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**Economic Commission for Europe**

Inland Transport Committee

**World Forum for Harmonization of Vehicle Regulations****Working Party on Passive Safety****Fifty-sixth session**

Geneva, 9-12 December 2014

Item 3(a) of the provisional agenda

**Global technical regulation No.9 (Pedestrian safety) – Proposal for  
Phase 2 of the global technical regulation****Fifth progress report****Submitted by the informal working group on global technical  
regulation No. 9\***

The final progress report reproduced below was prepared by the informal working group (IWG) on global technical regulation No. 9 to describe the process of developing the Phase 2 of the global technical regulation. It is based on a document without a symbol (GRSP-54-34-Rev.1) distributed during the fifty-fourth session of the Working Party on Passive Safety (GRSP) and reproduced in Annex II of the Report of that session (ECE/TRANS/WP.29/GRSP/54, para. 8).

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\* In accordance with the programme of work of the Inland Transport Committee for 2012–2016 (ECE/TRANS/224, para. 94 and ECE/TRANS/2012/12, 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.

## **Fifth progress report of the informal group on Phase 2 of gtr No. 9 (IWG GTR9 - PH2)**

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1. The intention of this report is to supplement procedural information on the development of phase 2 of gtr No. 9 included in the Part I (Statement of technical rationale and justification) of document ECE/TRANS/WP.29/GRSP/2013/25 and to provide further details on the informal working group.

2. For information on the technical rationale and justification of the amendment, readers are referred to Part I of document ECE/TRANS/WP.29/GRSP/2013/25.

### **I. Introduction**

3. GRSP agreed to set up an IWG on pedestrian safety Phase 2 in order to further develop proposals to amend gtr No.9 on introducing the Flexible Pedestrian Legform Impactor (Flex-PLI) (ECE/TRANS/WP.29/AC.3/24, ECE/TRANS/WP.29/1079, para. 101).

4. The Flex-PLI Technical Evaluation Group (Flex-TEG) has conducted technical evaluation activities on the Flex-PLI since September 2005. As result of the Flex-TEG activity Japan has submitted proposals for amendments on gtr No.9 - Phase 2 as well as on the draft UN-Regulation on Pedestrian Safety (Phase 2).

5. At the forty-ninth session of GRSP, some delegations expressed outstanding reservations with regard to the introduction of the Flex-PLI and requested to set up an IWG to discuss related issues and to develop proposals to amend gtr No. 9.

6. GRSP agreed to seek the consent of WP.29 and AC.3 to mandate a new IWG to solve the pending issues for incorporating the Flex-PLI in Phase 2 of the gtr No. 9 and in the draft UN Regulation on pedestrian safety in the same time. The World Forum agreed to set up this IWG, subject to the submission to WP.29 of the appropriate terms of references (ECE/TRANS/WP.29/1091, para. 36 and 100).

### **II. Objective of the Informal Group**

7. The main objective of the IWG on gtr No. 9 – Phase 2 was to develop a draft proposal to amend gtr No. 9 - Phase 2 on pedestrian safety by introducing the Flex-PLI as a single harmonized test tool in order to enhance the safety level of lower leg pedestrian protection.

8. The work of the IWG was not limited to draft proposals to amend gtr No. 9, but covered the development of a complementary draft proposal to amend the draft UN-Regulation No. 127 on pedestrian safety.
9. The IG GTR9-PH2 worked on the items listed in Appendix 1 of the terms of reference (see Annex 1 of this document).
10. The IWG also reviewed further draft proposals to improve and / or clarify aspects of the legform test procedure.

