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 body 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 referred to in 8.2.2.6, on the subjects set out in 8.2.2.3.2 to 8.2.2.3.5. The training shall also include individual practical exercises (see 8.2.2.3.8).

8.2.2.3 ***Structure of training***

8.2.2.3.1 Training shall be given in the form of a basic training course and, when applicable, specialization training courses. Basic training courses and specialization training courses may be given in the form of comprehensive training courses, conducted integrally, on the same occasion and by the same training body.

8.2.2.3.2 Subjects to be covered by the basic training course shall 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, instructions in writing, 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) Traffic restrictions in tunnels and instructions on behaviour in tunnels (prevention of incidents, safety, action in the event of fire or other emergencies, etc.);

(o) Security awareness.

8.2.2.3.3 Subjects to be covered by the specialization training 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 Subjects to be covered by the specialization training 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 Subjects to be covered by the specialization training 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.

8.2.2.3.6 Teaching units are intended to last 45 minutes.

8.2.2.3.7 Normally, not more than eight teaching units are permitted on each training day.

8.2.2.3.8 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.

8.2.2.4 ***Initial training programme***

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

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

For the basic training course and the specialization training course for carriage in tanks, additional teaching units are required for practical exercises referred to in 8.2.2.3.8 which will vary depending on the number of drivers under instruction.

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

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 The duration of the refresher training including individual practical exercises shall be of at least two days for comprehensive training courses, or at least one half the duration allocated to the corresponding initial basic or initial specialization training courses as specified in 8.2.2.4.1 for individual training courses.

8.2.2.5.3 A driver may replace a refresher training course and examination with the corresponding initial training course and examination.

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 training courses, initial or refresher training courses, and whether they are limited to specific dangerous goods or a specific class or classes.

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 basic training course*

8.2.2.7.1.1 After completion of the basic training, including the practical exercises, an examination shall be held on the corresponding basic training 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 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 training courses may be held.

8.2.2.7.1.5 Each competent authority shall supervise the modalities of the examination; including, if necessary, the infrastructure and organisation of electronic examinations in accordance with 8.2.2.7.1.8, if these are to be carried out.

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 for the basic training course. If the examination follows a refresher training course, at least 15 written questions shall be asked. The duration of these examinations shall be at least 45 and 30 minutes respectively. The questions may be of a varying degree of difficulty and be allocated a different weighting.

8.2.2.7.1.7 Every examination shall be invigilated. Any manipulation and deception shall be ruled out as far as possible. Authentication of the candidate shall be ensured. All examination documents shall be recorded and kept as a print-out or electronically as a file.

8.2.2.7.1.8 Written examinations may be performed, in whole or in part, as electronic examinations, where the answers are recorded and evaluated using electronic data processing (EDP) processes, provided the following conditions are met:

(a) The hardware and software shall be checked and accepted by the competent authority;

(b) Proper technical functioning shall be ensured. Arrangements as to whether and how the examination can be continued shall be made for a failure of the devices and applications. No aids shall be available on the input devices (e.g. electronic search function), the equipment provided shall not allow the candidates to communicate with any other device during the examination;

(c) Final inputs of each candidate shall be logged. The determination of the results shall be transparent;

(d) Electronic media may be used only if provided by the examining body. There shall be no means of a candidate introducing further data to the electronic media provided; the candidate may only answer the questions posed.

8.2.2.7.2 *Examinations for specialization training courses for carriage in tanks or carriage of substances and articles of Class 1 or radioactive material of Class 7*

8.2.2.7.2.1 After having sat the examination on the basic training course and after having attended the specialization training course for carriage in tanks or carriage of substances and articles of Class 1 or radioactive material of Class 7, the candidate shall be allowed to take part in the examination corresponding to the training.

8.2.2.7.2.2 This examination shall be held and supervised on the same basis as in 8.2.2.7.1. The catalogue of questions shall refer to the items summarized in 8.2.2.3.3, 8.2.2.3.4 or 8.2.2.3.5, as appropriate.

8.2.2.7.2.3 With respect to each specialization training examination, at least 15 written questions shall be asked. If the examination follows a refresher training course, at least 10 written questions shall be asked. The duration of these examinations shall be at least 30 and 20 minutes respectively.

8.2.2.7.2.4 If an examination is based on a restricted basic training course, this limits the examination of the specialization training course to the same scope.

8.2.2.8 ***Certificate of driver's training***

8.2.2.8.1 The certificate referred to in 8.2.1.1 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 training course for carriage in tanks or carriage of substances and articles of Class 1 or radioactive material of Class 7, 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;

(c) If applicable, after completion of a restricted basic or restricted tank specialization training course, provided the candidate has successfully passed the examination in accordance with 8.2.2.7.1 or 8.2.2.7.2. The certificate issued shall clearly indicate its limited scope of validity to the relevant dangerous goods or class(es).

8.2.2.8.2 The date of validity of a driver training certificate shall be five years from the date the driver passes an initial basic or initial comprehensive training examination.

The certificate shall be renewed if the driver furnishes proof of participation in refresher training in accordance with 8.2.2.5 and has passed an examination in accordance with 8.2.2.7 in the following cases:

(a) In the twelve months before the date of expiry of the certificate. The competent authority shall issue a new certificate, valid for five years, the period of validity of which shall begin with the date of expiry of the previous certificate;

(b) Prior to the twelve months before the date of expiry of the certificate. The competent authority shall issue a new certificate, valid for five years, the period of validity of which shall begin from the date on which the refresher examination was passed.

Where a driver extends the scope of his certificate during its period of validity, by meeting the requirements of 8.2.2.8.1 (b) and (c), the period of validity of a new certificate shall remain that of the previous certificate. When a driver has passed a specialization training examination, the specialization shall be valid until the date of expiry of the certificate.

8.2.2.8.3 The certificate shall have the layout of the model shown in 8.2.2.8.5. Its dimensions shall be in accordance with ISO 7810:2003 ID-1 and it shall be made of plastic. The colour shall be white with black lettering. It shall include an additional security feature such as a hologram, UV printing or guilloche patterns.

8.2.2.8.4 The certificate shall be prepared in the language(s) or one of the languages of the country of the competent authority which issued the certificate. If none of these languages is English, French or German, the title of the certificate, the title of item 8 and the titles on the back shall also be drawn up in English, French or German.

8.2.2.8.5 *Model for the training certificate for drivers of vehicles carrying dangerous goods*

Front

ADR DRIVER TRAINING CERTIFICATE

**

(Insert driver photograph)*

1. (CERTIFICATE No.)*
2. (SURNAME)*
3. (OTHER NAME(S))*
4. (DATE OF BIRTH dd/mm/yyyy)*
5. (NATIONALITY)*
6. (DRIVER SIGNATURE)*
7. (ISSUING BODY)*
8. VALID TO: (dd/mm/yyyy)*

Back

VALID FOR CLASS(ES) OR UN Nos.:

TANKS	**OTHER THAN TANKS**
9. (Enter Class or UN Number(s))*	10. (Enter Class or UN Number(s))*

* Replace the text with appropriate data.

