Amendment of UN ECE R100 regarding „in-use“ requirements for vehicles of category L
IMMA contribution to REESS IG from perspective L1-L5 (07-EVTF-13)

RESS-8-6

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Informal document **GRSP-51-11**

A	Current version of the Regulation.	Updated Regulation Proposal by IMMA	Explanation	Questions for discussion
1.1	**PART I:** safety requirements with respect to the electric power train of road vehicles of categories M and N, with a maximum design speed exceeding 25 km/h, equipped with one or more traction motor(s) operated by electric power and not permanently connected to the grid, as well as their high voltage components and systems which are galvanically connected to the high voltage bus of the electric power train. **PART I of this** Regulation does not cover post-crash safety requirements of road vehicles;	**PART I:** safety requirements with respect to the electric power train of road vehicles of categories M and N, with a maximum design speed exceeding 25 km/h **and vehicles of categories L [with a maximum design speed exceeding 6 km/h],** equipped with one or more traction motor(s) operated by electric power and not permanently connected to the grid, as well as their high voltage components and systems which are galvanically connected to the high voltage bus of the electric power train. **PART I of this** Regulation does not cover post-crash safety requirements of road vehicles;	IMMA to date has only considered L1-L5 aspects. L6/L7 Aspects will be considered in a later phase.	

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§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
2.1	**"Active driving possible mode"** means the vehicle mode when application of pressure to the accelerator pedal (or activation of an equivalent control) or release of the brake system will cause the electric power train to move the vehicle.	**"Active driving possible mode"** means the vehicle mode when application of pressure to the accelerator pedal (or activation of an equivalent control) or release of the brake system will cause the electric power train to move the vehicle.	No changes since previous RESS meeting.	
2.2	**"Barrier"** means the part providing protection against direct contact to the live parts from any direction of access.	**"Barrier"** means the part providing protection against direct contact to the live parts from any direction of access.	No Changes since previous RESS meeting.	

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§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
2.4	**"Conductive connection"** means the connection using connectors to an external power supply when the rechargeable energy storage system (REESS) is charged.	**"Conductive connection"** means the connection using connectors to an external power supply when the rechargeable energy storage system (REESS) is charged.	As agreed in previous RESS meeting.	
2.5	**"Coupling system for charging the rechargeable energy storage system (REESS)"** means the electrical circuit used for charging the REESS from an external electric power supply including the vehicle inlet.	**"Coupling system for charging the rechargeable energy storage system (REESS)"** means the electrical circuit used for charging the REESS from an external electric power supply including the vehicle inlet.	As agreed in previous RESS meeting.	
2.7	**"Direct contact"** means the contact of persons with live parts.	**"Direct contact"** means the contact of persons with live parts.	As agreed in previous RESS meeting.	
2.8	**"Electrical chassis"** means a set made of conductive parts electrically linked together, whose potential is taken as reference.	**"Electrical chassis"** means a set made of conductive parts electrically linked together, whose potential is taken as reference.	As agreed in previous RESS meeting.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
2.9	**"Electrical circuit"** means an assembly of connected live parts which is designed to be electrically energized in normal operation.	**"Electrical circuit"** means an assembly of connected live parts which is designed to be electrically energized in normal operation.	As agreed in previous RESS meeting.	
2.10	**"Electric energy conversion system"** means a system that generates and provides electric energy for electric propulsion.	**"Electric energy conversion system"** means a system that generates and provides electric energy for electric propulsion.	As agreed in previous RESS meeting.	
2.11	**"Electric power train"** means the electrical circuit which includes the traction motor(s), and may include the REESS, the electric energy conversion system, the electronic converters, the associated wiring harness and connectors, and the coupling system for charging the REESS.	**"Electric power train"** means the electrical circuit which includes the traction motor(s), and may include the REESS, the electric energy conversion system, the electronic converters, the associated wiring harness and connectors, and the coupling system for charging the REESS.	As agreed in previous RESS meeting.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
2.12	**"Electronic converter"** means a device capable of controlling and/or converting electric power for electric propulsion.	**"Electronic converter"** means a device capable of controlling and/or converting electric power for electric propulsion.	As agreed in previous RESS meeting.	
2.13	**"Enclosure"** means the part enclosing the internal units and providing protection against direct contact from any direction of access.	**"Enclosure"** means the part enclosing the internal units and providing protection against direct contact from any direction of access.	As agreed in previous RESS meeting.	
2.15	**"Exposed conductive part"** means the conductive part which can be touched under the provisions of the protection degree IPXXB, and which becomes electrically energized under isolation failure conditions. This includes parts under a cover that can be removed without using tools.	**"Exposed conductive part"** means the conductive part which can be touched under the provisions of the protection degree IPXXB, and which becomes electrically energized under isolation failure conditions. This includes parts under a cover that can be removed without using tools.	As agreed in previous RESS meeting.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
2.16	**"External electric power supply"** means an alternating current (AC) or direct current (DC) electric power supply outside of the vehicle.	**"External electric power supply"** means an alternating current (AC) or direct current (DC) electric power supply outside of the vehicle.	As agreed in previous RESS meeting.	
2.19	**"High Voltage"** means the classification of an electric component or circuit, if its working voltage is > 60 V and ≤ 1500 V DC or > 30 V and ≤ 1000 V AC root mean square (rms).	**"High Voltage"** means the classification of an electric component or circuit, if its working voltage is > 60 V and ≤ 1500 V DC or > 30 V and ≤ 1000 V AC root mean square (rms).	As agreed in previous RESS meeting.	
2.20	**"High voltage bus"** means the electrical circuit, including the coupling system for charging the REESS that operates on high voltage.	**"High voltage bus"** means the electrical circuit, including the coupling system for charging the REESS that operates on high voltage.	As agreed in previous RESS meeting.	
2.21	**"Indirect contact"** means the contact of persons with exposed conductive parts.	**"Indirect contact"** means the contact of persons with exposed conductive parts.	As agreed in previous RESS meeting.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
		~~[“Isolation resistance” means the resistance between live parts of voltage class B electric circuit and the electric chassis or exposed conductive parts as well as the voltage class A system]~~		There may be an amendment of § 5 necessary. Proposal will developed by VDE, TÜV SGS and IMMA. The proposal has also to be discussed with OICA. IMMA suggestion: to add in paragraph 5.1.3.1. this sentence: If AC high voltage buses and DC **not high voltage** buses are galvanically isolated from each other, isolation resistance between the high voltage bus and the electrical chassis shall have a minimum value of 500 Ω/volt of the working voltage for AC buses.
2.22	**"Live parts"** means conductive part(s) intended to be electrically energized in normal use.	**"Live parts"** means conductive part(s) intended to be electrically energized in normal use.	As agreed in previous RESS meeting.	
2.23	"Luggage compartment" means the space in the vehicle for luggage accommodation, bounded by the roof, hood, floor, side walls, as well as by the	"Luggage compartment" means the **closed** space in the vehicle for luggage accommodation ~~bounded by the roof, hood, floor, side walls, as well as by~~	The luggage compartment of many electrical motorcycles don’t have roof or hood. There is an applicable part	Need to be checked whether it will fit also for vehicles of categories M or if different definitions should defined for different vehicle categories.

