

Transmitted by the expert from the United Kingdom in his capacity as chair of the meeting of “interested experts”.

**Draft report of the
Discussion concerning a possible amend to Gtr 7 - Head Restraints
26 May 2009**

1. At its 25th session, and in response to proposals from Japan and the United States, AC.3 invited GRSP to make provision during its 45th session for a discussion concerning the future development of gtr 7 – Head Restraints. The bases for this discussion were the proposals from Japan (ECE/TRANS/WP.29/2008/76) and the United States (ECE/TRANS/WP.29/2008/115, ECE/TRANS/WP.29/2009/47 and ECE/TRANS/WP.29/2009/48).
2. The principle discussion concerns the assessment of active and reactive head restraints that are increasingly fitted to passenger cars. The gtr contains one procedure for this assessment but acknowledges that this approach is not acceptable to the majority of signatories to the 1998 Global Agreement. It therefore makes provision for new procedures to be introduced.
3. Japan has proposed that phase II of the gtr be developed for the purpose of advancing technology that will reduce the occurrence of so called “whiplash injuries” resulting from rear impacts. In their proposal they have indicated their preference for the use of the BioRid test device. This device was advanced by the European Enhanced Vehicle safety Committee (EEVC) towards the end of the development of gtr7.
4. The United States has proposed that, in addition to the injuries envisaged by Japan, the gtr should also consider measures to mitigate more serious injuries resulting from rear impacts of higher speed than those proposed by Japan. These injuries are not generally accepted as being “whiplash injuries”. It has been suggested that by including these types of injuries in the assessment the gtr it will no longer be limited to “head restraint” assessment and that consequently this may be a change in the scope of the gtr.
5. The United States also expressed the view that a revision to the test procedures of the gtr must be accompanied by injury criteria. However, the group noted that at present the mechanism of whiplash injury is not understood and that therefore there was little immediate potential to specify injury criteria in a regulation.

6. Japan has indicated her willingness to be the Technical Sponsor for an amendment to gtr 7. However, in their presentation to the group of interested experts they indicated that their sponsorship was restricted to the activity concerning the lower speed impact assessment. The role of Technical Sponsor for the higher speed work is unclear.
7. During the discussion OICA indicated concern about a possible divergence in regulatory requirements that may result in a need for particular seat designs for different markets. They also expressed concern about the continuing development of regulatory requirements during the current economic downturn and requested that this topic be re-classified as an exchange of views.
8. EEVC provided an update on the state of development of the BioRid test device. They advised that the manufacturers of BioRid had attended a workshop with EEVC in February this year. EEVC noted that the manufacturer had responded to a range of issues raised by the EEVC concerning the use and performance of BioRid. It was noted that upgrades to the device had been developed and were being evaluated during 2009. It was also noted that new calibration equipment together with published protocols are in preparation.
9. The importance of the seating position of the test device was raised and it was noted that there are different procedures in use under various programmes that employ the BioRid tool. This item would require attention during the development of a proposal for the gtr.
10. There was general acceptance that further research is necessary before the BioRid device can be used for the dynamic assessment of head restraints. It was noted that Korea, Japan, the United States and the EEVC are all continuing work in this area. It was also noted that the manufacture is working with BioRid users to evaluate their new equipment and procedures.
11. Whilst this research is in progress it is recognised that there issues may arise that cause the development of a dynamic test procedure to be slower than intended. It is therefore proposed that, should AC.3 sanction a new work item to amend gtr 7, the informal working group shall report progress to AC.3 before the end of 2010. If it is considered at that time that the provision of a dynamic test procedure will require an extended period of discussion, the informal group may propose the adoption of a dynamic-geometric procedure employing the BioRid test device as an alternative to the current procedure using the Hybrid III device. In this case the choice of procedure to be used during certification will be at the discretion of the Regional Authority applying the gtr.
12. In the proposals of Japan and the United States the issue of the height of head restraints requires further consideration. The expert from the Netherlands confirmed that work had continued in his country following the adoption of gtr 7 and that he could provide further information as part of a future discussion.

