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## Economic Commission for Europe

### Inland Transport Committee

### World Forum for Harmonization of Vehicle Regulations

#### 161<sup>st</sup> session

Geneva, 12-15 November 2013

Item 17.5 of the provisional agenda

**Progress on the development of new UN Global Technical Regulations (UN GTRs) and of amendments to established UN Global Technical Regulations (UN GTRs) - Gtr No. 9 (Pedestrian safety)**

### **Fourth progress report for Phase 2 of gtr No. 9 (Pedestrian safety)**

#### **Submitted by the Chair of the informal working group on Phase 2 of gtr No. 9 \***

The text reproduced below was prepared by the Chair of the informal working group. It is based on informal document WP.29-160-13, distributed at the 160<sup>th</sup> session of the World Forum for Harmonization of Vehicle Regulations (WP.29) (ECE/TRANS/WP.29/1104, para. 112). This document, if adopted, shall be appended to the amendment to the gtr in accordance with the provisions of paragraphs 6.3.4.2., 6.3.7. and 6.4. of the 1998 Agreement.

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\* In accordance with the programme of work of the Inland Transport Committee for 2010–2014 (ECE/TRANS/208, para. 106 and ECE/TRANS/2010/8, programme activity 02.4), the World Forum will develop, harmonize and update regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

## I. Objective of this proposal

1. The representatives of Germany and Japan proposed the development of Phase 2 (PH2) of global technical regulation (gtr) No. 9 on pedestrian safety. The main objective of PH2 is the development of a draft proposal to amend gtr No. 9 by introducing the flexible pedestrian legform impactor (FlexPLI) as a single harmonized test tool aimed at enhancing the level of protection for the lower legs of pedestrians.
2. The work of the informal working group (IWG) shall not be limited to draft proposals to amend gtr No. 9, but shall cover the development of a complementary draft proposal to amend Regulation No. 127.
3. The IWG should also review proposals to improve and/or clarify aspects of the legform test procedure.

## II. Background

4. At the 154<sup>th</sup> session of WP.29 and the thirty-second session of the Executive Committee of the 1998 Agreement (AC.3), it was agreed to set up an IWG to solve the pending issues for incorporating the FlexPLI in PH2 of gtr No. 9 and in Regulation No. 127 on pedestrian safety, subject to the submission to WP.29 and to AC.3 of appropriate terms of references (document ECE/TRANS/WP.29/1091, paras. 36 and 100).
5. WP.29 and AC.3 noted that this IWG, named GTR9-PH2, would be co-sponsored by Germany and Japan.
6. The IWG started its work on 3 November 2011 with a constitutional meeting in Bonn (Germany) to draft the terms of references, the rules of procedures, the time schedule and the work plan. At that occasion, the participants agreed with the proposal by the co-sponsors that the IWG would be managed by Germany (Chair), Japan (Vice-Chair) and that the International Organization of Motor Vehicle Manufacturers (OICA) would perform the tasks of the secretariat.
7. At the 155<sup>th</sup> session of WP.29 and the thirty-third session of AC.3, Germany and Japan have informed delegates about the outcome of the constitutional meeting, the management of the group and the ongoing activities of the IWG (document WP.29-155-35). WP.29 and AC.3 noted that the first meeting of the IWG was planned for 1 and 2 December 2011 to start the technical discussion and to finalize the draft terms of references as well as the work plan for submission to GRSP at its December 2011 session.
8. The first meeting of IWG was held on 1 and 2 December 2011 in Geneva (Switzerland). The technical discussion started and the draft document on the terms of reference, the rules of procedures, the time schedule and the work plan for submission to GRSP in December 2011 was concluded. The first progress report was submitted to the Working Party on Passive Safety (GRSP) in December 2011 and to WP.29 at its 156<sup>th</sup> session as well as to AC.3 at its thirty-fourth session in March 2012. At its 156<sup>th</sup> session, the World Forum endorsed in principle the above mentioned terms of references, pending the adoption of the report of the December 2011 session of GRSP. AC.3 also endorsed in principle the terms of reference of the IWG and requested the secretariat to distribute WP.29-156-11 with an official symbol for consideration at the June 2012 session.
9. The second meeting of the IWG took place in Osaka (Japan) on 28 and 29 March 2012. The discussion was focused on the technical aspects including the accident and benefit analysis. High priority was given to discuss the activities on the further

development of the certification procedures. As a further work item, a task force was established to initiate the work on the bumper test area for the lower legform impact.