	barrier and enclosure provided for protecting the power train from direct contact with live parts, being separated from the passenger compartment by the front bulkhead or the rear bulk head.	~~the barrier and enclosure provided for protecting the power train from direct contact with live parts, being separated from the passenger compartment by the front bulkhead or the rear bulk head..~~	in L1-L5 such as tool box, luggage box under seat, accessory box, or Cowl pocket on front cowl. A new and separate definition may be proposed by IMMA for L6/L7 in a later phase.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
2.25	**"On-board isolation resistance monitoring system"** means the device which monitors the isolation resistance between the high voltage buses and the electrical chassis.	**"On-board isolation resistance monitoring system"** means the device which monitors the isolation resistance between the high voltage buses and the electrical chassis.	As agreed in previous RESS meeting.	
2.26	**“Open type traction battery"** means a liquid type battery requiring refilling with water and generating hydrogen gas released to the atmosphere.	**“Open type traction battery"** means a liquid type battery requiring refilling with water and generating hydrogen gas released to the atmosphere.	As agreed in previous RESS meeting.	
2.27	**"Passenger compartment"** means the space for occupant accommodation, bounded by the roof, floor, side walls, doors, window glass, front bulkhead and rear bulkhead, or rear gate, as well as by the barriers and enclosures provided for protecting the power train from direct contact with live parts.	**"Passenger compartment" for M and N category** means the space for occupant accommodation, bounded by the roof, floor, side walls, doors, window glass, front bulkhead and rear bulkhead, or rear gate, as well as by the barriers and enclosures provided for protecting the power train from direct contact with live parts. **"Passenger compartment" for L category means** **The passenger**	L1, L3, L5 have few examples for a passenger compartment. An applicable case exists also for L2 and L4 in the sidecar. It may also be possible to introduce ‘Embodied vehicle’: definition exists in Directive 97/24/CE chapter 12): An embodied L category vehicle is a vehicle of which the passenger compartment is bounded by at least 4 of the following elements : windscreen, floor, roof,	L6, L7 vehicles also may have Passenger compartment.