** Distinguishing sign used on vehicles in international traffic (for Parties to the 1968 Convention on Road Traffic or the 1949 Convention on Road Traffic, as notified to the Secretary General of the United Nations in accordance with respectively article 45(4) or annex 4 of these conventions).

8.2.2.8.6 Contracting Parties shall provide the UNECE secretariat with an example of the national model for any certificate intended for issue in accordance with this section. Contracting Parties shall also provide explanatory notes to enable the verification of conformity of certificates against the examples provided. The secretariat shall make this information available on its website.

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**

Members of the vehicle crew 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**

The portable 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. This prohibition of smoking is also applicable to the use of electronic cigarettes and similar devices.

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 brakes and wheel chocks**

No vehicles carrying dangerous goods may be parked without the parking brakes being applied. Trailers without braking devices shall be restrained from moving by applying at least one wheel chock as described in 8.1.5.2.

8.3.8 **Use of cables**

In the case of a transport unit equipped with an anti-lock braking system, consisting of a motor vehicle and a trailer with a maximum mass exceeding 3.5 tonnes, the connections referred to in sub-section 9.2.2.6 shall be connecting the towing vehicle and the trailer at all times during carriage.

CHAPTER 8.4

REQUIREMENTS CONCERNING THE SUPERVISION OF VEHICLES

8.4.1 Vehicles carrying dangerous goods in the quantities shown in special provisions S1 (6) and S14 to S24 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.

8.4.2 Loaded MEMUs shall be supervised or alternatively may be parked, unsupervised, in a secure depot or secure factory premises. Empty uncleaned MEMUs are exempted from this requirement.

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: **Requirements concerning the carriage of explosive substances and articles (Class 1)**

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

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 defined in 8.2.2.3.4, the specialization training 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 smoking, fire and naked flame***

Smoking, the use of fire or of naked flames 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. This prohibition of smoking is also applicable to the use of electronic cigarettes and similar devices.

(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. This distance shall not apply to vehicles belonging to the same transport unit.

(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 net mass of explosive substance above the limits set below are carried in a vehicle:

Division 1.1:	0 kg
Division 1.2:	0 kg
Division 1.3, compatibility group C:	0 kg
Division 1.3, other than compatibility group C:	50 kg
Division 1.4, other than those listed below:	50 kg
Division 1.5:	0 kg
Division 1.6:	50 kg
Substances and articles of Division 1.4 belonging to UN Nos. 0104, 0237,0255, 0267, 0289, 0361, 0365, 0366, 0440, 0441, 0455, 0456, 0500, 0512 and 0513:	0 kg

For mixed loads the lowest limit applicable to any of the substances or articles carried shall be used for the load as a whole.

In addition, these substances and articles, when subject to the provisions in 1.10.3, shall be supervised in accordance with the security plan in 1.10.3.2 at all times 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.

(7) ***Locking of vehicles***

Doors and rigid covers in the load compartments of EX/II vehicles and all openings in the load compartments of EX/III vehicles carrying substances and articles of Class 1 shall be locked during transport, except for the periods of loading and unloading.

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

(1) ***Portable lighting apparatus***

The load compartment of closed vehicles carrying liquids having a flash-point of not more than 60 °C or flammable substances or articles of Class 2, shall not be entered by persons carrying portable lighting apparatus other than those 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**

The requirements of the table columns (2), (3) and (5) in 8.1.4.1 and the requirements in 8.3.4 shall not apply.

S4: See 7.1.7.

NOTE: *This special 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 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 hazard.

Other additional requirements or special provisions

S7: *(Deleted)*

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: 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 defined in 8.2.2.3.5, the specialization training course may be totally or partially dispensed with.

S12: If the total number of packages containing radioactive material carried in the transport unit does not exceed 10, the sum of the transport indexes does not exceed 3 and there are no subsidiary hazards, the requirements in 8.2.1 concerning the training of drivers need not be applied. However, drivers shall then receive appropriate training in the requirements governing the carriage of radioactive material, commensurate with their duties. This training shall provide 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. See also 8.2.3.

S13: *(Deleted)*

S14: The provisions of Chapter 8.4 concerning the supervision of vehicles shall apply for vehicles carrying any amount of these substances.

S15: The provisions of Chapter 8.4 concerning the supervision of vehicles shall apply for vehicles carrying any amount of these substances. However, the provisions of Chapter 8.4 need not be applied when the loaded compartment is locked or 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, when subject to the provisions in 1.10.3, shall be supervised in accordance with the security plan in 1.10.3.2 at all times 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 or volume of these substances in the vehicle exceeds 10 000 kg as packaged goods or 3 000 litres in tanks.

S21: The provisions of Chapter 8.4 concerning the supervision of vehicles shall apply to all material, in whatever mass. 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 5μSv/h at any accessible point on the outer surface of the vehicle.

In addition, these goods, when subject to the provisions in 1.10.3, shall be supervised in accordance with the security plan in 1.10.3.2 at all times to prevent any malicious act and to alert the driver and the competent authorities in the event of loss or fire.

S22: The provisions of Chapter 8.4 concerning the supervision of vehicles shall apply when the total mass or volume of these substances in the vehicle exceeds 5 000 kg as packaged goods or 3 000 litres in tanks.

S23: The provisions of Chapter 8.4 concerning the supervision of vehicles shall apply when this substance is carried in bulk or in tanks and when the total mass or volume in the vehicle exceeds 3 000 kg or 3 000 litres, as applicable.

S24: 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.

CHAPTER 8.6

ROAD TUNNEL RESTRICTIONS FOR THE PASSAGE OF VEHICLES CARRYING DANGEROUS GOODS

8.6.1 General provisions

The provisions of this Chapter apply when the passage of vehicles through road tunnels is restricted in accordance with 1.9.5.

8.6.2 Road signs or signals governing the passage of vehicles carrying dangerous goods

The tunnel category, assigned in accordance with 1.9.5.1 by the competent authority to a given road tunnel for the purpose of restricting the passage of transport units carrying dangerous goods, shall be indicated as follows by means of road signs and signals:

Sign and signal	Tunnel category
No sign	Tunnel category A
Sign with an additional panel bearing a letter B	Tunnel category B
Sign with an additional panel bearing a letter C	Tunnel category C
Sign with an additional panel bearing a letter D	Tunnel category D
Sign with an additional panel bearing a letter E	Tunnel category E

8.6.3 Tunnel restriction codes

8.6.3.1 The restrictions for the transport of specific dangerous goods through tunnels are based on the tunnel restriction code of these goods, indicated in Column (15) of Table A of Chapter 3.2. The tunnel restriction codes are put between brackets at the bottom of the cell. When '(—)' is indicated instead of one of the tunnel restriction codes, the dangerous goods are not subject to any tunnel restriction; for the dangerous goods assigned to UN Nos. 2919 and 3331, restrictions to the passage through tunnels may, however, be part of the special arrangement approved by the competent authority(ies) on the basis of 1.7.4.2.

