

## **DRAFT**

### **SECOND PROGRESS REPORT OF THE INFORMAL GROUP ON A POLE SIDE IMPACT (PSI) GTR**

**Submitted by the Chairman of the Informal Group**

#### **PURPOSE**

The purpose of this document is to:

- provide a report on the progress of the PSI Informal Group, and
- seek the agreement of GRSP to amend the Terms of Reference for the PSI Informal Group, as set out in revision marking mode in Attachment A.

The amended Terms of Reference provide for the PSI GTR to be developed in two phases – the first phase would provide a test procedure for the WorldSID 50<sup>th</sup> percentile male; the second phase would provide a test procedure for the WorldSID 5<sup>th</sup> percentile female. Subject to GRSP agreement of this amendment, agreement will be sought from AC.3.

Among actions agreed at the most recent meeting of the PSI Informal Group in Seoul, members are particularly reminded that comments are due on the revised draft GTR circulated on 4 November 2011 by 20 January 2012.

#### **BACKGROUND**

##### The Proposal

At the 150<sup>th</sup> session of the World Forum for Harmonization of Vehicle Regulations (WP.29) in March 2010, Australia submitted an informal paper proposing a Pole Side Impact GTR (WP.29-150-11).

The proposal was based on:

- High fatality numbers in pole side and other side impacts in Australia and other countries,
- Wide variation in side and pole side crash tests, and
- The development of WorldSID, the most biofidelic side impact dummy, as a potential regulatory tool.

AC.3 requested the secretariat to distribute WP.29-150-11 with an official symbol for consideration and vote at the June 2010 session. It was agreed to transmit WP.29-150-11 to GRSP to consider at its May 2010 session and to assess the need for an informal group.

The May 2010 session of GRSP considered Australia's formal proposal (ECE/TRANS/WP.29/2010/81) together with a further informal paper (GRSP-47-28), which included a proposed task list. GRSP endorsed the proposed harmonization activity on a pole side impact test and the establishment of an informal group on this subject under the chairmanship of Australia, subject to the consent of WP.29 and AC.3.

At the 151<sup>st</sup> session of WP.29 in June 2010, AC.3 considered Australia's formal proposal and agreed to develop the GTR and to establish the Informal Group. AC.3 also agreed that the initial tasks of the Informal Group should be to (i) confirm the safety need for a GTR in light of the increasing prevalence of electronic stability control in the vehicle fleet and (ii) simultaneously assess potential candidate crash test standards to be addressed by the proposed GTR. AC.3 agreed that the development of the GTR and the study on the benefits of such a GTR would be made in parallel. The secretariat was requested to prepare a corresponding AC.3 document and to transmit it to GRSP for consideration.

The proposal is included among the *Proposals for developing GTRs, adopted by AC.3* at [http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29glob\\_proposal.html](http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29glob_proposal.html), as ECE/TRANS/WP.29/AC.3/28.

#### First Progress Report and Original Terms of Reference

The First Progress Report of the PSI Informal Group, including Terms of Reference, was submitted in draft form as an Informal Document to GRSP in December 2010 (GRSP-48-20). The draft was subsequently agreed by the PSI Informal Group and submitted to the 153<sup>rd</sup> session of WP.29 (WP.29-153-33). AC.3 requested the secretariat to distribute the document with an official symbol for consideration at its June 2011 session and for information and comments to GRSP at GRSP's May 2011 session. At the 154<sup>th</sup> session of WP.29, AC.3 adopted the First Progress Report including the Terms of Reference (ECE/TRANS/WP.29/2011/87).

#### Members of the PSI Informal Group

The contracting parties represented on the PSI Informal Group are Australia, Canada, France, Germany, Italy, Japan, the Netherlands, New Zealand, China, the Republic of Korea, the United Kingdom, the United States of America and the European Commission. Representatives from the International Organization of Motor Vehicle Manufacturers (OICA) are also participants.

### **PROGRESS**

The PSI Informal Group has held four meetings in:

- Bonn, 16-18 November 2010;
- Brussels, 3-4 March 2011;
- Washington, 9 June 2011; and
- Seoul, 27-28 October 2011.

The PSI Informal Group has considered a large amount of research (see [Attachment B](#)). This included previous work undertaken by EEVC, APROSYS and NHTSA, which amended FMVSS 214 in 2007 to incorporate a test procedure for an oblique angle pole side impact test. Members have also undertaken a significant amount of primary research, including test programs and detailed analysis of some key issues.