		compartment is bounded by at least 4 of the following elements: the roof, floor, side walls, doors, window glass, front bulkhead and rear bulkhead, or rear gate, as well as by the barriers and enclosures provided for protecting the power train from direct contact with live parts.	lateral or rear closures or doors.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
2.28	"Protection degree" means the protection provided by a barrier/enclosure related to the contact with live parts by a test probe, such as a test finger (IPXXB) or a test wire (IPXXD), as defined in Annex 3.		As agreed in previous RESS meeting.	
2.29	**"Rechargeable energy storage system (REESS)"** means the rechargeable energy storage system that provides electric energy for electrical propulsion.	**"Rechargeable energy storage system (REESS)"** means the rechargeable energy storage system that provides electric energy for electrical propulsion.	As agreed in previous RESS meeting.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
2.31	**"Service disconnect"** means the device for deactivation of the electrical circuit when conducting checks and services of the REESS, fuel cell stack, etc.	**"Service disconnect"** means the device for deactivation of the electrical circuit when conducting checks and services of the REESS, fuel cell stack, etc.	As agreed in previous RESS meeting.	
2.33	**"Solid insulator"** means the insulating coating of wiring harnesses provided in order to cover and protect the live parts against direct contact from any direction of access; covers for insulating the live parts of connectors, and varnish or paint for the purpose of insulation.	**"Solid insulator"** means the insulating coating of wiring harnesses provided in order to cover and protect the live parts against direct contact from any direction of access; covers for insulating the live parts of connectors, and varnish or paint for the purpose of insulation.	As agreed in previous RESS meeting.	
2.37	**"Vehicle type"** means vehicles which do not differ in such essential aspects as: (a) Installation of the electric power train and the galvanically connected high voltage bus. (b) Nature and type of electric power train and the galvanically connected high voltage components.	**"Vehicle type"** means vehicles which do not differ in such essential aspects as: (a) Installation of the electric power train and the galvanically connected high voltage bus. (b) Nature and type of electric power train and the galvanically connected high voltage components.	As agreed in previous RESS meeting.	

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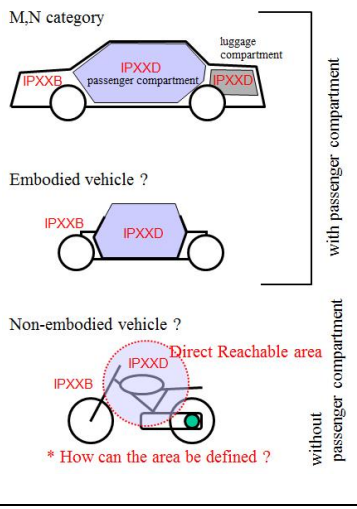
2.38	**"Working voltage"** means the highest value of an electrical circuit voltage root-mean-square (rms), specified by the manufacturer, which may occur between any conductive parts in open circuit conditions or under normal operating condition. If the electrical circuit is divided by galvanic isolation, the working voltage is defined for each divided circuit, respectively.	**"Working voltage"** means the highest value of an electrical circuit voltage root-mean-square (rms), specified by the manufacturer, which may occur between any conductive parts in open circuit conditions or under normal operating condition. If the electrical circuit is divided by galvanic isolation, the working voltage is defined for each divided circuit, respectively.	As agreed in previous RESS meeting.	
3.1.	**PART I: APPROVAL OF A VEHICLE TYPE WITH REGARD TO THE HIGH VOLTAGE SYSTEM**	**PART I: APPROVAL OF A VEHICLE TYPE WITH REGARD TO THE HIGH VOLTAGE SYSTEM**	As agreed in previous RESS meeting.	
3.1.1.	The application for approval of a vehicle type with regard to specific requirements for the electric power train shall be submitted by the vehicle manufacturer or by his duly accredited representative.	The application for approval of a vehicle type with regard to specific requirements for the electric power train shall be submitted by the vehicle manufacturer or by his duly accredited representative.	As agreed in previous RESS meeting.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
3.1.2.	It shall be accompanied by the under-mentioned documents in triplicate and following particulars:		As agreed in previous RESS meeting.	
3.1.2.1.	Detailed description of the vehicle type as regards the electric power train and the galvanically connected high voltage bus.		As agreed in previous RESS meeting.	
3.1.3.	A vehicle representative of the vehicle type to be approved shall be submitted to the Technical Service responsible for conducting the approval tests		As agreed in previous RESS meeting.	
5.	**REQUIREMENTS OF A VEHICLE WITH REGARD TO ITS ELECTRICAL SAFETY**	**REQUIREMENTS OF A VEHICLE WITH REGARD TO ITS ELECTRICAL SAFETY**	As agreed in previous RESS meeting.	
5.1	**Protection against electrical shock** These electrical safety requirements apply to high voltage buses under conditions where they are not connected to external high voltage power supplies.	**Protection against electrical shock** These electrical safety requirements apply to high voltage buses under conditions where they are not connected to external high voltage power supplies.	As agreed in previous RESS meeting.	
5.1.1.	**Protection against direct contact** The protection against direct contact with live parts	**Protection against direct contact** The protection against direct contact with live	As agreed in previous RESS meeting.	