10. The second progress report was submitted to GRSP in May 2012 and to WP.29 for consideration at its 157<sup>th</sup> session and to AC.3 at its thirty-fifth session in June 2012. During these sessions, the first progress report (ECE/TRANS/WP.29/2012/58) and the terms of references including the rules of procedures, the time schedule and the work plan were formally adopted. The second progress report (WP.29-157-21) was distributed with an official symbol at the November 2012 sessions of WP.29 and AC.3.

11. The third meeting of the IWG was held on 29 and 30 May 2012 in Paris (France). During the meeting, the experts discussed main topics related to accident data on pedestrian injuries, the cost-benefit assessment and the setup of certification corridors.

12. The fourth meeting of the IWG took place on 17 to 19 September 2012 in Washington DC (United States of America). The group resumed discussions of the third meeting, while the main focus was given to the finalisation of certification corridors and the cost-benefit assessment for the introduction of the FlexPLI. Further priority was given to agree on an international Round-Robin vehicle test programme with the FlexPLI.

13. The draft third progress report was submitted to WP.29 at its 158<sup>th</sup> session and to AC.3 at its thirty-sixth session. AC.3 requested the secretariat to distribute the draft third progress report (WP.29-158-28) with an official symbol for consideration at the next session and adopted the second progress report (ECE/TRANS/WP.29/2012/120).

14. The fifth meeting was held on 6 and 7 December 2012 in Bergisch Gladbach (Germany). Main subjects of the discussion during this meeting were a review of the cost-benefit analysis, an exchange of information on the first results of the repeatability and reproducibility of the FlexPLI tests with vehicles and a discussion on the threshold values for the injury criteria. Furthermore, the IWG agreed to seek the consent of GRSP and WP.29/AC.3 for an extension of the mandate (working schedule) to take all test results into account for the amendment of the gtr.

15. On the development of Phase 2 of the gtr on pedestrian safety (based on the original mandate), delegates noted during the 159<sup>th</sup> session of WP.29 and the thirty-seventh session of AC.3 that GRSP had adopted the revised terms of reference of the IWG group as reproduced in Annex II to the GRSP report (ECE/TRANS/WP.29/GRSP/52). The World Forum endorsed the extension of the mandate of the IWG until June 2014 (expected adoption at WP.29/AC.3) and, in principle, the revised terms of references, pending the adoption of the GRSP report of its December 2012 session at the 160<sup>th</sup> session of the World Forum in June 2013.

16. The third progress report (ECE/TRANS/WP.29/2013/36) was recalled at the 159<sup>th</sup> session of WP.29 and at the thirty-seventh session of AC.3 together with the amendments proposed by GRSP (WP.29-159-20) at the December 2012 session. AC.3 adopted ECE/TRANS/WP.29/2013/36, as amended by Annex III of the report of the World Forum (ECE/TRANS/WP.29/1102).

17. The sixth meeting of the IWG took place in Washington DC (United States of America) from 19 to 20 March 2013. The group agreed on the approach to review the FlexPLI drawing package to prepare the addendum for the Mutual Resolution No. 1 (M.R.1). The review of the controversial discussion on the cost-benefit studies was finalised and the results of the different regions and laboratories on the vehicle repeatability and reproducibility tests were shared during the discussions.