13. The following text is based upon a consolidation of the proposals of Japan (ECE/TRANS/WP.29/2008/76) and the United States (ECE/TRANS/WP.29/2008/115, ECE/TRANS/WP.29/2009/47 and ECE/TRANS/WP.29/2009/48). Edited text represents a deviation from this position following the meeting of interested experts.

BACKGROUND

2. At its 143rd session, in November 2007, the World Forum for Harmonization of Vehicle Regulations (WP.29) agreed to provide guidance to GRSP for the development of the draft gtr on head restraints (ECE/TRANS/WP.29/1064, para. 81) and that Phase II 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 BioRID II dummy.

3. To address minor whiplash injuries (MAIS 1) that occur in low speed rear impact crashes ($\Delta V \leq 18$ km/h), insurance industry groups, such as the International Insurance Whiplash Prevention Group (IIWPG) (Insurance Institute for Highway Safety (IIHS) and Thatcham), have already started dynamic test evaluation of seats tests. EuroNCAP has introduced dynamic whiplash test rating in 2008, and JNCAP plans to introduce it 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 whiplash injuries in low speed crashes, including the test procedure, injury criteria and the associated corridors for the BioRID II dummy.

4. 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. The United States of America is currently evaluating several dummies and a dynamic test that could address these injuries.

SUBJECTS FOR REVIEW AND TASKS TO BE UNDERTAKEN

5. *With regard to head restraint height, the informal group should decide:*

(a) How to define the effective height;

(b) The height requirements.

6. *With regard to low and higher speed 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 vehicles as available on the market, and/or on real production seats conducted with mounted on sleds;
 - (ii) Number and conditions of sled pulses;
 - (b) Working within the accepted knowledge concerning Clarify the theories on the mechanism of whiplash injury and other rear impact injuries, ~~in order to identify parameters that may be used to advance developments in occupant protection which of them better reflects reality~~ 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 demonstrates an acceptable high 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 ~~the BioRID II is promising with its high fidelity to the human body, but still needs improving in testing methods, structure, etc. because it has a problem with reproducibility~~;
 - (ii) Define Improve the dummy sitting conditions method to reduce minimise variation in test results in the initial sitting position of the dummy;
 - (d) Evaluate indicators of human body injury that reflect the whiplash and other rear impact injury mechanisms;
 - (i) E.g. measure the relative movements 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.
7. With regard to evaluation, the informal group should evaluate the effects on reduction of injury and cost-effectiveness of the proposals.

WORK SCHEDULE

8. In the year 2008

(a) June – Submission of Japan's official proposal for the development of the Head Restraint gtr Phase II at the WP.29 session

(b) November – Approval by WP.29/AC.3 ~~July - 1st informal group meeting~~

(c) Date to be determined - 2nd Informal group meeting

(d) December - 1st progress report submitted to GRSP

9. In the year 2009

(a) Date to be determined – 2nd Informal group meeting

(b) May - 2nd Progress report and Head restraint height requirement draft submitted to GRSP

(c) Date to be determined - 3rd Informal group meeting

(d) December - 3rd Progress report submitted to GRSP

"10. In the year 2010

(a) Date to be determined – 4th Informal group meeting

(b) May – 4th Progress report and Head restraint height requirement draft submitted to GRSP

(c) Date to be determined - 4th Informal group meeting

(d) ~~December – 5th Progress report submitted to GRSP"~~

Low speed - Dynamic test requirement draft submitted to GRSP

11. 10. In the year 2011 2010

(a) Low speed - gtr formal document submitted to GRSP

(b) Low speed - gtr will be presented for vote to the WP.29

12. After the year 2012

(a) Higher speed - Dynamic test requirement draft submitted to GRSP

(b) Higher speed - gtr formal document submitted to GRSP

(c) Higher speed - gtr will be presented for vote to the WP.29