

## **Chapter 9.2 of ADR consolidated version.**

### **Version 8 dd 11-4-2024**

This document is a consolidated version of Chapter 9.2 intended to assist in the application of this chapter. Foot note 9 and 10 to R.134 and GTR 13 that will appear in the ADR are not included in this version.

Although best efforts are made to all include modifications up to the version date, the use of this document is for own account.

Chair of the IWG-EV

### **Chapter 1.6**

1.6.5 Add the following transitional measures:

“1.6.5.4 As regards the construction of AT vehicles, the requirements of Part 9 in force up to 31 December 2024 may be applied until 31 December 2026.”

“1.6.5.26 Vehicles first registered (or which entered into service if registration is not mandatory) before 1 Januari 2027, approved as AT vehicle not in compliance with the provisions of 9.2.4.2 concerning fuel tanks may continue to be used.”

“1.6.5.27 Vehicles first registered (or which entered into service if registration is not mandatory) before 1 January 2027, approved as AT vehicle not in compliance with the provisions of 9.2.4.4.2 concerning the evaluation of the REESS may continue to be used.”

“1.6.5.28 Vehicles first registered (or which entered into service if registration is not mandatory) before 1 January 2027, approved as AT vehicle not in compliance with the provisions of 9.2.4.3.1 concerning engines may, continue to be used.”

## **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 9.2.5 (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	
<b>9.2.2</b>	<b>ELECTRICAL EQUIPMENT</b>					
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 <sup>a</sup>	X	X <sup>b</sup>	X	<p><sup>a</sup> 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.</p> <p><sup>b</sup> Applicable for vehicles first registered (or which entered into service if registration is not mandatory) after 31 March 2018.</p>
9.2.2.3	Fuses and circuit breakers	X <sup>b</sup>	X	X	X	<sup>b</sup> 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 <sup>c</sup>	X	X <sup>b</sup>	X	<p><sup>b</sup> Applicable to vehicles first registered (or which entered into service if registration is not mandatory) after 31 March 2018.</p> <p><sup>c</sup> 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.</p>
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				COMMENTS
		EX/II	EX/III	AT	FL	
9.2.3	<b>BRAKING EQUIPMENT</b>					
9.2.3.1	General provisions	X	X	X	X	
	Anti-lock braking system	X <sup>e</sup>	X <sup>d,e</sup>	X <sup>d,e</sup>	X <sup>d,e</sup>	<p><sup>d</sup> 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.</p> <p>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.</p> <p><sup>e</sup> 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.</p>
	Endurance braking system	X <sup>f</sup>	X <sup>g</sup>	X <sup>g</sup>	X <sup>g</sup>	<p><sup>f</sup> 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.</p> <p><sup>g</sup> 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.</p>
<b>9.2.4</b>	<b>VEHICLE PROPULSION SYSTEM</b>					
9.2.4.2	Fuel tanks and cylinders	X	X	X <sup>k</sup>	X	<sup>k</sup> Applicable to motor vehicles using fuels other than hydrogen first registered after 31 December 2026
9.2.4.3	Internal combustion engine					
9.2.4.3.1	Engine	X	X	X <sup>k</sup>	X	<sup>k</sup> 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	X	
9.2.4.4.1	General provisions			X	X	
9.2.4.4.2	Rechargeable Electrical Energy Storage System			X <sup>k</sup>	X	<sup>k</sup> 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	<b>COMBUSTION HEATERS</b>					
9.2.5.1		X <sup>h</sup>	X <sup>h</sup>	X <sup>h</sup>	X <sup>h</sup>	<sup>h</sup> 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.
9.2.5.2						
9.2.5.5						
9.2.5.3					X <sup>h</sup>	<sup>h</sup> 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.
9.2.5.4						
9.2.5.6		X	X			
9.2.6	<b>SPEED LIMITATION DEVICE</b>	X <sup>i</sup>	X <sup>i</sup>	X <sup>i</sup>	X <sup>i</sup>	<sup>i</sup> 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	<b>COUPLING DEVICES OF MOTOR VEHICLES AND TRAILERS</b>	X	X	X <sup>j</sup>	X <sup>j</sup>	<sup>j</sup> 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	<b>PREVENTION OF OTHER RISKS CAUSED BY FUELS</b>			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<sup>1</sup>, 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.

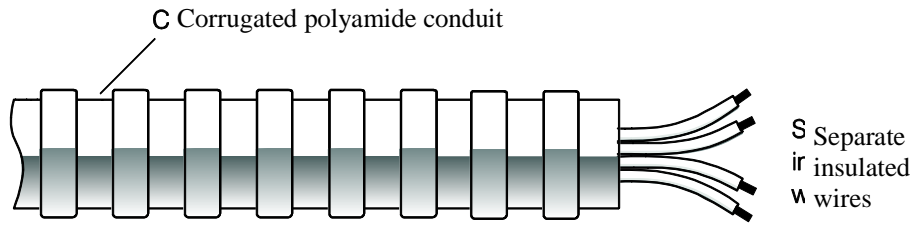
#### **9.2.2.2.2 *Additional protection***

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.

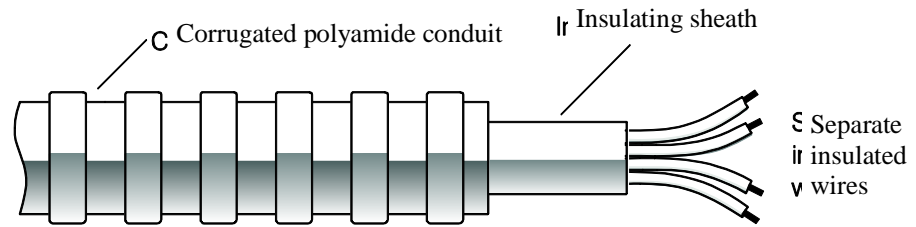
The additional protection shall be suitable for the conditions during normal use of the vehicle.