### **III. Subjects for review and tasks to be undertaken (terms of reference)**

18. The informal group has set up an activity list to address remaining items for the introduction of the FlexPLI:

- (a) Review and consideration of the remaining items:
  - (i) Review of Flex-TEG activities to reach common understanding;
  - (ii) Assessment of the biofidelity (i.e. comparison of FlexPLI and European Enhanced Vehicle-Safety Committee (EEVC) lower legform impactor);
  - (iii) Assessment of benefits and costs (injury reduction, additional benefit compared to EEVC lower legform impactor);
  - (iv) Preparation of the technical specifications (drawings) and user manual (PADI);
  - (v) Evaluation of the durability;
  - (vi) Test procedure (rebound phase, best practice, velocity measurement etc.);
  - (vii) Certification tests;
  - (viii) Review and exchange of test results;
  - (ix) Evaluation of reproducibility and repeatability;
  - (x) Evaluation and decision on performance/injury criteria and threshold values;
  - (xi) Evaluation of vehicle countermeasures (assessment of technical feasibility).
- (b) Development of draft amendments to gtr No. 9 on PH2.
- (c) Development of complementary draft amendments to Regulation No. 127 on Pedestrian Safety (including a recommendation for transitional provisions based on item (a) above).

### **IV. History of the discussions**

#### **A. Benefits and costs**

19. During the fifth and the sixth meeting the pedestrian experts reviewed further information from the Japan Automobile Standards Internationalization Center (JASIC) and the Federal Highway Research Institute of Germany (BAST) on the calculation of the benefits that would result from the introduction of the FlexPLI.

20. The Alliance of Automobile Manufacturers in the United States of America repeated the concerns that the two approaches presented may not be valid for every market depending especially on the situation of accidents and the vehicle fleet.

21. The IWG agreed that this argument may be valid for some regions which would result in the need to undertake, within the individual countries or regions, a cost-benefit analysis using their national or regional data on accidents and the situation of their vehicle fleet to verify the scope of the new provisions and the possible introduction of the FlexPLI in their territory. It was agreed that this topic will be reflected in the preamble of the amendment to gtr No. 9.

## **B. Technical specifications and user manual**

22. The dummy manufacturer provided the full drawing package for the FlexPLI in December 2012. The group discussed the planning to review the drawing package. It was agreed that a comparison of 100 per cent of the parts of one impactor will be done with the drawings. Additionally, the drawings will be checked if they conform to the requirements as defined by the IWG on Head Restraints Phase II, the IWG on Child Restraint Systems and the IWG GTR9-PH2.

23. A further part is the review of the user manual to check compliance with the defined requirements. The dummy manufacturer confirmed that updating of the drawings and the user manual would be done with guidance by the IWG. A draft proposal for an addendum to M.R.1 will be prepared by the IWG at its seventh meeting in September 2013.

## **C. Review and exchange of test results / Evaluation of reproducibility and repeatability**

24. The IWG started an international Round-Robin vehicle test programme in September 2012. The testing was finalised before the sixth IWG meeting. Results were presented by test houses from Europe, Korea and the United States of America. Apart from minor issues, the results of the different test houses showed a stable performance of the legform impactors with a good repeatability. Problems in durability did not occur during vehicle testing. During the vehicle tests at BAST, the lower test results with the master legs compared with the test results with former flexible legform impactors, but tested with the same cars led to discussions about the threshold values for the injury criteria (see paragraph 32 below). OICA showed results of vehicle tests with the FlexPLI, where the output values were not lower than those tests with former flexible legform impactors.

25. Further information on the influence of friction on the test device used for inverse testing was shown by the different laboratories that investigated their test apparatus. Based on the presentations and the conclusions, the IWG agreed on the limit for the friction of test devices for inverse testing. BAST and OICA presented information to define the tolerance of FlexPLI output values during the free-flight phase for vehicle tests. This topic should be further considered.

## **D. Test procedure**

26. BAST, JASIC and OICA presented proposals to define the rebound phase for the test with the FlexPLI. While JASIC and OICA were of the opinion that a definition can currently not be introduced into gtr No. 9, BAST showed a procedure to define a Biofidelic Assessment Interval (BAI). The decision on this topic was expected before the seventh meeting of the IWG.

27. After the second meeting of IWG, a Task Force Bumper Test Area (TF-BTA) was established, upon the request of the European Commission, to improve the procedure for the lower legform test, as the size of the area of the bumper tested was quite limited due to design features on the front part of some vehicles that interacted with the current test procedure. The European Commission is leading this activity.