8.6.3.2 When a transport unit contains dangerous goods to which different tunnel restriction codes have been assigned, the most restrictive of these tunnel restriction codes shall be assigned to the whole load.

8.6.3.3 Dangerous goods carried in accordance with 1.1.3 are not subject to the tunnel restrictions and shall not be taken into account when determining the tunnel restriction code to be assigned to the whole load of a transport unit, except if the transport unit is required to be marked in accordance with 3.4.13 subject to 3.4.14.

8.6.4 Restrictions for the passage of transport units carrying dangerous goods through tunnels

The restrictions for passage through tunnels shall apply:

- to transport units for which marking is required by 3.4.13 subject to 3.4.14, through tunnels of category E; and

- to transport units for which an orange-coloured plate marking is required according to 5.3.2, in accordance with the table below once the tunnel restriction code to be assigned to the whole load of the transport unit has been determined.

Tunnel restriction code of the whole load	Restriction
B	Passage forbidden through tunnels of category B, C, D and E
B1000C	Carriage where the total net explosive mass per transport unit - exceeds 1000 kg: Passage forbidden through tunnels of category B, C, D and E; - does not exceed 1000 kg: Passage forbidden through tunnels of category C, D and E
B/D	Tank carriage: Passage forbidden through tunnels of category B, C, D and E; Other carriage: Passage forbidden through tunnels of category D and E
B/E	Tank carriage: Passage forbidden through tunnels of category B, C, D and E; Other carriage: Passage forbidden through tunnels of category E
C	Passage forbidden through tunnels of category C, D and E
C5000D	Carriage where the total net explosive mass per transport unit - exceeds 5000 kg: Passage forbidden through tunnels of category C, D and E; - does not exceed 5000 kg: Passage forbidden through tunnels of category D and E
C/D	Tank carriage: Passage forbidden through tunnels of category C, D and E; Other carriage: Passage forbidden through tunnels of category D and E
C/E	Tank carriage: Passage forbidden through tunnels of category C, D and E; Other carriage: Passage forbidden through tunnels of category E
D	Passage forbidden through tunnels of category D and E
D/E	Bulk or tank carriage: Passage forbidden through tunnels of category D and E; Other carriage: Passage forbidden through tunnels of category E
E	Passage forbidden through tunnels of category E
-	Passage allowed through all tunnels (For UN Nos. 2919 and 3331, see also 8.6.3.1).

NOTE 1: *For example, the passage of a transport unit carrying UN No. 0161, powder, smokeless, classification code 1.3C, tunnel restriction code C5000D, in a quantity representing a total net explosive mass of 3000 kg is forbidden in tunnels of categories D and E.*

NOTE 2: *Dangerous goods packed in limited quantities carried in containers or transport units marked in accordance with the IMDG Code are not subject to the restrictions for passage through tunnels of category E when the total gross mass of the packages containing dangerous goods packed in limited quantities does not exceed 8 tonnes per transport unit.*

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 the Consolidated Resolution on the Construction of Vehicles (R.E.3)[1], 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 60 °C (with the exception of diesel fuel complying with standard EN 590:2013 + A1:2017, gas oil, and heating oil (light) - UN No. 1202 - with a flash-point as specified in standard EN 590:2013 + A1:2017) in fixed tanks or demountable tanks with a capacity exceeding 1 m³ or in tank-containers or portable tanks with an individual capacity exceeding 3 m³; or

(b) A vehicle intended for the carriage of flammable gases in fixed tanks or demountable tanks with a capacity exceeding 1 m³ or in tank-containers, portable tanks or MEGCs with an individual capacity exceeding 3 m³; or

(c) A battery-vehicle with a total capacity exceeding 1 m³ intended for the carriage of flammable gases; or

(d) 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 m³ or in tank-containers or portable tanks with an individual capacity exceeding 3 m³;

"AT vehicle" means:

(a) A vehicle, other than EX/III or FL vehicle or than a MEMU, intended for the carriage of dangerous goods in fixed tanks or demountable tanks with a capacity exceeding 1 m³ or in tank-containers, portable tanks or MEGCs with an individual capacity exceeding 3 m³; or

(b) A battery-vehicle with a total capacity exceeding 1 m³ other than a FL vehicle;

"MEMU" means a vehicle meeting the definition of mobile explosives manufacturing unit in 1.2.1.

"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);

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1 *United Nations document ECE/TRANS/WP.29/78/Rev.3.*

"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 UN Regulation No. 105[2];

"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 or AT vehicle or as a MEMU.

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

NOTE: *No special certificates of approval shall be required for vehicles other than EX/II, EX/III, FL, and AT vehicles and MEMUs, 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 and AT vehicles and MEMUs 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 9.8.

The competent authority may waive the first inspection for a tractor for a semi-trailer type-approved in accordance with 9.1.2.2 for which the manufacturer, his duly accredited representative or a body recognised by the competent authority has issued a declaration of conformity with the requirements of Chapter 9.2.

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 UN Regulation No. 13[3]. This declaration shall be presented at the first technical inspection.

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 UN Regulation No. 105[2] provided that the technical requirements of the said Regulation correspond to those of Chapter 9.2 of this Part and provided that no modification of the vehicle alters its validity. In the case of MEMUs, the type approval mark affixed in accordance with UN Regulation No. 105 may identify the vehicle as either MEMU or EX/III. MEMUs need only be identified as such on the certificate of approval issued in accordance with 9.1.3.

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.

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[2] *UN Regulation No. 105 (Uniform provisions concerning the approval of vehicles intended for the carriage of dangerous goods with regard to their specific constructional features).*

[3] *UN Regulation No. 13 (Uniform provisions concerning the approval of vehicles of categories M, N and O with regards to braking).*

9.1.2.3 ***Annual technical inspection***

EX/II, EX/III, FL and AT vehicles and MEMUs 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.

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 and AT vehicles and MEMUs with the requirements of this Part is subject to a certificate of approval (certificate of ADR approval)[4] issued by the competent authority of the country of registration for each vehicle whose inspection yields satisfactory results or has resulted in the issue of a declaration of conformity with the requirements of Chapter 9.2 in accordance with 9.1.2.1.

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. It may include additional security features such as a hologram, UV printing, guilloche patterns or barcode.

Contracting Parties that have introduced additional security features in the certificate of approval shall provide the UNECE secretariat with an example of the national model for any certificate intended for issue in accordance with this section. Contracting Parties shall also provide explanatory notes to enable the verification of conformity of certificates against the examples provided. The secretariat shall make this information available on its website.

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".

The certificate for FL or EX/III vehicles in compliance with the requirements of 9.7.9 shall bear the following remark under No. 11: "Vehicle in compliance with 9.7.9 of ADR".

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.

The vehicle shall not be used for the carriage of dangerous goods after the nominal expiry date until the vehicle has a valid certificate of approval.

However, these provisions shall not mean that tank inspections have to be carried out at intervals shorter than those laid down in Chapters 6.8, 6.10 or 6.13.

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[4] *Guidelines for completing the certificate of approval may be consulted on the website of the secretariat of the United Nations Economic Commission for Europe* (https://unece.org/guidelines-telematics-application-standards-construction-and-approval-vehicles-calculation-risks) .

