

Transmitted by the representative from Japan,  
United Kingdom and the United States of America

Informal document No. WP.29-153-28  
(153rd WP.29, 8-11 March 2011,  
agenda item 17.2)

Amendments to the proposal to develop Phase II of gtr No. 7  
and to establish an informal group for its development

Gtr No. 7 (Head restraints)

The text reproduced below was submitted by the representative of Japan, the United Kingdom and the United State of America amendments 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 the Informal document No. WP.29-152-13 and WP.29-152-16 as a result of 48<sup>th</sup> GRSP session. The proposed amendments are marked in bold and in strikethrough characters.

## I. PROPOSAL

*Delete paragraph 5 and add two new paragraphs, to read:*

~~5. At higher speed rear impact crashes ( $\Delta V \geq 18$  km/h), there are as many minor injuries as recorded in the low speed crashes and there are a significant number of more severe injuries (MAIS 2 and MAIS 3) occurring in some countries. The United States of America is currently evaluating several dummies and a dynamic test that could address these injuries. As a second step, AC.3 will resume consideration of development of a high speed test at its November 2010 session.~~

**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 the range of 16 – 25 km/h.**

**(<http://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.**

**([http://www.eevc.org/publicdocs/EEVC\\_WG20\\_Pulse\\_Recommendations\\_Sept\\_2007.pdf](http://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 discussion 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 the existing gtr 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.**

*Paragraph 7. amend to read:*

~~., With regard to low speed dynamic test, the informal group should:~~

**With regard to mitigating long-term and short-term minor neck injuries with a dynamic test, the informal group should:**

*Paragraph 9., amend to read:*

9. **In a first step Work schedule** (under the chairmanship of the United Kingdom and with the technical sponsorship by Japan)

(b) In the year 2009

- (i) June – Approval by WP29/AC.3
- (ii) December – 1<sup>st</sup> informal group meeting

(c) In the year 2010

- (i) February - 2<sup>nd</sup> informal group meeting,
- (ii) ~~May - 1<sup>st</sup> progress report with new working schedule proposal~~  
**May - 3<sup>rd</sup> informal group meeting, 1<sup>st</sup> progress report submitted to GRSP.**
- (iii) ~~Date to be determined - 3<sup>rd</sup> informal group meeting~~  
**September - 4<sup>th</sup> informal group meeting**
- (iv) November – Report progress and resume consideration of the development of a high speed test at WP.29 AC.3

~~(d) In the year 2011~~

- ~~(i) Low speed - gtr formal document submitted to GRSP~~
- ~~(ii) Low speed - gtr will be presented for vote to the WP.29~~

**(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**

*Delete Paragraph 10.,:*

~~10. In a further step (discuss on high speed under [to be determined].)~~

~~(a) [To be determined]~~

~~(i) Higher speed Dynamic test requirement draft submitted to GRSP~~

~~(ii) Higher speed gtr formal document submitted to GRSP~~

~~(iii) Higher speed gtr will be presented for vote to the WP.29~~

## **II. JUSTIFICATION**

At the 152nd session of WP.29, Japan presented a proposed revision of the TOR to AC.3. This proposal was to establish the timeline of the group until 2012 to allow for the completion of the injury criteria analysis, but noted that if the work was not complete, a detailed BioRID II test would be added to the GTR as an alternative to the existing test (the option already exists as a placeholder). The United States presented an alternative proposal to revise the TOR to allow the group to take a comprehensive approach to address both long-term and short-term minor neck injuries. AC.3 returned the proposals to GRSP, noting that it anticipated a revised proposal to revise the TOR at the 153rd session.

At the fifth meeting of the information group it was confirmed that the preference was to deliver a new proposal that could be adopted into the GTR as a single procedure to assess the protection against neck injury. The group also agreed with the recommendation of the United States that the injury criteria that emerge from the ongoing research effort in the US and Japan should guide the development of the final procedure.

Japan had associated lower speed tests with injuries at AIS1 level and expressed concerns that any change to address more severe injury levels would take longer than December 2012. It was agreed that AIS1 injuries remain the focus but that, if possible, consideration be given to long term as well as short term injuries.

As a result, the group is recommending that GRSP propose amending the TOR to specify that the primary focus of the informal group should be the development of a proposal for the BioRID II that would provide benefits equivalent or better than the benefits provided by the existing option in gtr 7. If the group was able to provide additional benefits within the specified time frame it would be permitted to do so, but if this work was not completed, any discussion of further work in this area would take place at a future date.

(Reference) Full document of new ToR

**I. OBJECTIVE OF THE PROPOSAL**

1. The representative of Japan proposes the development of Phase 2 of gtr No. 7 and has incorporated the amendments proposed by the United State of America. <sup>1/</sup> He also proposes the establishment of 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 its one-hundred-and-forty-eighth session, 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 and of the United States of America. This approach will consider whether BioRID II can more effectively address injuries occurring in low speed rear impact crashes and focus 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

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

(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 the technical sponsorship by Japan, to evaluate whether the BioRID II dummy can be used to develop an amendment to gtr 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 the range of 16 – 25 km/h.**

**(<http://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.**

**([http://www.eevc.org/publicdocs/EEVC\\_WG20\\_Pulse\\_Recommendations\\_Sept\\_2007.pdf](http://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 discussion 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 the existing gtr 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) Analyzing 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;
- (e) Define reference values which should be based on the results of injury risk analysis and feasibility studies.

9. With regard to evaluation, the informal group should evaluate the effects on reduction 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 – Submission of the official proposal from the representative of Japan for the development of the Head Restraint gtr Phase 2 at the one-hundred-and-forty-fifth session of WP.29.
- (b) In the year 2009
  - (i) June – Approval by WP29/AC.3



(ii) December – 1<sup>st</sup> informal group meeting

(c) In the year 2010

(i) February - 2<sup>nd</sup> informal group meeting,

(ii) **May - 3<sup>rd</sup> informal group meeting, 1<sup>st</sup> progress report submitted to GRSP.**

(iii) **September - 4<sup>th</sup> informal group meeting**

(iv) November – Report progress

**(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**

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