At its last meeting in Seoul, the PSI Informal Group considered a first draft of the GTR and a revised version of this text was circulated on 4 November 2011 for comment by 20 January 2012. This will enable a more developed draft GTR to be presented by the Secretariat for consideration by the PSI Informal Group at its next meeting and for all issues to be thoroughly canvassed.

Australia and Canada are continuing with a joint crash test program and other members of the PSI Informal Group, including Japan, will be undertaking crash test programs to assist with development of the GTR.

Australia has commissioned Monash University Accident Research Centre to undertake research on the effectiveness of airbags and particular airbag combinations and the likely benefits of the GTR. Australia is liaising with other contracting parties to supplement information on benefits. Australia is also liaising with OICA regarding provision of cost data. These activities will supplement previous work undertaken by NHTSA and EEVC.

The PSI Informal Group is also continuing to work in close conjunction with the Informal Group on Harmonization of Side Impact Dummies, which is completing the work necessary for the WorldSID 50<sup>th</sup> percentile male and 5<sup>th</sup> percentile female to be incorporated into regulation.

Some of the key areas of focus of the Informal PSI Group's work to date include:

#### Safety Need

The passive safety countermeasures expected to be used in vehicles to meet the requirements of a PSI GTR are likely to reduce injury risk in pole side impact crashes as well as other side impact crashes, including high severity vehicle-to-vehicle side impact crashes and/or where head injury risks not simulated by current regulatory barrier tests occur as a result of geometric incompatibility between vehicles. There may also be benefits in rollovers.

As a primary task, the PSI Informal Group has sought to confirm that the GTR will address a safety need and a substantial amount of research has been undertaken on the number of occupant fatalities and serious injuries in pole and other side impacts and rollovers in contracting parties. The data clearly supports development of a GTR. For example, based on German, French, UK and Dutch figures, over 4,800 vehicle occupants were killed in side impacts in the EU in 2009 (over 1,628 in pole side impacts; over 3,174 in other side impacts); 6,243 were killed in the US (1,371; 4, 872) and 1,228 were killed in Korea (204;1024). Work is continuing to fill gaps in fatality data for some contracting parties and to improve quantification and classification of injuries, which will be important in assessing the benefits of the GTR.

### Electronic Stability Control (ESC)

Presentations by BASt, the Australian Department of Infrastructure and Transport and NHTSA at the PSI Informal Group meeting in Bonn indicated that ESC may reduce single vehicle crashes by up to 40%. However this leaves a significant single vehicle crash population to be addressed and ESC is not expected to significantly influence vehicle-to-vehicle side impact crash rates. Without appropriate passive safety countermeasures, pole and other side impact crashes would be likely to continue as a significant source of road crash fatalities in many countries.

### Scope

Discussion within the PSI Informal Group has favoured the scope of the GTR being applied to Category 1 and Category 2 vehicles, particularly as contracting parties can decide to narrow the scope when implementing the GTR domestically.

Pole and other side impacts are responsible for a significant portion of occupant fatalities in Category 2 commercial vehicles in, at least, some countries (although further information will be gathered on this issue). Application to Category 2 vehicles is also appropriate as some types of Category 2 vehicles have similar design features to passenger vehicles.

However, while contracting parties will be able to narrow the scope of the GTR in line with their own circumstances, it is recognised that exemptions may be appropriate for some Category 1-2 and Category 2 vehicles. OICA has indicated that it will work closely with contracting parties in the PSI Informal Group to develop a list of possible exemptions. Japanese Kei cars and other similar vehicles will require careful consideration.

### Angle and Point of Impact

Two options for angle of impact are being considered by the PSI Informal Group with the vehicle either striking the pole in perpendicular or oblique (75 degrees) configuration. In both options the pole is aligned with the centre of gravity of the dummy head. A perpendicular test procedure with the location of the pole offset from the head centre of

gravity was initially considered by the Group, but discounted as presenting unnecessary change to test procedures which are currently being used either in FMVSS 214 or New Car Assessment Programs.

Evidence presented in the PSI Informal Group to date has either favoured an oblique angle test over a perpendicular angle test or, at least, been neutral: US, German and Australian data indicate pole side crashes occur at predominantly oblique angles (earlier EEC analysis indicating that 90 degree angle crashes were more common was recorded within a range of plus or minus 15 degrees and therefore not contradictory); the oblique angle test has been shown to load the WorldSID thorax better than a perpendicular test; manufacturers have indicated that the oblique test encourages more robust sensors; repeatability does not appear to be an issue; and data has been presented suggesting oblique angle impacts are likely to be more common for vehicles fitted with ESC. An oblique angle test is also expected to ensure an extended coverage area by head protection airbags.