The additional protection is complied with if multicore cables in conformity with ISO 14572:2011<sup>1</sup>, ISO 19642-7:2019, ISO 19642-8, ISO 19642-9 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.

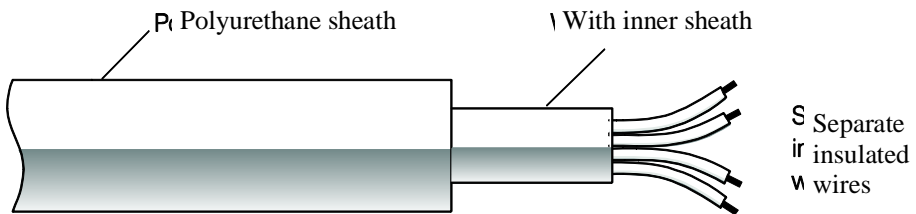
**Figure 9.2.2.2.2.1**



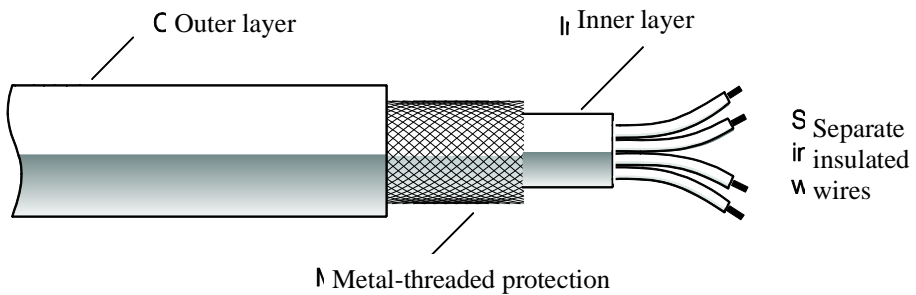
**Figure 9.2.2.2.2.2**



**Figure 9.2.2.2.2.3**



**Figure 9.2.2.2.2.4**



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<sup>2</sup>, ISO 7638:2003<sup>2</sup>, EN 15207:2014 or ISO 25981:2008<sup>2</sup>;
- where the electrical connections are part of an automatic coupling system (see UN Regulation No.55<sup>3</sup>).

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.

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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).

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***

**NOTE:** *Features to enable the de-energization of the electric circuits shall be designed so that they can be operated when the vehicle is stationary.*

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 The de-energization shall be completed within 30 seconds after the activation of the control device.

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<sup>1</sup>, 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<sup>4</sup> 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<sup>4</sup>, 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<sup>5</sup>, 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<sup>5</sup>, as amended at least by the 11 series of amendments, as applicable.

Trailers with re-generative 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<sup>5</sup>, Annex 5.

9.2.3.2 *(Deleted)*

**9.2.3.3** 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.

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

*Hybrid vehicles equipped with an internal combustion engine and electric power train shall comply with the relevant provisions of 9.2.4.3 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<sup>6</sup>; 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<sup>7</sup>.
- (d) Fuel tanks for LPG shall meet the relevant requirements of UN Regulation No. 67<sup>8</sup>.
- (e) Fuel tanks and cylinders for hydrogen shall meet the relevant requirements of UN Regulation No. 134<sup>9</sup>, as amended at least by the series 02 of amendments or for liquid hydrogen containers the technical provisions of Global Technical Regulation No.13<sup>10</sup>, Amendment 01 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, 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, electrical storage systems or engine exhaust. Pipes of the fuel system shall not be fixed on the shell containing the load.

#### **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<sup>7</sup> for CNG or LNG.
- (b) UN Regulation No. 67<sup>8</sup> for LPG.
- (c) *UN Regulation No. 134<sup>9</sup> for compressed hydrogen and the technical provisions of Global Technical Regulation No.13<sup>10</sup>, Amendment 01 for liquid hydrogen as relevant.*

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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)*

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 The electric power train shall meet the requirements of UN Regulation No. 100<sup>1</sup>, 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 to the driver receives in the driver's cab as required by 6.15.1 of UN Regulation No.100<sup>1</sup> 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/A1:2022 Am.01 to establish safety for normal operational conditions. A review shall be carried out by a technical service such as technical service for vehicle approvals according to UN Regulation No. 100) as amended at least by the 03 series of amendments.

Note: normal operational conditions includes the normal, malfunctioning and reasonable 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**

9.2.4.5.1 Hydrogen Fuel Cell Vehicles shall comply with the requirements for the electrical power train of 9.2.4.4.

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<sup>1</sup> UN Regulation No. 100 (Uniform provisions concerning the approval of vehicles with regard to specific requirements for the electric power train).

9.2.4.5.2 Hydrogen Fuel cell vehicles shall comply with UN Regulation No. 134<sup>9</sup> series 02 of amendment. For vehicles using liquid hydrogen the technical requirements of the Global Technical Regulation 13<sup>10</sup>. Amendment 01 apply.”

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 an impact of 3.25 m.s<sup>2</sup> for 0.7 s against the direction of travel, and
- (c) in case of lateral overturning above an angle of 23<sup>0</sup>.

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<sup>9</sup>, 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) Startup of a feed pump on the motor vehicle for the dangerous goods carried.

9.2.5.4 After running 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 after running 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 after running cycle of 40 seconds for the time of their normal use.

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<sup>10</sup>, as amended. The device or function shall be set in such a way that the speed cannot exceed 90 km/h.

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

<sup>12</sup> 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

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