### III. Procedural Background

11. At the 154<sup>th</sup> session of the World Forum for Harmonization of Vehicle Regulations (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 the incorporation of the FlexPLI in Phase 2 of the gtr No. 9 and in the draft UN Regulation 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).
12. Japan and Germany have informed the World Forum for Harmonization of Vehicle Regulations and the Executive Committee of the 1998 Agreement that this IWG named IG GTR9 - Phase 2 will be co-sponsored by Japan and Germany.
13. The IWG has started its work on 3 November 2011 with a Constitutional Meeting in Bonn, Germany, to draft a document on the terms of references, the operating principles, the schedule and the work plan. At this occasion the participants agreed to the proposal of Japan and Germany that the IWG will be managed by Germany (chair), Japan (vice-chair) and OICA (Secretary).
14. At the 155<sup>th</sup> session of the World Forum and at the thirty-third session of the Executive Committee of the 1998 Agreement, Japan and Germany have informed delegates about the ongoing activities of the IWG on gtr No. 9 Phase 2 (document WP.29-155-35). The delegates were informed about the constitutional meeting and the management of the group. The information was given that the first meeting was planned for 01 and 02 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 in December 2011.
15. The first meeting of the IWG was held on 1 and 2 December 2011 in Geneva, Switzerland. The technical discussion was started and the draft document on the terms of references, the operating principles, the schedule and the work plan for submission to GRSP in December 2011 were finalised. The first progress report was submitted to GRSP in December 2011 and to WP.29 at its 156<sup>th</sup> session and to AC.3 at its thirty-fourth session in March 2012. At the 156<sup>th</sup> session WP.29 endorsed in principle the above mentioned terms of references, pending the adoption of the report of the December 2011 session of GRSP. AC.3 endorsed in principle the terms of reference of the informal working group and requested the secretariat to distribute document ECE/TRANS/WP.29-156-11 with an official symbol for June 2012.
16. The second meeting of the IWG took place on 28 and 29 March 2012 in Osaka, Japan. The discussion was focused on the technical aspects including the accident and benefit analysis. Main priority was also given to discuss the activities on the further development of the certification procedures. For one further work item, a task force was initiated to work on the bumper test area for the lower legform impact.
17. The second progress report was submitted to GRSP in May 2012 and to WP.29 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 operating principles, the schedule and the work plan were adopted. The second progress

report (document ECE/TRANS/ WP.29-157-21) was distributed with an official symbol for November 2012.

18. The third meeting of the IWG was held on 29 and 30 May 2012 in Paris, France. Main topics discussed during the meeting were related to accident data on pedestrian injuries, the cost benefit assessment and the setup of certification corridors.

19. The fourth meeting of the IWG took place on 17 to 19 September 2012 in Washington, D.C., United States of America. The group carried on the 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 the plan for an international vehicle test programme with the FlexPLI.

20. The draft third progress report was submitted to the 158th session of the World Forum and to the thirty-sixth session of AC.3. 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).

21. The fifth meeting was held on 6 and 7 December 2012 in Bergisch Gladbach, Germany. Main subjects of this meeting were a review of the cost benefit analysis, an exchange of information based on the first results of the repeatability and reproducibility testing of the FlexPLI with vehicles and a discussion of the threshold values for the injury criteria. Additionally, the IWG agreed to ask GRSP and AC.3 for an extension of the mandate (working schedule) to take all testing results into account for the amendment.

22. At the 159<sup>th</sup> session of WP.29 and at the thirty-seventh session of AC.3 it was reported that concerning the development of Phase 2 of the gtr on pedestrian safety based on the original mandate (working schedule) GRSP had adopted the revised terms of reference of the informal working group as reproduced in Annex II to the GRSP report. The World Forum endorsed the extension of the mandate of the informal working group until June 2014 (adoption at 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.

23. The third progress report (ECE/TRANS/WP.29/2013/36) was recalled at the 159th session of the World Forum and the 37th session of AC.3 as amended (WP.29-159-20) at the December 2012 session of GRSP. 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).

24. The sixth meeting of the IWG took place in Washington D.C., 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 testing were shared for discussions.

25. The draft fourth progress report of the group was presented at the fifty-third session of GRSP. It was added that the group had made good progress and that it was ready to submit an official proposal to the December session of GRSP with possible pending decisions on threshold values of injury criteria. GRSP agreed to resume consideration of this subject on the basis of a proposal submitted by the IWG.

26. At its 160<sup>th</sup> session, the World Forum was informed by the representative of the United States that GRSP expected to recommend that Amendment 2 (Phase 2) of the gtr on pedestrian safety, aimed at including the Flex-PLI and the definition of the head form impact point be included into the gtr No. 9 test. These provisions would also be included into UN Regulation No. 127. He also announced the submission of an Amendment 1 (Phase 1) to the gtr on pedestrian safety on an updated definition of the head form impact point.