28. Up to now, three meetings of the TF-BTA took place. The European Commission sought guidance on this topic by commissioning a contractor to investigate the different issues. First results of this work showed that, for the newer vehicles, the test area for the lower legform impact was narrowed. It was recognised that tests outside the current bumper test areas would lead to problems and that the reliability of the test results would be

questionable. This issue will be further considered and an assessment would be planned, if the current pedestrian lower legform impactors (EEVC PLI, FlexPLI) can be used to test the current bumper corners.

29. TF-BTA will assess all information available and provided. The next meeting of the TF-BTA is planned to be held in conjunction with the next meeting of the IWG.

30. OICA presented a proposal for the definition of the vehicle setup in terms of riding height. The proposal will be added in square brackets to the draft informal document for discussion.

#### **E. Evaluation of vehicle countermeasures (assessment of technical feasibility)**

31. During the fifth and sixth IWG meeting, information on the technical feasibility and possible vehicle countermeasures was provided by OICA, JASIC and the US National Highway Traffic Safety Administration (NHTSA). OICA informed the IWG that the feasibility may be a problem for some small volume products for which currently no detailed information on the performance with the FlexPLI was available. Automakers from the United States of America explained that, for some heavier trucks and Sport Utility Vehicles (SUV), there would be a conflict between the customer requests for the US-market and the pedestrian bumper requirements. The IWG agreed that, for some markets, it may be necessary to further consider the scope of the gtr and to review, for specific vehicles, the lead time for the transposition of gtr No. 9 into regional or national law.

#### **F. Evaluate and decide on performance/injury criteria and threshold values**

32. The IWG started to discuss the injury threshold values at its fifth meeting. The experts agreed smoothly on the injury criteria, but had an in-depth discussion on the threshold values for the different injury criteria. While BASt proposed to lower the threshold values, OICA was supportive of keeping the threshold values as proposed by the Technical Evaluation Group (TEG) on FlexPLI. At the sixth meeting, OICA presented further test data obtained by using their FlexPLI with the same build level as the "master legs". These tests showed a higher output values than those measured with the three master legs during vehicle tests. The decision about the threshold values was postponed until a later stage of the work.

#### **G. Activity list and schedule**

33. The IWG has reviewed the activity list in terms of identifying outstanding issues to be resolved. It has to be noted that all items of the activity list were addressed, but some items still need further consideration before a decision can be made.

34. The IWG intended to hold the seventh meeting as a WebEx meeting to discuss and resolve some specific issues, especially the threshold values for the injury criteria, the definition of a rebound phase and the tolerances of FlexPLI output values during free-flight phase. An agreement on these topics was expected for the seventh meeting.

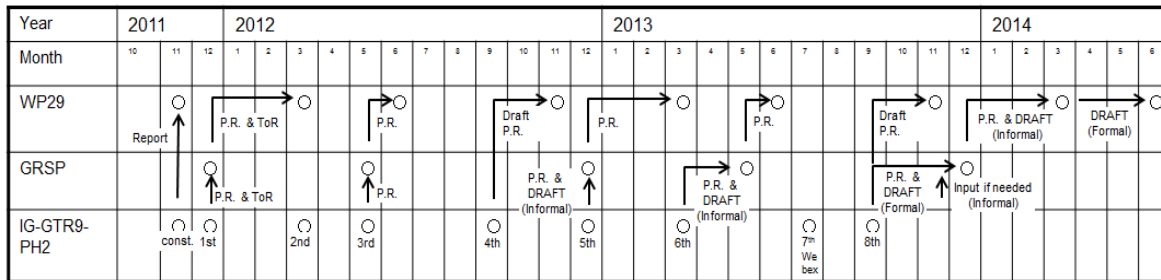
35. According to the overall schedule, the IWG would provide a draft informal document to insert the PH2 provisions into gtr No. 9 for a final review and discussion at the eighth meeting of the IWG. Subsequently, an official working document would be submitted for a detailed discussion at the GRSP session in December 2013. The IWG

expected to also submit to the December 2013 session of GRSP a proposal for an addendum to the Mutual Resolution (M.R.1) to incorporate the FlexPLI provisions.