	shall comply with Paragraphs 5.1.1.1. and 5.1.1.2. These protections (solid insulator, barrier, enclosure, etc.) shall not be able to be opened, disassembled or removed without the use of tools.	parts shall comply with Paragraphs 5.1.1.1. and 5.1.1.2. These protections (solid insulator, barrier, enclosure, etc.) shall not be able to be opened, disassembled or removed without the use of tools.		
5.1.1.1.	For protection of live parts inside the passenger compartment or luggage compartment, the protection degree IPXXD shall be provided.	For protection of live parts inside the passenger compartment or luggage compartment, the protection degree IPXXD shall be provided.	As agreed in previous RESS meeting.	
5.1.1.2.	For protection of live parts in areas other than the passenger compartment or luggage compartment, the protection degree IPXXB shall be satisfied.	For protection of live parts in areas other than the passenger compartment or luggage compartment, the protection degree IPXXB shall be satisfied.	As agreed in previous RESS meeting.	
5.1.1.3		**For vehicles where no passenger compartment is ~~defined~~ present, for all areas within direct reach of driver and passenger (by the hands when the driver or passenger is on the seat), protection degree IPXXD shall be provided**.	Refer to the explanation chart document from FAMI to explain the proposed amendment "Luggage compartment" can be used in the way as it is now, because all of M/N/L can have it.	“The area within direct reach of driver and passenger” in the text, is it well defined and unambiguously?

				 M,N category luggage compartment IPXXD passenger compartment IPXXB IPXXD Embodied vehicle ? IPXXB IPXXD with passenger compartment Non-embodied vehicle ? Direct Reachable area IPXXD IPXXB * How can the area be defined ? without passenger compartment

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
5.1.1.3.	Connectors (including vehicle inlet) are deemed to meet this requirement if: (a) they comply with 5.1.1.1. and 5.1.1.2. when separated without the use of tools, or (b) they are located underneath the floor and are provided with a locking mechanism, or (c) they are provided with a locking mechanism and other components shall be removed with the use of tools in order to separate the connector, or (d) the voltage of the live parts becomes equal or below DC 60V or equal or below AC 30V (rms) within one second after the connector is separated.	Connectors (including vehicle inlet) are deemed to meet this requirement if: (a) they comply with 5.1.1.1. and 5.1.1.2. when separated without the use of tools, or (b) they are located underneath the floor and are provided with a locking mechanism, or (c) they are provided with a locking mechanism and other components shall be removed with the use of tools in order to separate the connector, or (d) the voltage of the live parts becomes equal or below DC 60V or equal or below AC 30V (rms) within one second after the connector is separated.	As agreed in previous RESS meeting.	
§	**UN ECE R100**	**Proposal from IMMA**	**Explanation**	**Questions for discussion**
5.1.1.4.	**Service disconnect**	**Service disconnect**	As agreed in previous RESS meeting.	

	For a service disconnect which can be opened, disassembled or removed without tools, it is acceptable if protection degree IPXXB is satisfied under a condition where it is opened, disassembled or removed without tools.	For a service disconnect which can be opened, disassembled or removed without tools, it is acceptable if protection degree IPXXB is satisfied under a condition where it is opened, disassembled or removed without tools.		
5.1.1.5.	**Marking**	**Marking**		
5.1.1.5.1.	In the case of a REESS having high voltage capability the symbol shown in Figure 1 shall appear on or near the REESS. The symbol background shall be yellow, the bordering and the arrow shall be black.	In the case of a REESS having high voltage capability the symbol shown in Figure 1 shall appear on or near the REESS. The symbol background shall be yellow, the bordering and the arrow shall be black.	As agreed in previous RESS meeting.	
			As agreed in previous RESS meeting.	
	Figure 1 - Marking of high voltage equipment	Figure 1 - Marking of high voltage equipment	As agreed in previous RESS meeting.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
5.1.1.5.2.	The symbol shall also be visible on enclosures and barriers, which, when removed expose live parts of high voltage circuits. This provision is optional to any connector for high voltage buses. This provision shall not apply to any of the following cases: (a) where barriers or enclosures cannot be physically accessed, opened, or removed; unless other vehicle components are removed with the use of tools (b) where barriers or enclosures are located underneath the vehicle floor.	The symbol shall also be visible on enclosures and barriers, which, when removed expose live parts of high voltage circuits. This provision is optional to any connector for high voltage buses. This provision shall not apply to any of the following cases: (a) where barriers or enclosures cannot be physically accessed, opened, or removed; unless other vehicle components are removed with the use of tools (b) where barriers or enclosures are located underneath the vehicle floor.	As agreed in previous RESS meeting.	
5.1.1.5.3.	Cables for high voltage buses which are not located within enclosures shall be identified by having an outer covering with the colour orange.	Cables for high voltage buses which are not located within enclosures shall be identified by having an outer covering with the colour orange.	As agreed in previous RESS meeting.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
5.1.2.	**Protection against indirect contact**	**Protection against indirect contact**		
5.1.2.1.	For protection against electrical shock which could arise from indirect contact, the exposed conductive parts, such as the conductive barrier and enclosure, shall be galvanically connected securely to the electrical chassis by connection with electrical wire or ground cable, or by welding, or by connection using bolts, etc. so that no dangerous potentials are produced.	For protection against electrical shock which could arise from indirect contact, the exposed conductive parts, such as the conductive barrier and enclosure, shall be galvanically connected securely to the electrical chassis by connection with electrical wire or ground cable, or by welding, or by connection using bolts, etc. so that no dangerous potentials are produced.	As agreed in previous RESS meeting.	
5.1.2.2.	The resistance between all exposed conductive parts and the electrical chassis shall be lower than 0.1 ohm when there is current flow of at least 0.2 amperes. This requirement is satisfied if the galvanic connection has been established by welding.	The resistance between all exposed conductive parts and the electrical chassis shall be lower than 0.1 ohm when there is current flow of at least 0.2 amperes. This requirement is satisfied if the galvanic connection has been established by welding.	As agreed in previous RESS meeting.	
§	**UN ECE R100**	**Proposal from IMMA**	**Explanation**	**Questions for discussion**
5.1.2.3.	In the case of motor vehicles which are intended to be connected	In the case of motor vehicles which are intended to be connected	The purpose of this requirement is protection of the user from electric shock	