27. At the same session of WP.29, the representative of Japan, Vice-Chair of the IWG on Phase 2 of gtr No. 9, introduced the fourth progress report of the group together with a presentation. He explained that the IWG had made good progress and that an official proposal for incorporating the flexible pedestrian legform impactor would be submitted to the December 2013 session of GRSP. AC.3 adopted the fourth progress report and requested the secretariat to distribute it with an official symbol at its November 2013 session.

28. The seventh meeting of the IWG was held as a telephone and online meeting on 3 July 2013. The group discussed some specific issues, especially on the threshold values for the injury criteria, the definition of the rebound phase and the tolerances of FlexPLI output values during the free-flight phase. The latter ones were agreed in principal while a decision on the threshold values is still pending. A further work item agreed was to perform an analysis on the necessity and possibility to introduce certification corridors for the femur bending moment.

29. The eighth meeting of the IWG was held on 9 and 10 September 2013. The meeting was dedicated mainly to discussion of the open items like the injury criteria, the femur certification corridors and to review the preamble and the regulatory text of the gtr No. 9.

30. The ninth meeting of the IWG was held on 16 and 17 December 2013. During the meeting open items were discussed and resolved during the final review of the proposed amendment of the text for the gtr and the UN Regulation 127. One pending issue on the performance limits for the injury criteria has to be discussed within GRSP involving all Contracting Parties.

31. At the fifty-fourth session of GRSP, Contracting Parties discussed introducing flexibility for Contracting Parties regarding the injury threshold values, but limiting it to Contracting Parties without pre/existing pedestrian protection regulations or standards implemented in domestic legislation at the time the Phase 2 of Global Technical Regulation No. 9. OICA expressed concerns with this approach because it is not fully in line with the global harmonization principles and recommended seeking guidance from AC.3 on this specific matter. GRSP agreed to recommend the draft amendment for Phase 2 of the gtr to the June 2014 session of AC.3 pending its decision whether the proposed wording is acceptable for Contracting Parties to the 1998 Agreement.

## **Annex 1 - Terms of Reference**

### **A. Introduction**

1. GRSP agreed to set up an informal working group on pedestrian safety Phase 2 in order to further develop proposals to amend gtr No. 9 on introducing the Flexible Pedestrian Legform Impactor (Flex-PLI) (ECE/TRANS/WP.29/AC.3/24, ECE/TRANS/WP.29/1079, para. 101).

2. The Flex-PLI Technical Evaluation Group (Flex-TEG) has conducted technical evaluation activities on the Flex-PLI since September 2005. As result of the Flex-TEG activity Japan has submitted proposals for amendments on gtr No. 9 - Phase 2 as well as on the draft UN Regulation on Pedestrian Safety (Phase 2). At the forty-ninth session of GRSP some delegations have expressed outstanding reservations with regard to the introduction of the Flex-PLI and requested setting up an informal working group to discuss related issues and to develop proposals to amend gtr No. 9.

3. GRSP agreed to seek the consent of WP.29 and AC.3 to mandate a new informal working group to solve the pending issues for the incorporation of the Flex-PLI in Phase 2 of the gtr No. 9 and in the draft UN Regulation on pedestrian safety in the same time. The World Forum agreed to set up this informal working group, subject to the submission to

WP.29 of the appropriate terms of references (ECE/TRANS/WP.29/1091, para. 36 and 100).

## B. Objective of the informal working group

4. The main objective of the informal working group gtr No. 9 – Phase 2 (GTR9-PH2) is to develop a draft proposal to amend the UN global technical regulation No. 9 - Phase 2 on pedestrian safety by introducing the Flex-PLI as a single harmonized test tool in order to enhance the safety level of lower leg pedestrian protection.

5. The work of the informal working group shall not be limited to draft proposals to amend gtr No. 9, but shall cover the development of a complementary draft proposal to amend the draft UN Regulation on pedestrian safety.

6. The informal working group may also review further draft proposals to improve and / or clarify aspects of the legform test procedure.