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

CERTIFICATE OF APPROVAL FOR VEHICLES CARRYING CERTAIN DANGEROUS GOODS

This certificate testifies that the vehicle specified below fulfils the conditions prescribed by the Agreement concerning the International Carriage of Dangerous Goods by Road (ADR).

1. Certificate No.:	**2. Vehicle manufacturer:**	**3. Vehicle Identification No.:**	**4. Registration number** (if any)**:**

5. Name and business address of carrier, operator or owner:

6. Description of vehicle: [1]

7. Vehicle designation(s) according to 9.1.1.2 of ADR:[2]

EX/II EX/III FL AT MEMU

8. Endurance braking system:[3]

□ Not applicable

□ The effectiveness according to 9.2.3.1.2 of ADR is sufficient for a total mass of the transport unit of ____t[4]

9. Description of the fixed tank(s)/battery-vehicle (if any)**:**

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 TC and TE according to 6.8.4 of ADR (if applicable)[6]:

10. Dangerous goods authorised for carriage:

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 or EX/III vehicle [3] □ goods of Class 1 including compatibility group J □□ goods of Class 1 excluding compatibility group J

10.2 In the case of a tank-vehicle/battery-vehicle [3]

□ only the substances permitted under the tank code and any special provisions specified in No. 9 may be carried[5]

or

□ 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.

11. Remarks:

12. Valid until: Stamp of issuing service

Place, Date, Signature

[1] *According to the definitions for power-driven vehicles and for trailers of categories N and O as defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3) or in Directive 2007/46/EC.*

[2] *Strike out what is not appropriate.*

[3] *Mark the appropriate.*

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

[5] *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.*

[6] *Not required when the authorized substances are listed in No. 10.2.*

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 Compliance with the requirements of this Chapter

9.2.1.1 EX/II, EX/III, FL 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 and AT:

- the requirements of 9.2.3.1.1 (Braking equipment in accordance with UN 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 9.2.6 (Speed limitation device in accordance with UN Regulation No. 89 or Directive 92/24/EEC) are applicable to all motor vehicles with a maximum mass exceeding 12 tonnes first registered after 31 December 1987 and all motor vehicles with a maximum mass exceeding 3.5 tonnes but not more than 12 tonnes first registered after 31 December 2007.

TECHNICAL SPECIFICATIONS		VEHICLES				COMMENTS
		EX/II	EX/III	AT	FL	
9.2.2	**ELECTRICAL EQUIPMENT**					
9.2.2.1	General provisions	X	X	X	X	
9.2.2.2.1	Cables	X	X	X	X	
9.2.2.2.2	Additional protection	X[a]	X	X[b]	X	[a] Applicable to vehicles with a maximum mass exceeding 3.5 tonnes first registered (or which entered into service if registration is not mandatory) after 31 March 2018. [b] Applicable for vehicles first registered (or which entered into service if registration is not mandatory) after 31 March 2018.
9.2.2.3	Fuses and circuit breakers	X[b]	X	X	X	[b] Applicable to vehicles first registered (or which entered into service if registration is not mandatory) after 31 March 2018.
9.2.2.4	Batteries	X	X	X	X	
9.2.2.5	Lighting	X	X	X	X	
9.2.2.6	Electrical connections between motor vehicles and trailers	X[c]	X	X[b]	X	[b] Applicable to vehicles first registered (or which entered into service if registration is not mandatory) after 31 March 2018. [c] Applicable to motor vehicles intended to draw trailers with a maximum mass exceeding 3.5 tonnes and trailers with a maximum mass exceeding 3.5 tonnes first registered (or which entered into service if registration is not mandatory) after 31 March 2018.
9.2.2.7	Voltage	X	X			
9.2.2.8	De-energizing electrical circuits		X		X	
9.2.2.9	Permanently energized circuits					
9.2.2.9.1					X	
9.2.2.9.2			X			

TECHNICAL SPECIFICATIONS		VEHICLES EX/II	EX/III	AT	FL	COMMENTS
9.2.3	**BRAKING EQUIPMENT**					
9.2.3.1	General provisions	X	X	X	X	
	Anti-lock braking system	X[e]	X[d,e]	X[d,e]	X[d,e]	[d] Applicable to motor vehicles (tractors and rigid vehicles) with a maximum mass exceeding 16 tonnes and motor vehicles authorized to tow trailers (i.e. full-trailers, semi-trailers and centre axle-trailers) with a maximum mass exceeding 10 tonnes. Motor vehicles shall be equipped with a category 1 anti-lock braking system. Applicable to trailers (i.e. full-trailers, semi-trailers and centre axle-trailers) with a maximum mass exceeding 10 tonnes. Trailers shall be equipped with a category A anti-lock braking system. [e] Applicable to all motor vehicles and applicable to trailers with a maximum mass exceeding 3.5 tonnes, first registered (or which entered into service if registration is not mandatory) after 31 March 2018.
	Endurance braking system	X[f]	X[g]	X[g]	X[g]	[f] Applicable to motor vehicles with a maximum mass exceeding 16 tonnes or authorized to tow a trailer with a maximum mass exceeding 10 tonnes first registered after 31 March 2018. The endurance braking system shall be of type IIA. [g] Applicable to motor vehicles with a maximum mass exceeding 16 tonnes or authorized to tow a trailer with a maximum mass exceeding 10 tonnes. The endurance braking system shall be of type IIA.
9.2.4	**VEHICLE PROPULSION SYSTEM**					
9.2.4.2	Fuel tanks and cylinders	X	X	X[h]	X	[h] Applicable to motor vehicles using fuels other than hydrogen, first registered after 31 December 2026
9.2.4.3	Internal combustion engine	X	X	X[i]	X	[i] Applicable to motor vehicles first registered after 31 December 2026.
9.2.4.3.1	Engine	X	X	X[i]	X	[i] Applicable to motor vehicles first registered after 31 December 2026.
9.2.4.3.2	Exhaust system	X	X		X	
9.2.4.4	Electric power train			X		
9.2.4.4.1	General provisions			X	X	
9.2.4.4.2	Rechargeable electrical energy system			X[i]	X	[i] Applicable to motor vehicles first registered after 31 December 2026.
9.2.4.4.3	Measures against thermal propagation				X	
9.2.4.4.4	Vehicle charging inlet				X	
9.2.4.5	Hydrogen fuel cell			X	X	