## V. Work schedule

### 36. Work schedule

#### Overall Schedule



Date	Venue	Title
May 2011		Proposal of Draft ToR to GRSP (informal document)
June 2011		GRSP to seek consent of WP.29 and AC.3 to mandate new informal group on pedestrian protection
03 November 2011	(Bonn, DE)	Constitutional meeting of the IG GTR9-PH2
November 2011		Report to WP.29 on activities of IWG
01/02 December 2011	(Geneva, CH)	First meeting of the IG GTR9-PH2
December 2011		Progress-Report to GRSP, submission of Draft ToR to WP.29
March 2012		Progress-Report to WP.29 and adoption of ToR by WP.29 / AC.3
28 and 29 March 2012	(Osaka, JP)	Second meeting of the IG GTR9-PH2
May 2012		Progress-Report to GRSP
29 and 30 May 2012	(Paris, FR)	Third meeting of the IG GTR9-PH2
June 2012		Progress-Report to WP.29
17 to 19 Sept. 2012	(Washington DC, USA)	Fourth meeting of the IG GTR9-PH2
November 2012		Progress-Report to WP.29
06 and 07 December 2012	(Bergisch Gladbach, DE)	Fifth meeting of the IG GTR9-PH2
December 2012		Progress report and submission of informal draft documents to GRSP

<i>Date</i>	<i>Venue</i>	<i>Title</i>
March 2013		Sixth meeting of the IG GTR9-PH2
May 2013		Submit formal proposal to GRSP, adoption by GRSP, submit formal proposal to WP.29
November 2013		Adoption by WP.29
December 2013		Progress Report and submission of formal proposal to GRSP, agreement by GRSP
June 2014		Adoption by WP.29

## VI. Documents

### 37. Documents for the meetings

<i>Symbol</i>	<i>Transmitted by</i>	<i>Title</i>
ECE/TRANS/WP.29/GRSP/2011/13	Japan	Proposal for Amendment 2 to global technical regulation No. 9 (Pedestrian safety)
GRSP-49-38	Japan and Germany	Draft terms of reference for the informal group on pedestrian safety phase 2 (IG PS2)
ECE/TRANS/WP.29/1091		Reports of the World Forum for Harmonization of Vehicle Regulations on its 154th session, Administrative Committee of the 1958 Agreement on its forty-eighth session, Executive Committee of the 1998 Agreement on its thirty-second session, Administrative Committee of the 1997 Agreement on its eighth session
GTR9-C-01	Chair	Agenda for the constitutional meeting of the Informal Group on Pedestrian Safety Phase 2 (IG PS2)
GTR9-C-01r1	Chair	Agenda for the constitutional meeting of the Informal Group on Pedestrian Safety Phase 2 (IG PS2)
GTR9-C-02	Chair/Secretary	Minutes of the Constitutional Meeting of the Informal Group on Global Technical Regulation No. 9 – Phase 2 (IG GTR9-PH2)
GTR9-C-02r1	Chair/Secretary	Minutes of the Constitutional Meeting of the Informal Group on Global Technical Regulation No. 9 – Phase 2 (IG GTR9-PH2)
GTR9-C-03	Japan/Germany	Informal document GRSP-49-38: Draft Terms of Reference for the Informal Group on Pedestrian Safety Phase 2 (IG PS2)
GTR9-C-04	Japan	History of Development of the FlexPLI
GTR9-C-05	Japan	Review of the FlexPLI TEG Activities
GTR9-C-06	OICA	Comments on the Draft Terms of Reference for the Informal Group on Pedestrian Safety Phase 2 (28/10/2011)