7. The informal working group GTR9-PH2 shall work on the items listed in Appendix I to this document.

## C. Work plan and time schedule

May 2011	Proposal of Draft ToR to GRSP (informal document)
GRSP agreed to seek consent of WP.29 and AC.3 to mandate new IWG on pedestrian protection	
3 November 2011 (Bonn, DE)	Constitutional meeting of the IG GTR9-PH2
November 2011	Report to WP.29 on activities of IG
1-2 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 AC.3
28 and 29 March 2012 (Osaka, JP)	Second meeting of the IG GTR9-PH2
May 2012	Progress Report to GRSP
29 - 30 May 2012 (Paris, FR)	Third meeting of the IG GTR9-PH2
June 2012	Progress Report to WP.29
17 - 19 Sept. 2012 (Wash. DC, USA)	Fourth meeting of the IG GTR9-PH2
November 2012	Draft Progress Report to WP.29
6 - 7 December 2012 (Bergisch Gladbach, DE)	Fifth meeting of the IG GTR9-PH2
December 2012	Progr. Report and submission of informal documents to GRSP
March 2013	Progress Report to WP.29
19 - 20 March 2013 (Wash. DC, USA)	Sixth meeting of the IG GTR9-PH2
Draft Progress Report and submission of informal proposal for discussion to GRSP	
June 2013	Progress Report to WP.29
3 July 2013	Seventh meeting (WebEx) of the IG GTR9-PH2
9 - 10 September 2013 (Paris, France)	Eighth meeting of the IG GTR9-PH2
November 2013	Draft Progress Report to WP.29
16 and 17 December 2013 (Geneva, CH)	Ninth meeting of the IG GTR9-PH2
December 2013	Final Report and submission of formal proposal to GRSP, agreement by GRSP
June 2014	Adoption by WP.29

※Additional meetings (including virtual meetings) could be held according to the progress of discussions and the decision of the informal working group.

**Overall Schedule** P.R.: Progress Report

Year	2011			2012				2013				2014										
Month	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	
WP29																						
GRSP																						
IG-GTR9-PH2																						

Timeline details from the table:  
 - WP29: Report (Nov 2011), P.R. & ToR (Dec 2011), P.R. (Mar 2012), Draft P.R. (Apr 2012), P.R. (Jul 2012), P.R. (Oct 2012), Draft P.R. (Nov 2012), P.R. & DRAFT (Informal) (Jan 2013), P.R. & DRAFT (Formal) (Feb 2013), P.R. (Mar 2013), Draft P.R. (Apr 2013), P.R. & DRAFT (Informal) (Jul 2013), P.R. & DRAFT (Formal) (Oct 2013), P.R. & DRAFT (Informal) (Jan 2014), DRAFT (Formal) (Feb 2014).  
 - GRSP: P.R. & ToR (Dec 2011), P.R. (Mar 2012), P.R. & DRAFT (Informal) (Apr 2012), P.R. & DRAFT (Formal) (Jul 2012), P.R. & DRAFT (Formal) (Oct 2012), Input if needed (Informal) (Jan 2013).  
 - IG-GTR9-PH2: const. (Nov 2011), 1st (Dec 2011), 2nd (Jan 2012), 3rd (Feb 2012), 4th (Apr 2012), 5th (Jul 2012), 6th (Oct 2012), 7th We see (Jan 2013), 8th (Apr 2013), 9th (Jul 2013).

## Appendix - Activity list

The major tasks that will be performed by the informal working group on the phase 2 of gtr No. 9 include:

1. Review and consideration of remaining items:
  - (a) Review of Flex-TEG activities → to reach common understanding;
  - (b) Assessment of biofidelity (comparison of FlexPLI and EEVC lower legform impactor);
  - (c) Assessment of benefit and costs (injury reduction, additional benefit compared to EEVC lower legform impactor);
  - (d) Technical specifications (drawings) and PADI (user manual);
  - (e) Evaluation of durability;
  - (f) Test procedure (rebound phase, best practice, velocity measurement etc.);
  - (g) Certification tests;
  - (h) Review and exchange of test results;
  - (i) Evaluation of reproducibility and repeatability;
  - (j) Evaluate and decide on performance / injury criteria and threshold values;
  - (k) Evaluation of vehicle countermeasures (assessment of technical feasibility).
2. Develop a draft proposal to amend gtr No. 9 - Phase 2.
3. Develop a complementary draft proposal to amend draft UN Regulation on Pedestrian Safety (including a recommendation for transitional provisions based on item 1).

