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Progress on the development of new gtrs

and of amendments to established gtrs – Draft gtr on Electric Vehicle Safety (EVS)

Second progress report of the Informal Working Group on Electric Vehicle Safety

Submitted by the representative from China, Japan, the United States of America and the European Union*

The text reproduced below was prepared by the representatives of China, Japan, the United States of America and the European Union. It is based on informal document WP.29-163-22, distributed at the 163rd session (ECE/TRANS/WP.29/1110, para. 99). This document, if adopted, shall be appended to the gtr in accordance with the provisions of paragraphs 6.3.4.2., 6.3.7. and 6.4. of the 1998 Agreement.

* In accordance with the programme of work of the Inland Transport Committee for 2012–2016 (ECE/TRANS/224, para. 94 and ECE/TRANS/2012/12, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

Second progress report of the Informal Working Group on Electric Vehicle Safety

I. Introduction

1. This document is a progress report to the Executive Committee of the 1998 Agreement (AC.3) on the development of the draft gtr for electric vehicle safety (EVS), as recommended by the Working Party on Passive Safety (GRSP) at its May 2014 session. An extension of the mandate for the informal working group (IWG) is requested.

II. Background

2. The Executive Committee AC.3 gave, in November 2011, a general support to a joint proposal by Japan, the United States of America and the European Union to establish two IWGs to address the safety and environmental issues associated with electric vehicles (EVs). The proposal (ECE/TRANS/WP.29/2012/36 and Corr.1) was submitted to AC.3 at its March 2012 session for further consideration and formal adoption. AC.3 adopted this proposal with China, Japan, the United States of America and the European Union as co-sponsors. The objective of the two IWGs is to seek regulatory convergence at a global scale within the framework of the 1998 Agreement.

3. 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 technologies. It will be preceded by an exchange of information on current and future planned domestic regulatory safety requirements for EVs based on section C of the official proposal (ECE/TRANS/WP.29/2012/36 and Corr.1) including the underlying scientific and technical basis and research.

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

5. The gtr will also set provisions and test protocols to ensure the vehicle system and/or electrical components perform safely are appropriately protected and electrically managed while recharging from external electricity sources, whether at a residence or other location.

6. The gtr will cover high voltage electrical safety, electrical components such as electric connectors and inlet, and REESS in particular, 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:
 - (i) Protection against electrical shock;
 - (ii) Safety requirements for conductive and inductive charging including connectivity;
 - (iii) 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:
 - (i) protection against electrical shock;
 - (ii) REESS crashworthiness including the limitation of electrolyte leakage, physical battery retention, and the maintenance of essential safety performance;
 - (iii) REESS safety assessment and stabilization procedure.

Noise and electromagnetic compatibility will not be addressed by EVS gtr IWG.

III. Progress report of the fifth meeting and issues

7. At the June 2014 session of the Working Party on Passive Safety (GRSP), the expert from the United States of America, on behalf of the co-sponsors and Chair of the IWG, provided an update of the IWG activity, specifically, the latest fifth IWG meeting (in Washington D.C., 13-15 May 2014). He explained that the IWG had been making good progress in spite of complex and wide range of technical and timing issues.

8. Fifth EVS-gtr meeting report:

- (a) The IWG continued to exchange information on research and rulemaking activities. The expert from the Republic of Korea provided an update on their adoption of the electric safety portion of the hydrogen and fuel cells vehicle (HFCV) gtr No. 13. Canada and the United States of America provided detailed presentations on their lithium-ion (Li-Ion) battery research and investigations on field events, and New Car Assessment Programme (NCAP) on EVs.
- (b) These research activities are on electric vehicles and Li-Ion based batteries with a focus at the vehicle and system levels. It's expected that the research will provide science-based regulatory recommendations for the gtr, detailed test procedures as well as supporting technical data.
- (c) The outline of the gtr, which contains the complete list of all technical issues that IWG will address and consider for inclusion in the draft gtr, was updated with new information and estimated completion dates.
- (d) A number of specific provisions of the draft gtr and technical issues were resolved and updated. The remaining ones were tabled for further investigations and discussions.
- (e) The leaders of seven task force (TF) groups provided progress reports of their activities. These TF groups were established during the fourth EVS IWG meeting in October 2013 to work on specific technical issues. At the fifth meeting, the IWG established a new TF group (No. 8) to study the possibility of expanding the gtr scope to include buses and heavy commercial vehicles. The topics for the TF groups and leaderships are listed as follows:
 - (i) TF-1 – Water immersion and isolation resistance (China)
 - (ii) TF-2 – Low electric energy option (US Alliance)
 - (iii) TF-3 – Electrolyte leakage (International Organization of Vehicle Manufacturers (OICA), Renault)
 - (iv) TF-4 – REESS in-use testing (OICA, Daimler)
 - (v) TF-5 – Cell/Module/System test (China)
 - (vi) TF-6 – State of charge (SOC) (Japan)

- (vii) TF-7 – Fire Test procedure (Republic of Korea)
- (viii) TF-8 – Scope study (China)

9. The IWG also discussed the road map and timeline of the development of the draft gtr. The IWG considered the need of developing a complete and comprehensive gtr and taking into consideration the completion of the on-going research as well as planned testing. Since some of the research tasks and testing will not be completed until sometime in 2015, IWG recommended to seek endorsement of AC.3 to extend the mandate of IWG until December of 2015 to submit a draft gtr to GRSP.

10. The IWG request for extension of its mandate is based on the following estimated timeline and milestones:

- (a) December 2015: Submit draft gtr as informal document to GRSP;
- (b) May 2016: Submit draft gtr as formal document to GRSP;
- (c) June 2016: Submit draft gtr as informal document to WP.29;
- (d) November 2016: Submit draft gtr as formal document for consideration and vote by WP.29 and AC.3.

11. The sixth meeting of the IWG is scheduled for the week of 17 November 2014 in the Republic of Korea.

IV. Conclusions

12. The co-sponsors of the EVS gtr IWG are requesting AC.3 endorsement to extend the mandate of the IWG until December of 2015 to submit a draft gtr to GRSP. It is important to allow more time to complete the research, testing and studies that provide the technical support for the provisions in the draft gtr.