	to the grounded external electric power supply through the conductive connection, a device to enable the galvanical connection of the electrical chassis to the earth ground shall be provided.	to the grounded external electric power supply through the conductive connection, a device to enable the galvanical connection of the electrical chassis to the earth ground shall be provided. **In the following cases a galvanical connection of electrical chassis to the earth ground need not be provided:** **a) the vehicle which uses only a dedicated charger that is protected when a fault to a basic isolation arises** **b) the vehicle whose whole vehicle metallic body is protected when a fault to a basic isolation arises** **c) the vehicle which can not be charged without removing the traction battery pack from the vehicle**	when a fault to a basic isolation arises in case an external power supply is in class II (double or reinforced insulation is used and the ground connection must not be provided).	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
	The device should enable connection to the earth ground before exterior voltage is applied to the vehicle and retain the connection until after the exterior voltage is removed from the vehicle. Compliance to this requirement may be demonstrated either by using the connector specified by the car manufacturer, or by analysis.	The device should enable connection to the earth ground before exterior voltage is applied to the vehicle and retain the connection until after the exterior voltage is removed from the vehicle. Compliance to this requirement may be demonstrated either by using the connector specified by the car manufacturer, or by analysis.	No change	
5.1.3.	**Isolation resistance**	**Isolation resistance**	As agreed in previous RESS meeting.	
5.1.3.1.	**Electric power train consisting of separate Direct Current- or Alternating Current-buses** If AC high voltage buses and DC high voltage buses are galvanically isolated from each other, isolation resistance between the	**Electric power train consisting of separate Direct Current- or Alternating Current-buses** If AC high voltage buses and DC high voltage buses are galvanically isolated from each other, isolation resistance	As agreed in previous RESS meeting.	See discussion point 2.21
§	**UN ECE R100**	**Proposal from IMMA**	**Explanation**	**Questions for discussion**
	high voltage bus and the electrical chassis shall have a minimum value of	between the high voltage bus and the electrical chassis shall have a	As agreed in previous RESS meeting.	

	100 Ω/volt of the working voltage for DC buses, and a minimum value of 500 Ω/volt of the working voltage for AC buses. The measurement shall be conducted according to Annex 4A"Isolation resistance measurement method for vehicle based tests.	minimum value of 100 Ω/volt of the working voltage for DC buses, and a minimum value of 500 Ω/volt of the working voltage for AC buses. The measurement shall be conducted according to Annex 4A"Isolation resistance measurement method for vehicle based tests.		

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
5.1.3.2.	Electric power train consisting of combined DC- and AC-buses If AC high voltage buses and DC high voltage buses are galvanically connected isolation resistance between the high voltage bus and the electrical chassis shall have a minimum value of 500 Ω/volt of the working voltage. However, if all AC high voltage buses are protected by one of the 2 following measures, isolation resistance between the high voltage bus and the electrical chassis shall have a minimum value of 100 Ω/V of the working voltage:	Electric power train consisting of combined DC- and AC-buses If AC high voltage buses and DC high voltage buses are galvanically connected isolation resistance between the high voltage bus and the electrical chassis shall have a minimum value of 500 Ω/volt of the working voltage. However, if all AC high voltage buses are protected by one of the 2 following measures, isolation resistance between the high voltage bus and the electrical chassis shall have a minimum value of 100 Ω/V of the working voltage:	As agreed in previous RESS meeting.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
	(a) double or more layers of solid insulators, barriers or enclosures that meet the requirement in Paragraph 5.1.1. independently, for example wiring harness; (b) mechanically robust protections that have sufficient durability over vehicle service life such as motor housings, electronic converter cases or connectors; The isolation resistance between the high voltage bus and the electrical chassis may be demonstrated by calculation, measurement or a combination of both. The measurement shall be conducted according to Annex 4A "Isolation resistance measurement method for vehicle based tests.	a) double or more layers of solid insulators, barriers or enclosures that meet the requirement in Paragraph 5.1.1. independently, for example wiring harness; (b) mechanically robust protections that have sufficient durability over vehicle service life such as motor housings, electronic converter cases or connectors; The isolation resistance between the high voltage bus and the electrical chassis may be demonstrated by calculation, measurement or a combination of both. The measurement shall be conducted according to Annex 4A "Isolation resistance measurement method for vehicle based tests.	As agreed in previous RESS meeting.	
§	**UN ECE R100**	**Proposal from IMMA**	**Explanation**	**Questions for discussion**