The impact assessment for the amendment to introduce an oblique angle pole side impact test in FMVSS 214 calculated that an oblique angle test would save at least 87 more lives a year than a perpendicular angle test.

### Timing

The PSI Informal Group is currently seeking to develop a draft GTR for approval at the March 2013 meeting of WP.29. Commencement timing for the GTR will be considered at the next meeting of the PSI Informal Group.

### **WorldSID AND A TWO PHASED APPROACH TO THE GTR**

At its first meeting in Bonn, the PSI Informal Group agreed that the test procedure in the GTR would utilise WorldSID dummies. However, the WorldSID 50<sup>th</sup> percentile male is expected to be available for use in 2012 whereas the WorldSID 5<sup>th</sup> percentile female is unlikely to be available for use before the end of 2013.

As some contracting parties have indicated a desire to implement a GTR using the WorldSID 50<sup>th</sup> percentile male as soon as this is possible, there has been significant discussion over whether and how to address small occupant protection in the GTR, while recognising that it would not be possible for the US to agree to a GTR that was in any way less stringent than FMVSS 214. FMVSS 214 currently includes test procedures for both the ES2-RE 50<sup>th</sup> percentile male and SID-II 5<sup>th</sup> percentile female in the oblique angle pole side impact test.

NHTSA estimated that small occupants (5'4" or less) represented 25% of all near side occupant fatalities and serious injuries in side impacts in the US in the period 2002-04. In calculating the benefits for the amendment to FMVSS 214 to include a pole side impact test, NHTSA estimated that the use of the SID-II 5<sup>th</sup> percentile female would save an additional 78 lives a year.

At its meeting in Seoul, therefore, the PSI Informal Group agreed to a two phased approach to the GTR, to enable contracting parties to implement a pole side impact standard utilising the WorldSID 50<sup>th</sup> percentile male and, if warranted, subsequently implement a pole side impact standard utilising the WorldSID 5<sup>th</sup> percentile female. This approach has three key elements:

- An amendment to the Terms of Reference for the PSI Informal Group to provide for a second phase of GTR development to incorporate the WorldSID 5<sup>th</sup> percentile female (as set out for agreement in Attachment A);
- Provision for a second phase of work on the WorldSID 5<sup>th</sup> percentile female in the Preamble to the GTR; and
- Provision for a second phase of work in the GTR itself, including: place marking for the WorldSID 5<sup>th</sup> percentile female; and explicit provision for contracting parties to apply any pre-existing domestic pole side impact requirements for 5<sup>th</sup> percentile female side impact dummies, prior to availability of the WorldSID 5<sup>th</sup> percentile female (this provides for the situation of the US).

#### **NEXT MEETING**

The next meeting of the PSI Informal Group will be held in London on 22-23 March 2012, in conjunction with meetings of the Informal Groups on GTR7 Head Restraints and Harmonization of Side Impact Dummies.

## Revised Terms of Reference

The major tasks that will be performed by an Informal Group include:

1. Review of existing research, including crash tests, and literature;
2. Liaison with, and consideration of the results of, the GRSP WorldSID Informal Group;
3. Assessment of safety need, including analysis of current fatalities and injuries from pole side impact, other side impacts and rollovers, taking account of positive safety developments already occurring or likely such as ESC; and target vehicle categories to be taken into consideration;
4. Examination of possible test procedures;
5. Consideration of variations to candidate test procedures;
6. Establishment of likely countermeasures driven by shortlisted test procedures;
7. Calculation of likely injury mitigation coverage of the crash and injury population from these countermeasures;
8. Assessment of benefits and costs for shortlisted test procedures (including data from a significant range of countries, as there may be wide variations in benefits);
9. Assessment of likely incremental benefits and costs from, eg, ~~testing for smaller (5<sup>th</sup> percentile female) and~~ non-struck side and rear seat occupants;
10. Selection of a preferred test procedure; and
11. Production of a draft ~~Global Technical regulation~~ Regulation phase 1 (WorldSID 50<sup>th</sup> percentile male) for consideration by GRSP and subsequently WP29-; and
12. Production of a draft Global Technical Regulation phase 2 (WorldSID 5<sup>th</sup> percentile female) for consideration by GRSP and subsequently WP29.

**Papers from Meetings of the Informal Group**

NB: this list does not include some draft and working documents.