TECHNICAL SPECIFICATIONS		VEHICLES				COMMENTS
		EX/II	EX/III	AT	FL	
9.2.5	**COMBUSTION HEATERS**					
9.2.5.1 9.2.5.2 9.2.5.5		X[j]	X[j]	X[j]	X[j]	[j] Applicable to motor vehicles equipped after 30 June 1999. Mandatory compliance by 1 January 2010 for vehicles equipped before 1 July 1999. If the date of equipping is not available the date of first registration of the vehicle shall be used instead.
9.2.5.3 9.2.5.4					X[j]	[j] Applicable to motor vehicles equipped after 30 June 1999. Mandatory compliance by 1 January 2010 for vehicles equipped before 1 July 1999. If the date of equipping is not available the date of first registration of the vehicle shall be used instead.
9.2.5.6		X	X			
9.2.6	**SPEED LIMITATION DEVICE**	X[k]	X[k]	X[k]	X[k]	[k] Applicable to motor vehicles with a maximum mass exceeding 12 tonnes first registered after 31 December 1987, and all motor vehicles with a maximum mass exceeding 3.5 tonnes but not more than 12 tonnes first registered after 31 December 2007.
9.2.7	**COUPLING DEVICES OF MOTOR VEHICLES AND TRAILERS**	X	X	X[l]	X[l]	[l] Applicable to coupling devices of motor vehicles and trailers first registered (or which entered into service if registration is not mandatory) after 31 March 2018.
9.2.8	**PREVENTION OF OTHER RISKS CAUSED BY FUELS**			X	X	

9.2.1.2 MEMUs shall comply with the requirements of this Chapter applicable to EX/III-vehicles.

9.2.2 Electrical equipment

9.2.2.1 ***General provisions***

The installation shall be so designed, constructed and protected that it cannot provoke any unintended ignition or short circuit under normal conditions of use of vehicles.

The electrical installation shall meet the provisions of 9.2.2.2 to 9.2.2.9 in accordance with the table of 9.2.1.

The electric power train and the high voltage components which are galvanically connected to it, which are in compliance with the technical provisions of UN Regulation No. 100[1], as amended at least by the 03 series of amendments, need not to comply with the provisions of 9.2.2.2 to 9.2.2.7.

9.2.2.2 ***Wiring***

9.2.2.2.1 *Cables*

No cable in an electrical circuit shall carry a current in excess of that for which the cable is designed. Conductors shall be adequately insulated.

The cables shall be suitable for the conditions in the area of the vehicle, such as temperature range and fluid compatibility conditions as they are intended to be used.

The cables shall be in conformity with standard ISO 6722-1:2011 + Cor 01:2012, ISO 6722-2:2013, ISO 19642-3:2019, ISO 19642-4:2019, ISO 19642-5:2019 or ISO 19642-6:2019.

Cables shall be securely fastened and positioned to be protected against mechanical and thermal stresses.

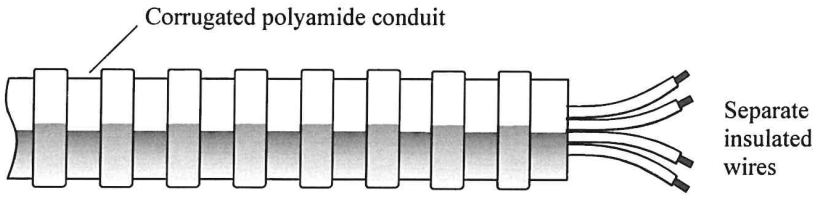
9.2.2.2.2 *Additional protection*

Cables located to the rear of the driver's cab and on trailers shall be additionally protected to minimize any unintended ignition or short-circuit in the event of an impact or deformation.

The additional protection shall be suitable for the conditions during normal use of the vehicle.

The additional protection is complied with if multicore cables in conformity with ISO 14572:2011, ISO 19642-7:2019, ISO 19642-8:2019, ISO 19642-9:2019 or ISO 19642-10:2019 are used or one of the examples in figures 9.2.2.2.2.1 to 9.2.2.2.2.4 below or another configuration that offers equally effective protection.

Figure 9.2.2.2.2.1



[1] *UN Regulation No. 100 (Uniform provisions concerning the approval of vehicles with regard to specific requirements for the electric power train).*

Figure 9.2.2.2.2.2

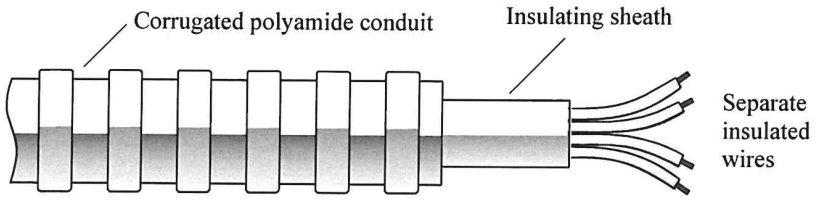


Figure 9.2.2.2.2.3

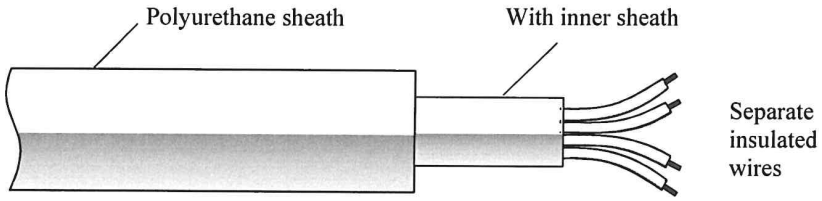
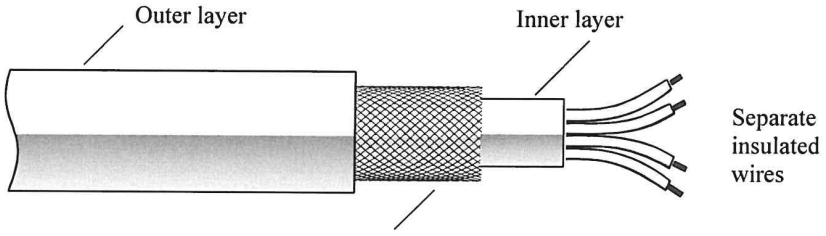


Figure 9.2.2.2.2.3



Cables of wheel speed sensors do not need additional protection.

EX/II vehicles being one stage built panel vans where the wiring behind the driver's cab is protected by the body are deemed to comply with this requirement.

9.2.2.3 ***Fuses and circuit breakers***

All circuits shall be protected by fuses or automatic circuit breakers, except for the following:

- From the starter battery to the cold start system;
- From the starter battery to the alternator;
- From the alternator to the fuse or circuit breaker box;
- From the starter battery to the starter motor;
- From the starter 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 starter battery to the electrical lifting mechanism for lifting the bogie axle;
- From the starter battery to the electric steering equipment.

The above unprotected circuits shall be as short as possible.

9.2.2.4 ***Batteries***

Battery terminals shall be electrically insulated or the battery shall be covered by an insulating cover.

Batteries which may develop ignitable gas and are not located under the engine bonnet, shall be fitted in a vented box.

9.2.2.5 ***Lighting***

Light sources with a screw cap shall not be used.

9.2.2.6 ***Electrical connections between motor vehicles and trailers***

9.2.2.6.1 Electrical connections shall be designed to prevent:

- Ingress of moisture and dirt; the connected parts shall have a protection degree of at least IP 54 in accordance with IEC 60529;
- Accidental disconnection; connectors shall fulfil the requirements given in clause 5.6 of ISO 4091:2003.