5.1.3.3.	**Fuel cell vehicles** If the minimum isolation resistance requirement cannot be maintained over time, then protection shall be achieved by any of the following: (a) double or more layers of solid insulators, barriers or enclosures that meet the requirement in Paragraph 5.1.1 independently;	**Fuel cell vehicles** If the minimum isolation resistance requirement cannot be maintained over time, then protection shall be achieved by any of the following: (a) double or more layers of solid insulators, barriers or enclosures that meet the requirement in Paragraph 5.1.1 independently;	As agreed in previous RESS meeting.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
	(b) on-board isolation resistance monitoring system together with a warning to the driver if the isolation resistance drops below the minimum required value. The isolation resistance between the high voltage bus of the coupling system for charging the REESS, which is not energized besides during charging the REESS, and the electrical chassis need not be monitored. The function of the on-board isolation resistance monitoring system shall be confirmed as described in Annex 5.	(b) on-board isolation resistance monitoring system together with a warning to the driver **or rider** if the isolation resistance drops below the minimum required value. The isolation resistance between the high voltage bus of the coupling system for charging the REESS, which is not energized besides during charging the REESS, and the electrical chassis need not be monitored. The function of the on-board isolation resistance monitoring system shall be confirmed as described in Annex 5.		

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
5.1.3.4.	**Isolation resistance requirement for the coupling system for charging the REESS** For the vehicle inlet intended to be conductively connected to the grounded external AC power supply and the electrical circuit that is galvanically connected to the vehicle inlet during charging of the REESS, the isolation resistance between the high voltage bus and the electrical chassis shall be at least 1 MΩ when the charger coupler is disconnected. During the measurement, the traction battery may be disconnected.	**Isolation resistance requirement for the coupling system for charging the REESS** For the vehicle inlet **and, only for L category vehicle having a flexible recharge cable to direct connect to AC power supply, for the cable** intended to be conductively connected to the grounded external AC power supply and the electrical circuit that is galvanically connected to the vehicle inlet **or to the recharge cable** during charging of the REESS, the isolation resistance between the high voltage bus and the electrical chassis shall be at least 1 MΩ when the charger coupler is disconnected. During the measurement, the traction battery may be disconnected.	L1-5 category vehicle can have a cable-type power receiving part. The text only for "cable-type L category vehicle" should be added, together with the original text of R100 for the "vehicle inlet". To take into account the case when the cable is permanently connected to the vehicle.	OICA and IMMA have to define Vehicle Inlet: IMMA believes it is not necessary.
5.2	**Rechargeable energy storage system (REESS)**	**Rechargeable energy storage system (REESS)**	As agreed in previous RESS meeting.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
5.2.1.	**Protection against Excessive Current** The RESS shall not overheat. If the REESS is subject to overheating due to excessive current, it shall be equipped with a protective device such as fuses, circuit breakers or main contactors. However, the requirement may not apply if the manufacturer supplies data that ensure that overheating from excessive current is prevented without the protective device.	**Protection against Excessive Current** The RESS shall not overheat. If the REESS is subject to overheating due to excessive current, it shall be equipped with a protective device such as fuses, circuit breakers or main contactors. However, the requirement may not apply if the manufacturer supplies data that ensure that overheating from excessive current is prevented without the protective device.	This paragraph has to be considered again when the REESS requirements for category L vehicles will be discussed.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
5.2.2.	**Accumulation of gas** Places for containing open type traction batteries that may produce hydrogen gas shall be provided with a ventilation fan or a ventilation duct to prevent the accumulation of hydrogen gas.	**Accumulation of gas** Places for containing open type traction batteries that may produce hydrogen gas shall be provided with a ventilation fan or a ventilation duct to prevent the accumulation of hydrogen gas. **L Category vehicles with open type framework that allows scavenging hydrogen gas are not required to have a ventilation fan or a ventilation duct.**	Not all open type batteries create hydrogen gas, therefore the requirement should be only for the vehicles that employ open type batteries. Not all L type cat vehicles.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
5.2.3		**Protection against electrolyte spills (L-category vehicles only)** **L category vehicles shall foresee that no spilled electrolyte from the REESS and its components shall reach the driver nor any person around the ~~motorcycle and/or moped~~ vehicle during normal condition of use and/or functional operation.**	As agreed in previous RESS meeting.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
5.2.4		Accidental or unintentional [~~ejection~~ detachment] (L-category vehicles only) The REESS and its components shall be installed in the vehicle in such a way so as to preclude the possibility of inadvertent or unintentional [~~ejection~~ detachment] of the REESS.		