## Annex 2 - Reports to WP.29

- 1st Progress Report ECE/TRANS/WP.29/2012/58
- 2nd Progress Report ECE/TRANS/WP.29/2012/120
- 3rd Progress Report ECE/TRANS/WP.29/2013/36
- 4th Progress Report ECE/TRANS/WP.29/2013/129
- 5th Progress Report WP.29-161-21

**Appendix - Reference Documents used by the Informal Group**

All informal documents used by this IWG are listed and available on the UNECE WP.29 website ([www.unece.org/trans/main/welcwp29.html](http://www.unece.org/trans/main/welcwp29.html)).

<i>Doc. No.</i>	<i>Rev</i>	<i>Name</i>
ECE/TRANS/WP.29/GRSP/2011/13		Proposal for Amendment 2 to global technical regulation No. 9 (Pedestrian safety)
GRSP-49-38		Draft terms of reference for the IWG 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	1	Agenda of the Constitutional Meeting of the IWG on gtr No 9 - Phase 2 (IG GTR9-PH2)
GTR9-C-02	1	Minutes of the Constitutional Meeting of the IWG on gtr No. 9 – Phase 2 (IG GTR9-PH2)
GTR9-C-03		Informal document GRSP-49-38: Draft terms of reference for the IWG on pedestrian safety phase 2 (IG PS2)
GTR9-C-04	1	History of Development of the FlexPLI
GTR9-C-05		Review of the FlexPLI TEG Activities
GTR9-C-06		Comments on the Draft Terms of Reference for the IWG on Pedestrian Safety Phase 2 (28/10/2011)
GTR9-C-07	1	Final Operating Principles and Terms of Reference for the IG GTR9-PH2
GTR9-C-08		TEG document matrix
GTR9-1-01	1	Agenda for the 1st meeting of the IWG GTR9-PH2
GTR9-1-02	1	Minutes of the 1st meeting of the IWG GTR9-PH2
GTR9-1-03	1	Document TF-RUCC-K-03-Rev.1: Work plan of TF-RUCC
GTR9-1-04		FlexPLI Version GTR Prototype SN-02 - Durability Assessment
GTR9-1-05	1	Technical Discussion – Biofidelity
GTR9-1-06	1	Technical Discussion – Injury Criteria
GTR9-1-07	1	Technical Discussion – Benefit
GTR9-1-08	1	FlexPLI GTR Status, 1 – 2 December 2011
GTR9-1-09		Inf. Doc. WP.29-155-35: Report to the November session of WP.29 on the activities of the IWG GTR9-PH2
GTR9-1-10		Changes to Flex PLI GTR Since Prototype Build, Status Dec. 2010
GTR9-1-11		Scatter of pendulum test results, 09.11.2010



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<i>Doc. No.</i>	<i>Rev</i>	<i>Name</i>
GTR9-1-12		Informal document GRSP-49-23: Update on Pedestrian Leg Testing
GTR9-2-01	1	Agenda for the 2nd meeting of the IWG GTR9-PH2 - Final
GTR9-2-02	1	Minutes of the 2nd meeting of the IWG GTR9-PH2 - Final
GTR9-2-03		Proposal for a Modification of the Bumper Test Area for Lower and Upper Legform to Bumper Tests
GTR9-2-04	1	Robustness of SN02 prototype test results - Revision 1
GTR9-2-05		Comparison of Filter Classes for FlexPLI
GTR9-2-06		Technical Specification and PADI
GTR9-2-07	1	Technical Discussion – Benefit (Update of document GTR9-1-07 Rev. 1)
GTR9-2-08		FlexPLI GTR meeting actions
GTR9-2-09		FlexPLI GTR – FE model v2.0
GTR9-2-10	2	FlexPLI Comparison - test experiences with different impactors (completed during the 3rd meeting)
GTR9-2-11		Informal document WP.29-156-11: First progress report of the IWG GTR9-PH2
GTR9-2-12		Re-examination of Number of Pedestrians by Injury Severity
GTR9-2-13		FLEX PLI Update for Alliance of Automobile Manufacturers
GTR9-2-14		Updated Japan progress report: Review and update certification test corridors and test methods (added pendulum test data)
GTR9-3-01	1	Agenda for the 3rd meeting of the IWG GTR9-PH2 - Final
GTR9-3-02	1	Minutes of the 3rd meeting of the IWG GTR9-PH2 – Final
GTR9-3-03		Informal document GRSP-51-15: Draft second progress report of the IWG GTR9-PH2
GTR9-3-04		Flex PLI GTR User Manual Rev. C
GTR9-3-05		FlexPLI Prototype SN04 Robustness Test results
GTR9-3-06		Proposal for a future vehicle test matrix
GTR9-4-01	1	Agenda for the 4th meeting of the IWG GTR9-PH2 - Final
GTR9-4-02	1	Minutes of the 4th meeting of the IWG GTR9-PH2 - Final
GTR9-4-03	3	Status of activity list items
GTR9-4-04		1994 EEVC WG10 Report
GTR9-4-05		1996 EEVC WG10 report to the 15th ESV conference
GTR9-4-06		1998/2002 EEVC WG17 Report
GTR9-4-07		TF-RUCC Activity Report 6 Sept. 2012