9.2.2.6.2 Requirements of 9.2.2.6.1 are deemed to be met:

- for connectors standardized for specific purposes according to ISO 12098:2004[2], ISO 7638:2003[2], EN 15207:2014 or ISO 25981:2008[2];
- where the electrical connections are part of an automatic coupling system (see UN Regulation No.55[3]).

9.2.2.6.3 Electrical connections for other purposes concerning the proper functioning of the vehicles or their equipment may be used provided they comply with the requirements of 9.2.2.6.1.

9.2.2.7 ***Voltage***

The nominal voltage of the electrical system shall not exceed 25 V A.C. or 60 V D.C.

Higher voltages are allowed in galvanically isolated parts of the electrical system provided those parts are not located within a perimeter of at least 0.5 metres from the outside of the load compartment or tank.

Additionally systems working on a voltage higher than 1000 V A.C. or 1500 V D.C. shall be integrated in an enclosed housing.

If Xenon lights are used only those having integrated starters are allowed.

9.2.2.8 ***De-energizing electrical circuits***

9.2.2.8.1 Features to enable the de-energization of the electrical circuits for all voltage levels shall be placed as close to the energy sources as practicable. In the case the feature interrupts only one lead from the energy source, it shall interrupt the supply lead.

9.2.2.8.2 A control device to facilitate the de-energizing 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 either by 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 devices are electrically operated, the circuits of the control devices are subject to the requirements of 9.2.2.9.

9.2.2.8.3 Features to enable the de-energization of the electrical circuits shall be designed so that they can be operated when the vehicle is stationary. The de-energization shall be completed within 30 seconds after the activation of the control device.

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[2] *ISO 4009, referred to in this standard, need not be applied.*

[3] *UN Regulation No. 55 (Uniform provisions concerning the approval of mechanical coupling components of combinations of vehicles).*

9.2.2.8.4 The feature shall be installed in such a way that protection IP65 in accordance with IEC 60529 is complied with.

9.2.2.8.5 *Cable connections on the feature*

Systems with a voltage that exceed 25 V AC or 60 V DC and systems under the scope of UN Regulation No. 100[1], shall comply with the requirements of the said regulation.

Systems with a voltage up to 25 V AC or 60 V DC shall have a protection degree IP 54 in accordance with IEC 60529. 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 by a rubber cap.

9.2.2.9 ***Permanently energized circuits***

9.2.2.9.1 (a) Those parts of the electrical installation including the leads which shall remain energized when the feature to de-energize the electrical circuits is activated, shall be suitable for use in hazardous areas. Such equipment shall meet the general requirements of IEC 60079, parts 0 and 14[4] and the additional requirements applicable from IEC 60079, parts 1, 2, 5, 6, 7, 11, 15, 18, 26 or 28;

(b) For the application of IEC 60079 part 14[4], the following classification shall be used:

Permanently energized electrical equipment including the leads which is not subject to 9.2.2.4 and 9.2.2.8 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.

9.2.2.9.2 Bypass connections to the feature to de-energize the electrical circuits for electrical equipment which shall remain energized when the feature is activated shall be protected against overheating by suitable means, such as a fuse, a circuit breaker or a safety barrier (current limiter).

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 UN Regulation No.13[5], as amended, in accordance with the dates of application specified therein. Vehicles equipped with an electric regenerative braking system shall fulfil all relevant technical requirements of UN Regulation No. 13[5], as amended at least by the 11 series of amendments, as applicable.

Trailers with regenerative braking or electric power train are not allowed.

9.2.3.1.2 EX/II, EX/III, FL and AT vehicles shall fulfil the requirements of UN Regulation No.13[5], Annex 5.

9.2.3.2 *(Deleted)*

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[1] *UN Regulation No. 100 (Uniform provisions concerning the approval of vehicles with regard to specific requirements for the electric power train).*

[4] *The requirements of IEC 60079 part 14 do not take precedence over the requirement of this Part.*

[5] *UN Regulation No. 13 (Uniform provisions concerning the approval of vehicles of categories M, N and O with regard to braking).*

9.2.3.3 ***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 **Vehicle propulsion system**

9.2.4.1 ***General provisions***

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

Hybrid vehicles equipped with an internal combustion engine and electric power train shall comply with the relevant provisions of 9.2.4.2 to 9.2.4.5.

9.2.4.2 ***Fuel tanks and cylinders***

The fuel tanks and cylinders supplying the engine or fuel cell of the vehicle shall meet the following requirements:

(a) In the event of any leakage under normal conditions of carriage, the liquid fuel or the liquid phase of a gaseous fuel shall drain to the ground and not come into contact with the load or hot parts of the vehicle;

(b) Fuel tanks for liquid fuels shall meet the requirements of UN Regulation No. 34[6]; 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;

(c) Fuel tanks and cylinders for LNG and for CNG respectively shall meet the relevant requirements of UN Regulation No. 110[7];

(d) Fuel tanks for LPG shall meet the relevant requirements of UN Regulation No. 67[8];

(e) Fuel tanks and cylinders for hydrogen shall meet the relevant requirements of UN Regulation No. 134[9], as amended at least by the 02 series of amendments, or for liquid hydrogen containers the technical provisions of Global Technical Regulation No.13[10], Amendment 1, part 7;

(f) The discharge opening(s) of pressure relief devices and/or pressure relief valves of fuel tanks containing gaseous fuels shall be directed away from air intakes, electric storage systems, fuel tanks, the load or hot parts of the vehicle and shall not impinge on enclosed areas, other vehicles, exterior-mounted systems with air intake (i.e. air-conditioning systems), engine intakes, or engine exhaust. Pipes of the fuel system shall not be fixed on the shell containing the load.

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6 *UN Regulation No. 34 (Uniform provisions concerning the approval of vehicles with regard to the prevention of fire risks)*

7 *UN Regulation No. 110 (Uniform provisions concerning the approval of:*
I. Specific components of motor vehicles using compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion systems;
II. Vehicles with regard to the installation of specific components of an approved type for the use of compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion system).

8 *UN Regulation No. 67 (Uniform provisions concerning the approval of:*
I. Approval of specific equipment of vehicles of category M and N using liquefied petroleum gases in their propulsion system
II. Approval of vehicles of category M and N fitted with specific equipment for the use of liquefied petroleum gases in their propulsion system with regard to the installation of such equipment)

9 *UN Regulation No. 134 (Uniform provisions concerning the approval of motor vehicles and their components with regard to the safety-related performance of Hydrogen-Fuelled Vehicles (HFCV))*

10 *UN Global technical regulation No. 13 on hydrogen and fuel cell vehicles*

9.2.4.3 ***Internal combustion engine***

9.2.4.3.1 *Engine*

The engine propelling the vehicle shall be so equipped and situated to avoid any danger to the load through heating or ignition. The use of a fuel shall only be permitted if components are approved and installation meet the provisions of 9.2.2 and the technical requirements of:

(a) UN Regulation No. 110[7] for CNG or LNG;

(b) UN Regulation No. 67[8] for LPG;

(c) UN Regulation No. 134[9] for compressed hydrogen and the technical provisions of Global Technical Regulation No.13[10], Amendment 1 for liquid hydrogen, as relevant.