**1<sup>st</sup> Meeting**

Reference documents

RD-01, National Highway Traffic Safety Administration (NHTSA): *49 CFR Parts 571 and 585 Federal Motor Vehicle Safety Standards; Occupant Protection in Interior Impact; Side Impact Protection; Fuel System Integrity; Electric-Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection; Side Impact Phase-In Reporting Requirements; Final Rule* (2007)

RD-02, NHTSA (Office of Regulatory Analysis and Evaluation, National Centre for Statistics and Analysis): *FMVSS No. 214 Amending Side Impact Dynamic Test: Adding Oblique Pole Test* (2007)

RD-03, NHTSA & Abacus Technology Corporation: *NHTSA Side Impact Research: Motivation for Upgraded Test Procedures*

RD-04, NHTSA: *49 CFR Parts 571 and 598 Federal Motor Vehicle Safety Standards; Side Impact Protection; Side Impact Phase-In Reporting Requirements; Proposed Rule* (2004)

RD-05, NHTSA: *49 CFR Parts 571 and 585 [Docket No. NHTSA–2008–0104] RIN 2127–AK27 Federal Motor Vehicle Safety Standards; Occupant Protection in Interior Impact; Side Impact Protection; Side Impact Phase-In Reporting Requirements* (2008)

Meeting papers and presentations

PSI-01-05, *GRSP Informal Group on a Pole Side Impact GTR (WP29 and GRSP Decisions, Draft Procedures and Terms of Reference)*

PSI-01-06, *Agenda for the first meeting of the GRSP Informal Group on a Pole Side Impact GTR*

PSI-01-07, Australian Department of Infrastructure and Transport: *Pole Side Impact GTR: Assessment of Safety Need: Initial Data Collection*

PSI-01-08, German Federal Highway Research Institute (BAST): *Influence of Vehicle Stability Control on Accidents on Rural Roads – GRSP Informal Group on a Pole Side Impact GTR*

PSI-01-09, Australian Department of Infrastructure and Transport & Monash University Accident Research Centre (MUARC): *Evaluating Vehicle Technologies – Electronic Stability Control Using Australian Used Car Safety Ratings Data*



PSI-01-10, NHTSA: *US Side Impact Pole Test – Federal Motor Vehicle Safety Standard No. 214*

PSI-01-11, European Enhanced Vehicle-safety Committee (EEVC) Working Group 13 & Working Group 21: *Accident Data: Side Impacts with Poles*

PSI-01-12, Australian Department of Infrastructure and Transport: *Summary of available test data*

PSI-01-13, Australian Department of Infrastructure and Transport: *Summary of current pole tests*

PSI-01-14, Transport Canada: *Pole Test Comparison of the WorldSID IRTRACC, WorldSID Rib-EYE & ES2-re*

PSI-01-15, Australian Department of Infrastructure and Transport: *Australian Pole Side Impact Research 2010 – A summary of recent oblique, perpendicular and offset perpendicular pole side impact research with WorldSID 50<sup>th</sup>*

PSI-01-16, NHTSA: *Calculating Benefits for Oblique Pole Side Impact Rulemaking*

PSI-01-17, EEVC Working Group 13 & Working Group 21: *Cost/Benefit of Side Impact Test Procedures*

PSI-01-18, Transport Canada: *WorldSID Positioning – Sub-Committee Update*

## **2<sup>nd</sup> Meeting**

### Pre-meeting documents

PSI-02-02, *First Progress Report of the Informal Group on a Pole Side Impact (PSI) GTR*

### Meeting papers and presentations

PSI-02-03, *Minutes of the First Meeting of the GRSP Informal Group on a Pole Side Impact GTR*

PSI-02-04, *Agenda for the 2<sup>nd</sup> meeting of the GRSP Informal Group on a Pole Side Impact GTR*

PSI-02-05, NHTSA: *FMVSS No. 226 – Ejection Mitigation Final Rule*

PSI-02-06, Australian Department of Infrastructure and Transport: *Pole Side Impact GTR: Assessment of Safety Need: Updated Data Collection*

PSI-02-07, Renault & PSA Peugeot Citroen: *Pole Side Impact Accident Data – France National & LAB Data*

PSI-02-08, Australian Department of Infrastructure and Transport: *Application/Scope of PSI GTR (draft for discussion)*

PSI-02-09, APROSYS: *Car to Pole Side Impact Activities*

PSI-02-10, NHTSA: *WorldSID Crash Testing*

PSI-02-11, NHTSA: *Discussion of Injuries in Pole Side Impact Crashes – NHTSA’s Motivation for Upgrading the Side Impact Test Procedures & Benefit Analysis*

PSI-02-12, German Federal Highway Research Institute (BAST): *Accident Data: Side Impacts with Poles – Informal Group on a Pole Side Impact GTR (PSI)*

PSI-02-13, Australian Department of Infrastructure and Transport: *Analysis of Vehicle Structural Deformation in Oblique, Perpendicular, and Offset Perpendicular Pole Side Impact*