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<i>Doc. No.</i>	<i>Rev</i>	<i>Name</i>
GTR9-4-08		Guidelines To Conduct FlexPLI Round Robin Car Test Smoothly and Effectively
GTR9-4-09		FlexPLI Round Robin Test Results
GTR9-4-10		Informal document WP.29-157-16: Proposal for the establishment of Special Resolution No. 2 on description and performance of test tools and devices necessary for the assessment of compliance
GTR9-4-11		Investigation of the Influences of Friction within the Inverse Certification Test Setup
GTR9-4-12		Report addressing the Pedestrian Research performed by JASIC
GTR9-4-13		JP Research Summary: JASIC Flex Injury Estimate
GTR9-4-14		Comparison of FlexPLI Performance in Vehicle Tests with Prototype and Series Production Legforms
GTR9-4-15		Informal document WP.29-157-21: 2 <sup>nd</sup> progress report of the IWG GTR9-PH2
GTR9-4-16	1	Pedestrian Lower Extremity Injury Risk - Revision 1
GTR9-4-17		FlexPLI Round Robin Car Test Schedule
GTR9-4-18		FlexPLI vs. EEVC LFI Benefit Estimation
GTR9-4-19		Overview of NHTSA Pedestrian Activities
GTR9-4-20		Validation of pedestrian lower limb injury assessment using subsystem impactors (IRCOBI conference, 12th – 14th Sept. 2012)
GTR9-4-21		OSRP Pedestrian Lower Leg Response Research test series
GTR9-4-22		Checklist for Vehicle Testing
GTR9-5-01	1	Agenda for the 4th meeting of the IWG GTR9-PH2 - Final
GTR9-5-02	1	Minutes of the 5th meeting of the IWG GTR9-PH2 - Final
GTR9-5-03		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		Flex PLI gtr User Manual Rev. D, Oct. 2012
GTR9-5-05	2	FlexPLI - Round Robin Tests
GTR9-5-06		Informal document WP29-158-28: Draft 3rd progress report
GTR9-5-07	c2	Discussion on Feasibility of FlexPLI Countermeasures
GTR9-5-08		Proposal for Procedure to Process FlexPLI Measurements in Rebound Phase
GTR9-5-09		Applicability Information
GTR9-5-10		FlexPLI Durability Against Larger Vehicles
GTR9-5-11		FlexPLI Repeatability in Car Tests