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
5.3.	**Functional safety** At least a momentary indication shall be given to the driver when the vehicle is in "active driving possible mode". However, this provision does not apply under conditions where an internal combustion engine provides directly or indirectly the vehicle´s propulsion power. When leaving the vehicle, the driver shall be informed by a signal (e.g. optical or audible signal) if the vehicle is still in the active driving possible mode.	**Functional safety** At least a momentary indication shall be given to the driver when the vehicle is in "active driving possible mode". However, this provision does not apply under conditions where an internal combustion engine provides directly or indirectly the vehicle´s propulsion power. When leaving the vehicle, the driver shall be informed by a signal (e.g. optical or audible signal) if the vehicle is still in the active driving possible mode.	If other alternative means are provided that ensure active driving possible mode is disabled when alighting the vehicle, this section should not apply. In the case a vehicle have equipment that confirms ‘not active’ when the crew leaves, the signal would be unnecessary. The signal (audible or visual) has to be present when the driver leaves the vehicle.	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
	If the on-board REESS can be externally charged by the user, vehicle movement by its own propulsion system shall be impossible as long as the connector of the external electric power supply is physically connected to the vehicle inlet. This requirement shall be demonstrated by using the connector specified by the car manufacturer. The state of the drive direction control unit shall be identified to the driver.	If the on-board REESS can be externally charged by the user, vehicle movement by its own propulsion system shall be impossible as long as the connector of the external electric power supply is physically connected to the vehicle inlet. **[If the charging cable is permanently connected to an L-category vehicle, without passenger compartment (non-embodied vehicle), the vehicle is exempted from this requirement in the case when using the cable to charge the vehicle prevents the use of the vehicle.]** This requirement shall be demonstrated by using the connector specified by the ~~car~~ **vehicle** manufacturer. The state of the drive direction control unit shall be identified to the driver **This shall not apply to**	When the charging cable during charging prevents the use of the vehicle, (e.g., cable layout can prevent the normal use of the vehicle) regardless of the mechanical or electrical way, the requirement is not necessary In the original text, it is limited for the case with traction system. However it is possible to prevent normal use with a structural method too: when the vehicle is connected to the power outlet (or the cable is not stored in the right position), 1. Prevent the riding * seat cannot be closed * cable disturb the rider to sit * cable disturb the rider to step-in * cable cannot be taken out without locking the seat in the open position (cable storage lid is the seat stopper) 2. Prevent the vehicle	

		vehicles not equipped with a reverse mode.	movement * stand cannot be released up * main or starter switch cannot be ON * parking lock cannot be released * charging cable cannot be taken out without locking the main stand (side stand) in the parking position (cable lid is the stand locking knob) * wheel is locked when the cable is taken out * handle lock can not be released without storing the charging cable in the right position	
§	**UN ECE R100**	**Proposal from IMMA**	**Explanation**	**Questions for discussion**
		Paragraph 5.3.1 shall only be applicable to L-category vehicles.		
		5.3.1. Propulsion system, power-on/power-off procedure		
		5.3.1.1. General **For the power-on procedure of the vehicle propulsion system at least two deliberate and distinctive actions shall be performed in order to**		

		go from the power-off mode to the active driving possible mode (only in this mode will the vehicle move when the accelerator device is applied).		
	UN ECE R100	**Proposal from IMMA**	**Explanation**	**Questions for discussion**
§		**Only one action is required to deactivate the active driving possible mode.** **A main-switch (a switch intended to start up the vehicle) shall be an integral part of the power-on/power-off procedure. If the power-on/power-off procedure of the propulsion system is activated by the vehicle key system, it shall be designed according to the operational safety design.** **It shall be indicated, continuously or temporarily, to the driver ~~rider~~, that the propulsion system of the vehicle is ready for driving.** **After an intentional power-off of the vehicle, it shall only be possible**	IMMA made amendment by defining main-switch in the text, to avoid any confusion with the safety-switch that physically disconnects the traction battery from the electric motor.	

		to reactivate it by the power-on procedure, as described.		
	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
§		5.3.1.2. Automatic turn-off mode An automatic turn-off mode shall be an integral part of the power-on/power-off procedure. If the automatic turn-off mode is activated, the power-off procedure of the propulsion system is activated even without any action on the main-switch. Automatic turn-off mode shall be activated when the vehicle is left alone without the driver ~~rider~~ for the period of time specified by the manufacturer, even if the main-switch is being kept as turned on. To go from the automatic turn-off mode to the active driving possible mode, one deliberate action shall be required to intentionally power-off the vehicle.		
	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion

		5.3.1.3. Driving with reduced power		
		5.3.1.3.1. Indication of reduced power **If the electric propulsion system is equipped with a means to automatically reduce the vehicle propulsion power, significant reductions ~~should~~ shall be indicated to the ~~rider~~ driver.**		
		5.3.1.3.2. Indication of SOC of REESS **If a ~~low~~ SOC ~~in~~ of the REESS has a relevant impact on vehicle driving it ~~performance a low energy content of the REESS~~ shall be indicated to the ~~rider~~ driver by an obvious device, (e.g. a visual or audible signal).**		

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion in IMMA
		~~At the indicated low state of charge specified by the vehicle manufacturer, the vehicle shall meet the following requirements:~~ ~~a) It shall be possible to move the vehicle out of the traffic area by its own propulsion system;~~ ~~b) A minimum energy reserve shall still be available for the lighting system as required by national and/or international standards or regulations, when there is no independent energy storage for the auxiliary electrical systems.~~		
		5.3.1.4. Driving backwards **It shall not be possible to activate the vehicle reverse control function whilst the vehicle is in forward motion**		

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion
5.4.	**Determination of hydrogen emissions**	**Determination of hydrogen emissions**		
5.4.1.	This test shall be carried out on all vehicles equipped with open type traction batteries.	This test shall be carried out on all vehicles equipped with open type traction batteries.		See last sentence of 5.4.2 “Other analysis methods can be approved if it is proven that they give equivalent results.”

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion in IMMA
5.4.2.	The test shall be conducted following the method described in Annex 7 to the present Regulation. The hydrogen sampling and analysis shall be the ones prescribed. Other analysis methods can be approved if it is proven that they give equivalent results.	The test shall be conducted following the method described in Annex 7 to the present Regulation. The hydrogen sampling and analysis shall be the ones prescribed. Other analysis methods can be approved if it is proven that they give equivalent results.		
5.4.3.	During a normal charge procedure in the conditions given in Annex 7, hydrogen emissions shall be below 125 g during 5 h, or below 25 x t_2 g during t_2 (in h).	During a normal charge procedure in the conditions given in Annex 7, hydrogen emissions shall be below 125 g during 5 h, or below 25 x t_2 g during t_2 (in h).	the original text of R100 is acceptable	
5.4.4.	During a charge carried out by a ~~**on-board**~~ charger presenting a failure (conditions given in Annex 7), hydrogen emissions shall be below 42 g. Furthermore the ~~**on-board**~~ charger shall limit this possible failure to 30 minutes.	[During a charge carried out by a ~~**on-board**~~ charger presenting a failure (conditions given in Annex 7), hydrogen emissions shall be below 42 g. Furthermore the ~~**on-board**~~ charger shall limit this possible failure to 30 minutes.]	the original text of R100 is acceptable	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion in IMMA
5.4.5.	All the operations linked to the ~~**battery**~~ **REESS** charging ~~**are**~~ **shall be** controlled automatically, included the stop for charging.	[All the operations linked to the ~~**battery**~~ **REESS** charging ~~**are**~~ **shall be** controlled automatically, included the stop for charging.]	the original text of R100 is acceptable	
5.4.6.	It shall not be possible to take a manual control of the charging phases.	[It shall not be possible to take a manual control of the charging phases.]	the original text of R100 is acceptable	
5.4.7.	Normal operations of connection and disconnection to the mains or power cuts shall not affect the control system of the charging phases.	[Normal operations of connection and disconnection to the mains or power cuts shall not affect the control system of the charging phases.]	the original text of R100 is acceptable	
5.4.8.	Important charging failures shall be permanently **indicated** ~~**signaled to the driver.**~~ An important failure is a failure that can lead to a ~~**disfunctioning**~~ **malfunction** of the ~~**on-board**~~ charger during charging later on.	[Important charging failures shall be permanently **indicated** ~~**signaled to the driver**~~. An important failure is a failure that can lead to a ~~**disfunctioning**~~ **malfunction** of the ~~**on-board**~~ charger during charging later on.]	the original text of R100 is acceptable	

§	UN ECE R100	Proposal from IMMA	Explanation	Questions for discussion in IMMA
5.4.9.	The manufacturer shall indicate in the owner's manual, the conformity of the vehicle to these requirements.	[The manufacturer shall indicate in the owner's manual, the conformity of the vehicle to these requirements.]	the original text of R100 is acceptable	
5.4.10	The approval granted to a vehicle type relative to hydrogen emissions can be extended to different vehicle types belonging to the same family, in accordance with the definition of the family given in Annex 7, Appendix 2.	[The approval granted to a vehicle type relative to hydrogen emissions can be extended to different vehicle types belonging to the same family, in accordance with the definition of the family given in Annex 7, Appendix 2.]	the original text of R100 is acceptable	
Annex 3	See document GRSP-51-11			
Annex 4A	See document GRSP-51-11			
Annex 5	See document GRSP-51-11			
Annex 7	See document GRSP-51-11			