In the case of EX/II and EX/III vehicles the engine shall be of compression-ignition construction using only liquid fuels with a flashpoint above 55 °C. Gases shall not be used.

9.2.4.3.2 *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.

9.2.4.4 ***Electric power train***

Electric power trains shall not be used for EX vehicles. Trailers with re-generative braking or electric power train are not allowed.

9.2.4.4.1 *General provisions*

The electric power train shall meet the requirements of UN Regulation No. 100[1], as amended at least by the 03 series of amendments.

Vehicles with an electric power train shall be equipped with an isolation resistance monitoring system.

The vehicle shall give external signals in stationary conditions, in addition to the warning the driver receives in the driver's cab as required by 6.15.1 of UN Regulation No.100[1], as amended at least by the 03 series of amendments.

9.2.4.4.2 *Rechargeable electrical energy storage system (REESS)*

NOTE: *Other acronyms for REESS are used in other documentation for similar systems (e.g. RESS).*

REESS of vehicles with an electric power train shall be designed and constructed taking into account a risk evaluation according to ISO 6469-1:2019/Amd 1:2022 to establish safety for normal operational conditions. A review shall be carried out by a technical service such as a technical service for vehicle approvals according to UN Regulation No. 100[1], as amended at least by the 03 series of amendments.

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[1] *UN Regulation No. 100 (Uniform provisions concerning the approval of vehicles with regard to specific requirements for the electric power train).*

[7] *UN Regulation No. 110 (Uniform provisions concerning the approval of:*
I. Specific components of motor vehicles using compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion systems;
II. Vehicles with regard to the installation of specific components of an approved type for the use of compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion system).

[8] *UN Regulation No. 67 (Uniform provisions concerning the approval of:*
I. Approval of specific equipment of vehicles of category M and N using liquefied petroleum gases in their propulsion system
II. Approval of vehicles of category M and N fitted with specific equipment for the use of liquefied petroleum gases in their propulsion system with regard to the installation of such equipment)

[9] *UN Regulation No. 134 (Uniform provisions concerning the approval of motor vehicles and their components with regard to the safety-related performance of Hydrogen-Fuelled Vehicles (HFCV))*

[10] *UN Global technical regulation No. 13 on hydrogen and fuel cell vehicles*

NOTE: *Normal operational conditions also include malfunctioning and reasonably foreseeable accidental situations.*

9.2.4.4.3 *Measures against thermal propagation*

REESS containing cells for which thermal propagation cannot be guaranteed to be contained within the REESS, measures shall be taken to mitigate danger to the load by heating or ignition.

9.2.4.4.4 *Vehicle charging inlet*

The vehicle charging inlet shall be provided with thermal sensing function which limits or interrupts current transfer according to ISO 17409:2020, when the temperature exceeds component rated values or required limits by applicable product standards, see e.g. IEC 62196-3-1:2020.

9.2.4.5 *Hydrogen fuel cell vehicles*

9.2.4.5.1 Hydrogen fuel cell vehicles shall comply with the requirements for the electrical power train of 9.2.4.4.

9.2.4.5.2 Hydrogen fuel cell vehicles shall comply with UN Regulation No. 134[9], as amended at least by the 02 series of amendments. For vehicles using liquid hydrogen the technical requirements of the Global Technical Regulation No.13[10], Amendment 1 applies.

9.2.4.5.3 Shut-off devices of hydrogen containers shall close automatically:

(a) when the vehicle is no longer in driving mode;

(b) at a deceleration of 3.25 $m \cdot s^{-2}$ for 0.7 s;

(c) in case of a lateral overturning above an angle of 23°.

The shut-off devices may be re-opened by a deliberate action of the driver.

9.2.5 Combustion heaters

9.2.5.1 Combustion heaters shall comply with the relevant technical requirements of UN Regulation No. 122[11], as amended, in accordance with the dates of application specified therein and the provisions of 9.2.5.2 to 9.2.5.6 applicable according to the table in 9.2.1.

9.2.5.2 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 9.2.4.2 and 9.2.4.3.2 respectively.

9.2.5.3 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.

9.2.5.4 Afterrunning is permitted after the combustion heaters have been put out of operation. For the methods of 9.2.5.3 (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.

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9 *UN Regulation No. 134 (Uniform provisions concerning the approval of motor vehicles and their components with regard to the safety-related performance of Hydrogen-Fuelled Vehicles (HFCV))*

10 *UN Global technical regulation No. 13 on hydrogen and fuel cell vehicles*

11 *UN Regulation No. 122 (Uniform provisions concerning the approval of vehicles of categories M, N and O with regard to their heating systems)*

9.2.5.5 The combustion heater shall be switched on manually. Programming devices shall be prohibited.

9.2.5.6 Combustion heaters with gaseous fuels are not permitted.

9.2.6 Speed limitation device

Motor vehicles (rigid vehicles and tractors for semi-trailers) with a maximum mass exceeding 3.5 tonnes, shall be equipped with a speed limitation device or function according to the technical requirements of UN Regulation No. 89[12], as amended. The device or function shall be set in such a way that the speed cannot exceed 90 km/h.

9.2.7 Coupling devices of motor vehicles and trailers

Coupling devices of motor vehicles and trailers shall comply with the technical requirements of UN Regulation No. 55[3] as amended, in accordance with the dates of application specified therein.

9.2.8 Prevention of other risks caused by fuels

9.2.8.1 Fuel systems for engines fuelled by LNG and liquid hydrogen shall be so equipped and situated to avoid any danger to the load due to the gas being refrigerated.

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12 *UN Regulation No.89 (Uniform provisions concerning the approval of:*
I. Vehicles with regard to limitation of their maximum speed or their adjustable speed limitation function
II. Vehicles with regard to the installation of a speed limiting device (SLD) or adjustable speed limitation device (ASLD) of an approved type
III. Speed limitation devices (SLD) and adjustable speed limitation device (ASLD))

3 *UN Regulation No. 55 (Uniform provisions concerning the approval of mechanical coupling components of combinations of vehicles).*

CHAPTER 9.3

ADDITIONAL REQUIREMENTS CONCERNING COMPLETE OR COMPLETED EX/II OR EX/III VEHICLES INTENDED FOR THE CARRIAGE OF EXPLOSIVE SUBSTANCES AND ARTICLES (CLASS 1) IN PACKAGES

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 9.2.5.1, 9.2.5.2, 9.2.5.5 and 9.2.5.6.

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 afterrunning 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. Sheeting shall be resistant to tearing and be of impermeable material, not readily flammable[1]. 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.

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-s3-d2 according to standard EN 13501-1:2007 + A1:2009 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.

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[1] *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 sheeting have a burn rate not exceeding 100 mm/min.*

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 electrical installation shall meet the relevant requirements of 9.2.2.1, 9.2.2.2 9.2.2.3, 9.2.2.4, 9.2.2.5, 9.2.2.6, 9.2.2.7, 9.2.2.8 and 9.2.2.9.2.