<i>Doc. No.</i>	<i>Rev</i>	<i>Name</i>
GTR9-5-12		Experimental Validation of Human and FlexPLI FE Models
GTR9-5-13		FlexPLI vs. EEVC LFI Correlation
GTR9-5-14		Benefit and Cost; Additional Analysis based on GTR9-2-07r1
GTR9-5-15		Moving Ram Friction Effect
GTR9-5-16	1	Round Robin Test Result (E-Leg)
GTR9-5-17		FlexPLI Test Results (SN-03)
GTR9-5-18		Flex PLI Logbook for the IG GTR9-PH2 Round Robin Tests
GTR9-5-19		Estimation of Cost Reduction due to Introduction of FlexPLI within GTR9
GTR9-5-20		Verification of Draft FlexPLI prototype impactor limits and application to FlexPLI serial production level
GTR9-5-21		US Round Robin Test Status
GTR9-5-22		Information on vehicle data used in NHTSA's studies
GTR9-5-23	c	Initial comments of OICA experts to the 5 <sup>th</sup> IG GTR9-PH2 meeting in response to document GTR9-5-20
GTR9-5-24		Height tolerance for pedestrian protection
GTR9-5-25		Flex PLI Inverse Test Setup - Moving Ram Friction
GTR9-5-26		Investigation of the influences of friction within the inverse certification test setup of the FlexPLI - Lower Legform Impactor
GTR9-5-27		Clarification of Injury Threshold Determination Process Used by JAMA
GTR9-5-28		Operating Principles and Terms of Reference for the IG GTR9-PH2, updated version 5th meeting
GTR9-5-29		Draft gtr No 9 amendment, version 2012-12-06
GTR9-5-30		Discussion of the Rebound Issue, ACEA comments
GTR9-5-31	1	FlexPLI version GTR drawing package
GTR9-6-01	1	Agenda for the 6th meeting of the IWG GTR9-PH2 - Final
GTR9-6-02	2	Minutes of the 6th meeting of the IWG GTR9-PH2 - Final
GTR9-6-03		FlexPLI Testing: Propelling Accuracy
GTR9-6-04		Guidelines for the development of drawings for a test tool to be added as an Addendum to M.R.1 - (ECE/TRANS/WP.29/1101)
GTR9-6-05		Schedule to prepare an Addendum for FlexPLI for the M.R.1
GTR9-6-06		FlexPLI GTR User Manual Rev. E 2013
GTR9-6-07		Definition of FlexPLI Biofidelic Assessment Interval
GTR9-6-08	1	Derivation of FlexPLI thresholds

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GTR9-6-09		FlexPLI Drawings
GTR9-6-10		FlexPLI Pre- & Post-Test Procedure
GTR9-6-11		Consideration of the Rebound Phase
GTR9-6-12		Validation of Flex-GTR model
GTR9-6-13		Proposal for a wording to consider tolerances of the normal ride height
GTR9-6-14	1	FlexPLI Round Robin Testing
GTR9-6-15	1	Summary JPR Report Evaluating the Methodology and Assumptions Made in Doc. GTR9-5-14 & GTR9-5-19
GTR9-6-16		JPR Report Evaluating the Methodology and Assumptions Made in Doc. GTR9-5-14 and GTR9-5-19
GTR9-6-17		Large Truck/SUV Challenges
GTR9-6-18		FlexPLI Round Robin Test Results
GTR9-6-19	1	FlexPLI Round Robin Test Results
GTR9-6-20		Discussion on Impactor Thresholds
GTR9-6-21		Flex-PLI Rebound Issue: Industry Proposal (Update)
GTR9-6-22		FlexPLI Drawing Review (Surface Level)
GTR9-6-23	2	FlexPLI Drawings Review
GTR9-6-24		Durability Study SN-03
GTR9-6-25		Comments on GTR9-6-15 (JP Research review of JASIC & BASt FlexPLI Injury Reduction Estimate)
GTR9-6-26		Development of Injury Probability Functions for the Flexible Pedestrian Legform Impactor
GTR9-6-27		Comments on Alliance and JP Research Documents (GTR9-6-15 and GTR9-6-16)
GTR9-6-28		Certification test results of the OEM legform used in document GTR9-6-20
GTR9-7-01	1	Agenda for the 7th meeting of the IWG GTR9-PH2 - Final
GTR9-7-02	1	Minutes of the 7th meeting of the IWG GTR9-PH2 - Final
GTR9-7-03		Draft running order of the provisional agenda
GTR9-7-04		Information on drawing package kindly provided by Humanetics
GTR9-7-05	c	Result of drawing review (surface level)
GTR9-7-06	c	Result of manual review
GTR9-7-07		Injury Probability Function for Tibia Fracture and MCL Failure
GTR9-7-08		Development of Flex-GTR Master Leg FE Model and Evaluation of Validity of Current Threshold Values