<i>Symbol</i>	<i>Transmitted by</i>	<i>Title</i>
GTR9-C-07	Chair	Final Operating Principles and Terms of Reference for the IG GTR9-PH2
GTR9-C-07r1	Chair	Final Operating Principles and Terms of Reference for the IG GTR9-PH2
GTR9-C-08	Secretary	TEG document matrix
GTR9-1-01	Chair/ Secretary	Agenda for the 1st meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2)
GTR9-1-01r1	Chair/Secretary	Agenda for the 1st meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2)
GTR9-1-02	Chair/ Secretary	Minutes of the 1st meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2) – Draft
GTR9-1-02r1	Chair/ Secretary	Minutes of the 1st meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2) – Final
GTR9-1-03	Japan	Work plan of Task Force Review and Update of Certification Corridors (TF-RUCC)
GTR9-1-03r1	Japan	Work plan of Task Force Review and Update of Certification Corridors (TF-RUCC)
GTR9-1-04	OICA	FlexPLI Version GTR Prototype SN-02 - Durability Assessment
GTR9-1-05	JASIC	Technical Discussion - Biofidelity
GTR9-1-05r1	JASIC	Technical Discussion – Biofidelity (revised)
GTR9-1-06	JASIC	Technical Discussion - Injury Criteria
GTR9-1-06r1	JASIC	Technical Discussion - Injury Criteria (revised)
GTR9-1-07	JASIC	Technical Discussion - Benefit
GTR9-1-07r1	JASIC	Technical Discussion – Benefit (revised)
GTR9-1-08	Humanetics	FlexPLI GTR status 1 / 2 December 2011
GTR9-1-08r1	Humanetics	FlexPLI GTR status 1 / 2 December 2011
GTR9-1-09	Japan/ Germany	Informal document WP.29-155-35: Report to the November session of WP.29 on the activities of the IG GTR9-PH2
GTR9-1-10c1	Humanetics	Flex-GTR changes list since prototype built, status 02 Dec. 2010 (corrected)
GTR9-1-11	Bertrandt	Pendulum Test Scatter
GTR9-1-12	United States	Informal document GRSP-49-23: Update on Pedestrian Leg Testing

<i>Symbol</i>	<i>Transmitted by</i>	<i>Title</i>
GTR9-2-01	Chair/ Secretary	Agenda for the 2nd meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2) – Draft
GTR9-2-01r1	Chair/ Secretary	Agenda for the 2nd meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2) – Final
GTR9-2-02	Chair/ Secretary	Minutes of the 2nd meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2) – Draft
GTR9-2-02r1	Chair/ Secretary	Minutes of the 2nd meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2) – Final
GTR9-2-03	BASt	Proposal for a Modification of the Bumper Test Area for Lower and Upper Legform to Bumper Tests
GTR9-2-04	BASt	Robustness of SN02 prototype test results
GTR9-2-05	BASt	Comparison of Filter Classes for FlexPLI
GTR9-2-06	OICA	Technical Specification and PADI
GTR9-2-07	JASIC	Technical Discussion – Benefit; Updated Version of Document GTR9-1-07r1 (Note: The document was not presented since a revision 1 of the document was already available for the meeting)
GTR9-2-07r1	JASIC	Technical Discussion – Benefit; Updated Version of Document GTR9-1-07r1
GTR9-2-08	Humanetics	Flex PLI GTR meeting actions
GTR9-2-09	Humanetics	FLEX PLI GTR –FE v2.0IG FLEX GTR9-PH2
GTR9-2-10	OICA	FlexPLI Comparison (Impactors: SN02, SN04, IND-Impactor - Test experiences)
GTR9-2-11	Chair	Informal document WP.29-156-11: First progress report of the informal group on Phase 2 of gtr No. 9
GTR9-2-12	JASIC	Re-examination of Number of Pedestrians by Injury Severity
GTR9-2-13	Humanetics	FLEX PLI Update for Alliance of Automobile Manufacturers
GTR9-2-14	JARI	Updated Japan Progress Report: Review and Update Certification Test Corridors and Test Methods (added pendulum Test data)
GTR9-3-01	Chair/ Secretary	Agenda for the 3rd meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2) - Draft
GTR9-3-02	Chair/ Secretary	Minutes of the 3rd meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2) – Draft

