

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

GTR 7 – Head Restraints

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. A report of that discussion is given below.

Summary

2. As a result of this discussion AC.3 is requested to **consider this report and provide guidance on the following points:**

- The **establishment of an expert group** (under GRSP) with the purpose of developing proposals for Phase II of gtr 7 Head Restraints. Specifically, the work programme will include proposals for:
 - the **regulated height** for a head restraint on the basis of population demographics;
 - the procedure for **establishing the effective height** of a head restraint; and
 - a **new regulatory procedure**, including;
 - **test tools**,
 - **protocols**, and
 - **assessment criteria**,for the **assessment of active and reactive head restraint performance** under dynamic conditions.
- To **agree the work schedule** set out at the end of this document, **noting the review point** scheduled for November 2010 (§13 of this report).
- **Whether the extension of the gtr activity** to include the higher speed dynamic assessment of higher severity injuries **is within the scope of gtr 7** (as defined) and to **confirm the Technical Sponsor for this higher speed contribution**.

**Report of the
Discussion concerning a possible amend to Gtr 7 – Head Restraints
26 May 2009**

3. 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).
4. 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, based on the current US legislation, 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.
5. 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 “minor neck injury” resulting from rear impacts. In their proposal they have indicated their preference for the use of the Bio Rid II test device. This device was advanced by the European Enhanced Vehicle safety Committee (EEVC) towards the end of the development of gtr 7.
6. 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 “minor neck 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.
7. 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.
8. 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.
9. 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 stressed their view that the current situation with gtr 7 and its implementation results in satisfactory, though not perfect, harmonisation, allowing common designs to be placed on the global market. They also expressed concern about the continuing development of gtr 7 which has a high chance of resulting in non-harmonised options, thereby constituting a step backwards in the global harmonisation work. OICA considered it crucial for Phase II to result in a future truly and globally harmonised full system whiplash evaluation test, as foreseen in the gtr 7 preamble (§40); if this cannot be achieved in the short to medium term, then OICA requested that the whole issue of Phase II, including the possibility of a higher test speed, be re-classified

as an exchange of views for the time being, pending completion of all further necessary research activities, to ensure that any future development of gtr 7 occurs on a globally harmonised scale.

10. EEVC provided an update on the state of development of the Bio Rid II test device. They advised that the manufacturers of Bio Rid II 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 Bio Rid II. 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.

11. 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 Bio Rid II tool. This item would require attention during the development of a proposal for the gtr.

12. There was general acceptance that further research is necessary before the Bio Rid II 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 manufacturer is working with Bio Rid II users to evaluate their new equipment and procedures.

13. Whilst this research is in progress it is recognised that 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 and seek their guidance concerning further activity.

14. In the proposals of both Japan and the United States the issue of the height of head restraints is identified as requiring 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.

15. 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).

BACKGROUND

16. 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 Bio RID II dummy.

17. To address minor neck 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 seat tests and 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 minor injuries in low speed crashes, including the test procedure, injury criteria and the associated corridors for the Bio RID II dummy.

18. 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

19. *With regard to head restraint height, the informal group should decide:*
- (a) How to define the effective height;
 - (b) The height requirements.
20. *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 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;
 - (d) Evaluate indicators of human body injury that reflect the minor neck 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.

21. With regard to evaluation, the informal group should evaluate the effects on reduction of injury and cost-effectiveness of the proposals.

WORK SCHEDULE

22. 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

23. *In* the year 2009

(a) June – Approval by WP29/AC.3

(b) Oct. – 1st informal group meeting

(c) December – 2nd Informal group meeting, 1st Progress report submitted to GRSP

24. In the year 2010

(a) Date to be determined – 3rd Informal group meeting

(b) May – 2nd Progress report with new working schedule proposal

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

(d) Nov. – Report progress and propose new working schedule to WP29 AC.3

[25. In the year 2011]

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

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

[26. 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
