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World Forum for Harmonization of Vehicle Regulations

Executive Committee (AC.3) of the 1998 Global Agreement

Revised authorization to develop amendments to global technical Regulation No. 7 concerning head restraints*

Technical Sponsor: Japan

The text reproduced below was submitted by the representatives of Japan, the United Kingdom of Great Britain and Northern Ireland and the United States of America. It proposes changes to the proposal to develop amendments to global technical regulation (gtr) No. 7 (ECE/TRANS/WP.29/AC.3/25). It is an update of Informal documents WP.29-152-13 and WP.29-152-16 as a result of the forty-eighth GRSP session. This document shall be appended to the amendment to the global technical regulation in conformity with paragraph 6.2.7. of the Agreement.

* In accordance with paragraph 6.2.7. of the 1998 Agreement (ECE/TRANS/180), the proposals to develop global technical regulations or their amendments shall be appended to them in the Global Registry. The present document is submitted in conformity with that mandate.

I. Objective of the proposal

1. The representative of Japan proposed developing Phase 2 of gtr No. 7. Amendments proposed by the United States of America were incorporated into the initial proposal.¹ The representative of Japan also proposed establishing an informal group for the development of this Phase. The informal group will discuss appropriate methods for testing and evaluating injuries due to rear impact crashes.

II. Background

2. At its one-hundred-and-forty-third session, in November 2007, the World Forum for Harmonization of Vehicle Regulations (WP.29) agreed to provide guidance to the Working Party on Passive Safety (GRSP) for the development of the draft gtr on head restraints (ECE/TRANS/WP.29/1064, para. 81) and that Phase 2 of the gtr should consider, as indicated in Informal document No. WP.29-143-23-Rev.1, the following issues:

- (a) The head restraint height of 850 mm;
- (b) The appropriate dynamic test, including the test procedure, injury criteria and the associated corridors for the biofidelic rear impact dummy II (BioRID II).

3. At the 148th session of the World Forum for Harmonization of Vehicle Regulations (WP.29), in June 2009, the Executive Committee of the 1998 Agreement (AC.3) agreed on the two-step approach suggested by the representatives of the United Kingdom of Great Britain and Northern Ireland and of the United States of America. This approach considers whether BioRID II can more effectively address injuries occurring in low speed rear impact crashes and focuses on reducing injuries in higher speed rear impact crashes as a second step.

4. To address minor neck injuries (maximum abbreviated injury scale 1 (MAIS)) that occur in low speed rear impact crashes, insurance industry groups, such as the International Insurance Whiplash Prevention Group (IIWPG), Insurance Institute for Highway Safety (IIHS) and Thatcham have been conducting dynamic evaluations of seats. The European new car assessment programme (EuroNCAP) introduced dynamic evaluations of seats in 2008, and the Japanese new car assessment programme (JNCAP) introduced dynamic evaluations of seats in 2009. However, the testing and evaluation methods vary from one programme to another. Additionally, the European Enhanced Vehicle-safety Committee (EEVC) Working Group 12 has been investigating the appropriate dynamic test, to address minor injuries in low speed crashes, including the test procedure, injury criteria and the associated corridors for the BioRID II dummy. At its June 2009 session, AC.3 gave its consent to establish the informal group, under the chairmanship of the United Kingdom and with technical sponsorship by Japan, to evaluate whether the BioRID II dummy can be used to develop an amendment to gtr No. 7 to reduce low speed rear impact injuries.

5. A deeper review of United States of America's (USA) initial data shows that while there are a number of AIS 2 and AIS 3 injuries occurring in rear impact crashes greater than 18 km/h, most of the neck injuries, which are the focus of this gtr and which can be evaluated by a rear impact dummy, are AIS 1. For AIS 1 injuries, there are approximately an equal number of occurrences below 18 km/h as there are above 18 km/h. Research from Japan shows similar trends, with a significant number of long-term minor neck injuries occurring in

¹ ECE/TRANS/WP.29/2008/115, ECE/TRANS/WP.29/2009/47 and ECE/TRANS/WP.29/2009/48

the range of 16–25 km/h (www.unece.org/trans/doc/2010/wp29grsp/GTR7-02-16e.pdf). An evaluation of research titled "Recommendations for a Low-speed Rear Impact Sled Test Pulse" conducted by the EEVC concluded that most long term minor neck injuries (greater than one month) are sustained at speeds between 16 km/h and 25 km/h (www.eevc.org/publicdocs/EEVC_WG20_Pulse_Recommendations_Sept_2007.pdf). The USA is currently evaluating several dummies and comparing them to cadaver testing at 24 km/h which can be used to help address these long term minor neck injuries.

6. Although previous discussions have differentiated between "low speed" and "high speed", all the research being conducted is at speeds that could be considered to be "low speed" with respect to short-term and long-term minor neck injuries. Instead of focusing on test speed, the informal working Group should take a comprehensive approach to determining the most appropriate test pulse or test pulses to mitigate minor neck injuries and provide a comparable level of benefits as in the existing gtr No. 7 requirements. The Group may consider options which would provide additional benefits by focusing on long term injuries during the time frame of the work schedule, but if this work is not completed, any discussion of further work in this area would take place at a future date.

III. Subjects for review and tasks to be undertaken

7. With regard to head restraint height, the informal group should decide:
 - (a) How to define the effective height;
 - (b) The height requirements.
8. With regard to mitigating long-term and short-term minor neck injuries with a dynamic test, the informal group should:
 - (a) Define test conditions that reflect accidents in the real world, including the performance of seat backs and head restraints as a system;
 - (i) Tests conducted on the whole vehicle as available on the market, and/or on production seats mounted on sleds;
 - (ii) Number and conditions of sled pulses.
 - (b) Working within the accepted knowledge concerning the mechanism of minor neck injury and other rear impact injuries, identify parameters that may be used to advance developments in occupant protection through, for example;
 - (i) Analysing accidents;
 - (ii) Performing volunteer tests (low speed only) and simulations with human body finite elements (FE) models.
 - (c) Evaluate dummies that reflect the above mechanism with high fidelity to the human body and which demonstrate an acceptable level of perfection as a measuring instrument:
 - (i) In particular, the dummy evaluations shall include an assessment of their biofidelity in the critical areas associated with the safety technology under review, their repeatability and their reproducibility;
 - (ii) Define the dummy sitting conditions to minimise variation in test results;
 - (iii) Harmonize the test dummy and calibration test.

(d) Evaluate indicators of human body injury that reflect the minor neck and other rear impact injury mechanisms:

(i) e.g. measure the relative movement between the upper and lower parts of the neck and the forces applied to each of these parts;

(ii) Define reference values which should be based on the results of injury risk analysis and feasibility studies.

9. The informal group should evaluate the effects on reducing of injury and cost-effectiveness of the proposals.

IV. Work schedule

10. Work schedule (under the chairmanship of the United Kingdom and with the technical sponsorship by Japan):

(a) In the year 2008

(i) June – Submitted the official proposal from the representative of Japan for developing the Head Restraint gtr No. 7, Phase 2 at the one-hundred-and-forty-fifth session of WP.29.

(b) In the year 2009

(i) June – Approval by WP.29/AC.3

(ii) December – First informal group meeting

(c) In the year 2010

(i) February – Second informal group meeting

(ii) May – Third informal group meeting, first progress report submitted to GRSP

(iii) September – Fourth informal group meeting

(iv) November – Progress Report

(d) In the year 2011

(i) March – Report progress and amend ToR

(e) In the year 2012

(i) December – Gtr formal document submitted to GRSP

(f) In the year 2013

(i) June – Requirements will be presented for vote to the WP.29