9.3.7.2 The electrical installation in the load compartment shall be dust-protected at least IP 54 according to IEC 60529 or equivalent. In the case of carriage of items and articles of compatibility group J, protection to at least IP 65 according to IEC 60529 or equivalent shall be provided.

9.3.7.3 No wiring shall be positioned inside the load compartment. Electrical equipment accessible from the inside of the load compartment shall be sufficiently protected from mechanical impact from the inside.

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 afterrunning 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 afterrunning 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 2.2.52.1.15 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 W/m^2K;

(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 to prevent the control temperature from being exceeded are listed in 7.1.7.4.5. 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 m³ OR IN TANK-CONTAINERS, PORTABLE TANKS OR MEGCs OF A CAPACITY GREATER THAN 3 m³ (EX/III, FL 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 or Chapter 6.13, as appropriate.

9.7.2.5 Vacuum-operated waste tanks shall meet the requirements of Chapter 6.10.

9.7.3 Fastening

9.7.3.1 Fastenings shall be designed to withstand static and dynamic stresses in normal conditions of carriage. Fastenings also include any supporting frames used for mounting the structural equipment (see definition in 1.2.1) to the vehicle.

9.7.3.2 Fastenings in the case of tank-vehicles, battery-vehicles and vehicles carrying tank-containers, demountable tanks, portable tanks, MEGCs or UN MEGCs shall be capable of absorbing, under the maximum permissible load, the following separately applied static forces:

- In the direction of travel: twice the total mass multiplied by the acceleration due to gravity (g)[1];
- Horizontally, at right angles to the direction of travel: the total mass multiplied by the acceleration due to gravity (g)[1];
- Vertically upwards: the total mass multiplied by the acceleration due to gravity (g)[1];
- Vertically downwards: twice the total mass multiplied by the acceleration due to gravity (g)[1].

NOTE: *The requirements of this paragraph do not apply to twist lock tie-down devices in compliance with ISO 1161:2016 "Series 1 freight containers -- Corner and intermediate fittings – Specifications". However, the requirements apply to any frames or other devices used for support of such fastenings on the vehicle.*

9.7.3.3 For tank-vehicles, battery-vehicles and vehicles carrying demountable tanks, the fastenings shall withstand the minimum stresses as defined in 6.8.2.1.11 to 6.8.2.1.13, 6.8.2.1.15 and 6.8.2.1.16.

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1 *For calculation purposes g = 9.81 m/s².*

9.7.4 Electrical bonding 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 6.13.1.2 and 6.13.2.14.3.*

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) of the axle with greatest width 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 m³ 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 UN Regulation No. 111[2] 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 9.2.5.1, 9.2.5.2, 9.2.5.5 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 9.2.5.3 and 9.2.5.4.

9.7.7.2 If the vehicle is intended for the carriage of dangerous goods for which a label conforming to models Nos. 1.5, 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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[2] *UN 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 Additions to or modifications of the electrical installation on vehicles shall meet the relevant requirements of Chapter 9.2 as appropriate (see table 9.2.1.1).

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, 18, 26 or 28. 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, 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 on FL vehicles, 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 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.

9.7.9 Additional safety requirements concerning FL and EX/III vehicles

9.7.9.1 The following vehicles shall be equipped with an automatic fire suppression system for the compartment where the internal combustion engine propelling the vehicle is located:

(a) FL vehicles carrying liquefied and compressed flammable gases with a classification code including an F;

(b) FL vehicles carrying packing group I or packing group II flammable liquids; and

(c) EX/III vehicles.

9.7.9.2 The following vehicles shall be fitted with thermal protection capable of mitigating the propagation of a fire from all the wheels:

(a) FL vehicles carrying liquefied and compressed flammable gases with a classification code including an F;

(b) FL vehicles carrying packing group I or packing group II flammable liquids; and

(c) EX/III vehicles.

NOTE: *The aim is to avoid the propagation of the fire to the load, for example with thermal shields or other equivalent systems, either:*

(a) By direct spread from the wheel to the load; or

(b) By indirect spread from the wheel to the cabin and further to the load.

CHAPTER 9.8

ADDITIONAL REQUIREMENTS CONCERNING COMPLETE AND COMPLETED MEMUs

9.8.1 General provisions

In addition to the vehicle proper, or the units of running gear used in its stead, a MEMU comprises one or more tanks and bulk containers, their items of equipment and the fittings for attaching them to the vehicle or to the running-gear units.

9.8.2 Requirements concerning tanks and bulk containers

Tanks, bulk containers and special compartments for packages of explosives of MEMUs shall meet the requirements of Chapter 6.12.

9.8.3 Electrical bonding of MEMUs

Tanks, bulk containers and special compartments for packages of explosives made of metal or of fibre-reinforced plastics material shall be linked to the chassis by means of at least one good electrical connection. Any metal contact capable of causing electro-chemical corrosion or reacting with the dangerous goods carried in the tanks and bulk containers shall be avoided.

9.8.4 Stability of MEMUs

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) of the axle with greatest width shall be at least equal to 90 % of the height of the centre of gravity of the laden 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.

9.8.5 Rear protection of MEMUs

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 protecting fittings or accessories in contact with the substance being carried). Vehicles 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: *This provision does not apply to MEMUs where the tanks are protected adequately against rear impact by other means, e.g. machinery or piping not containing dangerous goods.*

9.8.6 Combustion heaters

9.8.6.1 Combustion heaters shall meet the requirements of 9.2.5.1, 9.2.5.2, 9.2.5.5, 9.2.5.6 and the following:

(a) The switch may be installed outside the driver's cab;

(b) The device shall be switched off from outside the MEMU compartment; and

(c) It is not necessary to prove that the heat exchanger is resistant to the reduced afterrunning cycle.

9.8.6.2 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 compartments containing tanks. It shall be ensured that the heating air outlet cannot be blocked. The temperature to which any equipment is heated shall not exceed 50 °C. Heating devices installed inside the compartments shall be designed so as to prevent the ignition of any explosive atmosphere under operating conditions.

9.8.7 **Additional safety requirements**

9.8.7.1 MEMUs shall be equipped with automatic fire extinguisher systems for the engine compartment.

9.8.7.2 Protection of the load by metal thermal shields against tyre fire shall be provided.

9.8.8 **Additional security requirements**

Process equipment and special compartments in MEMUs shall be fitted with locks.

AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR)
(applicable as from 1 January 2025)

Corrigendum

Note: Corrigenda to the published versions of ADR, as well as amendments entering into force before the next version, will be made available on the United Nations Economic Commission for Europe web site at the following address: https://unece.org/transport/dangerous-goods

Volume I

1. **Chapter 1.9, 1.9.4, footnote 2, link in parenthesis**

For the existing link, *substitute*

https://transport.ec.europa.eu/transport-themes/transport-dangerous-goods/risk-management-framework_en

Volume II

2. **Chapter 9.2, 9.2.1.1, in the table, entire row for 9.2.4.4**

For the existing row, *substitute*

9.2.4.4	Electric power train