<i>Symbol</i>	<i>Transmitted by</i>	<i>Title</i>
GTR9-3-02r1	Chair/ Secretary	Minutes of the 3rd meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2) – Final
GTR9-3-03	Germany	Informal document GRSP-51-15: Draft second progress report of the informal group on Phase 2 of UN GTR No. 9 (IG GTR9 - PH2)
GTR9-3-04	Humanetics	Flex PLI GTR User Manual Rev. C
GTR9-3-05	BASt	FlexPLI Prototype SN04 Robustness Test results
GTR9-3-06	BASt	Draft future work plan - testing
GTR9-4-01	Chair/ Secretary	Agenda for the 4th meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2) - Draft
GTR9-4-01r1	Chair/ Secretary	Agenda for the 4th meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2) - Final
GTR9-4-02	Chair/ Secretary	Minutes of the 4th meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2) – Draft
GTR9-4-03	Secretary	Status of activity list items
GTR9-4-04	United Kingdom	EEVC WG10 report, Nov. 1994
GTR9-4-05	United Kingdom	EEVC WG10 report, 15.ESV paper, May 1996
GTR9-4-06	United Kingdom	EEVC WG17 report, Dec. 1998, update Sep. 2002
GTR9-4-07	Chair of TF- RUCC	Activity report TF-RUCC
GTR9-4-08	Chair of TF- RUCC	Guideline to conduct FlexPLI round robin car tests, smooth and effectively
GTR9-4-09	Humanetics	Round robin certification test results
GTR9-4-10	Chair	Draft document “Special resolution No2” (WP.29-157-16)
GTR9-4-11	Concept Tech	Investigation of the influence of friction within the inverse certification test setup
GTR9-4-12	Alliance / JP	Letter of JP Research report on benefit assessment of the FlexPLI
GTR9-4-13	Alliance / JP	JP Research presentation on benefit assessment of the FlexPLI
GTR9-4-14	BASt	Comparison of FlexPLI performance in vehicle tests with prototype and series production legforms

<i>Symbol</i>	<i>Transmitted by</i>	<i>Title</i>
GTR9-4-15	Chair	Informal document WP.29-157-21: Second progress report of the informal group on Phase 2 of gtr No. 9
GTR9-4-16	BASt	Pedestrian lower extremity injury risk
GTR9-4-16r1	BASt	Pedestrian lower extremity injury risk – updated information
GTR9-4-17	Vice-Chair	FlexPLI round robin car test schedule
GTR9-4-18	BASt	FlexPLI vs. EEVC WG17 PLI, benefit estimation
GTR9-4-19	NHTSA	Overview of pedestrian protection activities for USA
GTR9-4-20	JASIC	Validation of Pedestrian Lower Limb Injury Assessment using Subsystem Impactors (IRCOBI paper Sept. 2012)
GTR9-4-21	USCAR / Alliance	USCAR/OSRP Pedestrian Lower Leg Response Research test series
GTR9-4-22	IG GTR9-PH2	Checklist for Vehicle Testing
GTR9-5-01	Chair/ Secretary	Agenda for the 5th meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2) - Draft
GTR9-5-01r1	Chair/ Secretary	Agenda for the 5th meeting of the Informal Group on Global Technical Regulation No. 9 - Phase 2 (IG GTR9-PH2) - Final
GTR9-5-02	Chair/ Secretary	Draft Minutes
GTR9-5-02r1	Chair/ Secretary	Draft Minutes (this document) - Final
GTR9-5-03	NHTSA	Pedestrian Injuries By Source: Serious and Disabling Injuries in US and European Cases (Mallory et al. Paper for 56th AAAM Annual Conference)
GTR9-5-04	Humanetics	Flex PLI GTR User Manual Rev. D, Oct. 2012
GTR9-5-05	Bertrandt	FlexPLI - Round Robin Tests
GTR9-5-05r1	Bertrandt	FlexPLI - Round Robin Tests, Rev. 1
GTR9-5-05r2	Bertrandt	FlexPLI - Round Robin Tests, Rev. 2
GTR9-5-06	Chair	Informal document WP29-158-28: Draft 3rd progress report
GTR9-5-07	OICA	Discussion on Feasibility of FlexPLI Countermeasures