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GTR9-7-09		Flex-GTR Master Leg Level Impactor Test Data - Pendulum Test
GTR9-7-10		FlexPLI Logbook - legform SN-01
GTR9-7-11		FlexPLI Logbook - legform SN-03
GTR9-7-12		FlexPLI Logbook - legform E-Leg
GTR9-7-13		FlexPLI Rebound Phase
GTR9-7-14		Detailed Review of Drawing Package and Itemized Check against Master Leg Impactor SN03
GTR9-7-15		BASSt comments on GTR9-7-13:JASIC position on FlexPLI rebound phase
GTR9-7-16	1	Collation of FlexPLI Pendulum Certification Test Results
GTR9-7-17	1	Collation of FlexPLI Inverse Certification Test Results
GTR9-8-01	1	Agenda for the 8th meeting of the IWG on Gtr No. 9 – Phase 2 (IG GTR9-PH2) - Final
GTR9-8-02		Minutes of the 8th meeting of the IWG on Gtr No. 9 – Phase 2 (IG GTR9-PH2) - Draft
GTR9-8-03	1	GTR9 – Draft Working Document of IG GTR9 PH2; Version 1, 04 Sept. 2013
GTR9-8-04		GTR9 – Draft Preamble of IG GTR9 PH2; Version 1, 04 Sept. 2014
GTR9-8-05		(not used)
GTR9-8-06		OICA comments on the draft text, based on document GRSP-53-29
GTR9-8-07		Proposed Title Block for Regulation Drawings
GTR9-8-08	1	Comments to JAMA presentation GTR9-7-06c and Proposed Changes, FlexPLI GTR Manual
GTR9-8-09		Comments to Cellbond Flex PLI Drawing Check Document GTR9-6-23
GTR9-8-10		Comments to JASIC's Comments Provided with Document GTR9-7-05c
GTR9-8-11		Comparison of Effect of Different Approaches on Injury Risk Functions
GTR9-8-12		Possible Influence of Temperature and Humidity on the FlexPLI Behavior
GTR9-8-13		FlexPLI Manual: FlexPLI Preparation before Car Testing
GTR9-8-14		Request for Transitional Provisions for FlexPLI Usage
GTR9-8-15		FlexPLI Biofidelic Assessment Interval (BAI): Open Issues
GTR9-8-16		Change to foam flesh used by EEVC lower & upper legforms
GTR9-8-17		FlexPLI Version GTR - Testing of Vehicles with Different Bumper Systems

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GTR9-8-18		Femur Certification Corridors for the Inverse Test (Zero Cross Timing)
GTR9-8-19		Femur Certification Corridors for the Pendulum Test (Zero Cross Timing)
GTR9-9-01	1	Agenda for the 8th meeting of the IWG on gtr No. 9 – Phase 2 (IG GTR9-PH2) - Draft
GTR9-9-02		(Minutes of the 9th Meeting, not yet available)
GTR9-9-03		FlexPLI weight tolerances, Reduction of proposed weight tolerances
GTR9-9-04	1	Lower Legform Test Area, Justification of the Need for a Relaxation Zone
GTR9-9-05		Proposal of 01 series of amendments to Regulation No. 127: Transitional provisions
GTR9-9-06		Proposed amendments of the three-point bending certification test figure
GTR9-9-07	1	FlexPLI GTR User Manual Rev. F (Draft) 2013
GTR9-9-08	1	Updates to Flex PLI Manual Rev E to Rev F
GTR9-9-09		Max and Min Femur Certification Analysis FlexPLI
GTR9-9-10		FlexPLI Weight Tolerance Review
GTR9-9-11		Reviewed FlexPLI version GTR drawing package
GTR9-9-12		Details of Drawing Updates to Flex PLI gtr No. 9 Regulation Drawings
GTR9-9-13		Flesh Neoprene Corridor FlexPLI
GTR9-9-14		Dimensional Tolerance Review FlexPLI
GTR9-9-15		Confor Foam Change [for EEVC Impactors]
GTR9-9-16		Flex PLI Drawing Review
GTR9-9-17		Legform Tests, Results from Round 2, FlexPLI

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