

## DRAFT

### **Terms of Reference for the informal group on Electric Vehicle Safety (EVS)**

#### **1. INTRODUCTION**

The executive committee of the 1998 Agreement (AC.3) gave, in November 2011, a general support to a joint proposal by the United States, Japan, and the European Union to establish 2 working groups to address the safety and environmental issues associated with electric vehicles (EVs). This proposal (ECE/Trans/WP.29/2012/36. and its Corr1) has been submitted to the World Forum for Harmonization of Vehicle Regulations (WP 29) at its March 2012 session for further consideration and formal adoption. The WP29 Committee has adopted this proposal with China as one of the co-sponsors together with the United States, Japan, and European Union, and recorded in the reports.

The objective of the two working groups is to seek regulatory convergence on the global scale via the work in the framework of the 1998 Agreement. The purpose of this document is to set forth the Terms of Reference (TOR) for the electric vehicle safety (EVS) working group with the goal of establishing a Global Technical Regulation (GTR) for EVs covering high voltage electrical safety, safety of electrical components, and rechargeable energy storage systems (REESS).

#### **2. OBJECTIVE OF THE PROPOSAL**

The GTR will address the unique safety risks posed by EVs and their components. It will be performance-based to the extent possible so as not to restrict future technology development. It will be preceded by an exchange of information on current and future planned domestic regulatory safety requirements for electric vehicles based on section C of the formal proposal, (ECE/TRANS/WP.29/2012/36 and its Corr1) including the underlying scientific and technical basis and research.<sup>1</sup>

Given that electric vehicle technology is advancing and that vehicle manufacturers are planning to produce EVs at higher production volumes in the near future, it is necessary to address potential safety risks of EVs while in use and after a crash event, including electrical shocks associated with the high voltage circuits of EVs and potential hazards associated with lithium-ion batteries and/or other rechargeable energy storage systems (REESS) (in particular, containing flammable electrolyte).

The GTR will also set provisions and test protocols to ensure the vehicle system and/or electrical components perform safely, are appropriately protected, and are electrically

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<sup>1</sup> The work already accomplished under the 1958 Agreement could be an important input, notably UN Regulations 100, 12, 94 and 95 and the results of the REESS informal working group which has been operating since November 2010 and which is scheduled to deliver results in 2012. Importantly, the start of the work under the 1998 Agreement will not pre-empt any further work on REESS under the 1958 Agreement.

# DRAFT

managed while recharging from external electricity sources, whether at a residence or other charging location.

The GTR will cover high voltage electrical safety, electrical components such as electric connectors and inlets, and REESS-- in particular those containing flammable electrolyte. The provisions will address the safety of electric vehicles, both in-use and post-crash. The key items would be as follows:

**a. In-use--normal operation of the vehicle excluding maintenance and repair:**

- a) Protection against electrical shock
- b) Safety requirements for conductive and inductive charging, including connectivity
- c) Safety requirements for REESS risks, including thermal shock, thermal cycling, mechanical shock, over-discharge, isolation resistance, over-charge, vibration, fire resistance and short circuit, etc.

**b. During and post-crash:**

- a) protection against electrical shock
- b) REESS crashworthiness, including the limitation of electrolyte leakage, physical battery retention, and the maintenance of essential safety performance
- c) REESS safety assessment and stabilization procedures

To the extent possible, the experts of the subgroup will develop the GTR using the following processes:

- Identify potential safety risks specific to EVs
- Develop and evaluate the requirements by reviewing analyses and evaluations conducted to support the requirements;
- Develop and validate test procedures using existing evaluations and research; and
- Avoid design-restrictive requirements and provisions that are not technically supported.

Other topics that the EVS informal working group could consider, insofar as these topics may be relevant for the technical requirements to be developed;

- the different standards for electro-mobility (vehicle inlets for charging) and for vehicle-to-grid communication (intelligent charging),
- best practices or guidelines for manufacturers and/or emergency first responders

Noise issue and electromagnetic compatibility will not be addressed by EVS GTR working group.

### 3. OPERATING PRINCIPLES

- 1) The EVS informal working group will be chaired by the U.S., vice-chaired by the EC and China, and Japan will be the secretariat.

# DRAFT

- 2) The EVS informal working group will report to the Working Party on Passive Safety (GRSP).
- 3) Participation in the EVS informal working group is open to Contracting Parties, vehicle manufacturers and suppliers, technical services, safety standard organizations, electric safety experts, etc.
- 4) The official language of the EVS informal working group will be English.
- 5) Sessions shall be held in agreement with the majority of the participants based on the joint proposal by the chair, vice-chairs, and secretariat.
- 6) All documents will be circulated by e-mail to the members and submitted to the UNECE secretariat and posted on the UNECE/GRSP website in advance of the meetings. The informal working group may refuse to discuss any item or proposal which has not been circulated 10 working days in advance of the scheduled session.
- 7) Agenda: A provisional agenda shall be drawn up by the chairman, vice-chairman and secretariat in accordance with the participants of the EVS informal working group. The first item upon the provisional agenda for each session shall be the adoption of the agenda. The second item on the provisional agenda will be the discussion, matters arising and adoption of the Minutes of the previous session.
- 8) Proposals will be developed by consensus. When consensus cannot be reached, the chairman shall present the different points of view to GRSP. The chairman may seek guidance from AC.3 and GRSP as appropriate.
- 9) Meeting Minutes: Draft meeting minutes will be circulated in advance before the next session with the view to be formally adopted at the next meeting.
- 10) Reporting: The progress of the informal Subgroup will be reported to GRSP and AC.3 orally or as an informal document by the chairperson or a designated participant of the group.

## 4. TIMELINE

- 1) **14-18 November 2011:** World Forum for Harmonization of Vehicle Regulations (WP.29) (155th session) – Executive Committee for the 1998 Agreement (AC.3) supports the proposal by the US, Japan and EU to establish two informal Working Groups on electric vehicles submitted.
- 2) **13-16 March 2012:** World Forum for Harmonization of Vehicle Regulations (WP.29) (156th session): official adoption of the decision to launch the two informal WG by WP.29 in Geneva, chairs, vice-chairs, and secretaries are identified.
- 3) **April 2012:** first meeting of the EVS working group.

# DRAFT

- 4) **May 2012:** Adoption of Terms of Reference for the EVS WG by GRSP at its 51<sup>st</sup> session
- 5) **2012-2014:** sessions of the EVS WG, regular reporting to GRSP and AC.3, developing proposals for the draft GTR on EVS
- 6) **End of 2014:** estimated completion of EVS GTR.