PSI-02-14, NHTSA: *Real World Need for Oblique Test*

PSI-02-15, ISO/WG6 & ACEA-TFD: *Update on the WorldSID Injury Risk Curves*

PSI-02-16, Australian Department of Infrastructure and Transport: *Fatalities and Serious Injuries in Side Impact Crashes by Age – Victoria, Australia, 2000-2009*

PSI-02-17, University of Michigan Transportation Research Institute: *Effects of Occupant Age on AIS 3+ Injury Outcome Determined from Analyses of Fused NASS/CIREN Data*

PSI-02-18, BMW Group: *Side Pole Impact Accidents and Vehicle Testing*

PSI-02-19, Australian Department of Infrastructure and Transport: *Research Proposal – Quantitative analysis of Side Impact injuries, and effectiveness of existing countermeasures; Extension of existing work on side airbag effectiveness*

### **3<sup>rd</sup> Meeting**

#### Meeting papers and presentations

PSI-03-01, *Agenda for the 3<sup>rd</sup> Meeting of the GRSP Informal Group on a Pole Side Impact GTR*

PSI-03-02, *Minutes of the Second Meeting of the GRSP Informal Group on a Pole Side Impact GTR*

PSI-03-03, Australian Department of Infrastructure and Transport & Transport Canada: *Joint Australian and Canadian Pole Side Impact Research*

PSI-03-04, Australian Department of Infrastructure and Transport: *Pole Side Impact GTR: Assessment of Safety Need: Updated Data Collection*

PSI-03-05, Australian Department of Infrastructure and Transport: *Fatalities and Serious Injuries in Side Impact Crashes by Impact Type, Occupant Age and Year of Vehicle Manufacture, Victoria, Australia, 1999-2010*

PSI-03-06, NHTSA: *Incremental Benefits Perpendicular to Oblique Configuration*

PSI-03-07, Monash University Accident Research Centre: *Data Analysis to Investigate the Injury Profile of Near-Side, Side Impact Crashes: a Comparison of Injury Risk between Pole and Vehicle-Vehicle Impacts*

PSI-03-08, Australian Department of Infrastructure and Transport: *Scope of the UN GTR* (draft for discussion)

PSI-03-09, Australian Department of Infrastructure and Transport: *Options for the 5<sup>th</sup> Female*

PSI-03-10, German Federal Highway Research Institute (BASt): *Accident Data: Side Impacts with Poles*

PSI-03-11, BMW Group: *WorldSID 50M – Injury Criteria*

PSI-03-12, NHTSA: *Repeatability of Oblique Test Configuration*

#### **4<sup>th</sup> Meeting**

##### Meeting papers and presentations

PSI-04-01, *Agenda for the 4<sup>th</sup> Meeting of the GRSP Informal Group on a Pole Side Impact GTR*

PSI-04-02, *Minutes of the Third Meeting of the GRSP Informal Group on a Pole Side Impact GTR*

PSI-04-03, Australian Department of Infrastructure and Transport: *Joint Australian and Canadian Pole Side Impact Research*

PSI-04-04, French Technical Union for the Automobile, Motorcycle and Cycle Industries (UTAC): *4<sup>th</sup> Meeting of the GRSP Informal Group on Pole Side Impact GTR*

PSI-04-05, Australian Department of Infrastructure and Transport: *Safety Need – High Level Figures*

PSI-04-06, Australian Department of Infrastructure and Transport: *GTR Scope – NI Occupant Fatalities in Australia*

PSI-04-07, Australian Department of Infrastructure and Transport: *Options for Addressing Gap in Readiness between WorldSID Male 50<sup>th</sup> and WorldSID Female 5<sup>th</sup> in Drafting the Pole Side Impact GTR*

PSI-04-08, Australian Department of Infrastructure and Transport: *Analysis of Australian National Crash In-Depth Study (ANCIS) Pole Side Impact Cases by Angle of Impact*

PSI-04-09, NHTSA: *Exclusions* (in FMVSS 214)

PSI-04-10, OICA: *Scope of GTR – Pole Side Impact – Commercial Vehicle Use and Accident Data*

PSI-04-11, JASIC/Japan: *Japanese Proposal and Research Plan*

PSI-04-12, Australian Department of Infrastructure and Transport: *Draft Outline of Preamble of the UN GTR*

PSI-04-13, Australian Department of Infrastructure and Transport: *Draft Text of the Regulation of the UN GTR* (NB a revised draft of this text was circulated to PSI Informal Group members on 4 November 2011 as a working document)