

~~Transmitted by the Chair of the informal  
working group GTR9-PH2~~

~~Informal document **WP.29-158-28**  
(158th WP.29, 13–16 November 2012,  
—agenda item 16.3.)~~

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Transmitted by the chairman of the informal  
group GTR9-PH2

Informal document **GRSP-52-31**  
(52nd GRSP, 11 – 14 December 2012,  
agenda item 4(a))

Draft Third progress report of the informal group on Phase 2 of gtr No. 9  
(IG GTR9 - PH2)

The text reproduced below was submitted by the chairman of the informal group on phase 2 of gtr no. 9 and proposes the 3rd progress report on the activities and work of this informal group (ECE/TRANS/WP.29/AC.3/24).

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## **I. Objective of this proposal**

1. The representatives of Japan and Germany proposed the development of Phase 2 of gtr No. 9. The main objective is the development of a draft proposal to amend the UN global technical regulation No. 9 - Phase 2 on pedestrian safety by introducing the flexible pedestrian legform impactor (FlexPLI) as a single harmonized test tool in order to enhance the level of protection for lower legs of pedestrians.

The work of the informal 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.

The group may also review proposals to improve and / or clarify aspects of the legform test procedure.

## **II. Background**

2. At the 154th session of the World Forum for Harmonization of Vehicle Regulations and the 32nd session of the Executive Committee of the 1998 Agreement it was agreed to set up an informal group to solve the pending issues for the incorporation of the FlexPLI in Phase 2 of the UN 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).

Japan and Germany have informed the World Forum for Harmonization of Vehicle Regulations and the Executive Committee of the 1998 Agreement that this informal group named IG GTR9 - Phase 2 will be co-sponsored by Japan and Germany.

3. The informal group has started its work on 03 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 informal group will be managed by Germany (chair), Japan (vice-chair) and OICA (secretary).

4. At the 155th session of the World Forum for Harmonization of Vehicle Regulations and the 33rd session of the Executive Committee of the 1998 Agreement Japan and Germany have informed delegates about the ongoing activities of the informal group on UN 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.

5. The first meeting of the informal group was held on 01 and 02 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 was finalised. The first progress report was submitted to GRSP in December 2011 and to the World Forum for Harmonization of Vehicle Regulations for the 156th session and to the Executive Committee of the 1998 Agreement for its 34th

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session in March 2012. At the 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 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.

6. The second meeting of the informal group 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.

7. The second progress report was submitted to GRSP in May 2012 and to the World Forum for Harmonization of Vehicle Regulations for the 157<sup>th</sup> session and to the Executive Committee of the 1998 Agreement for its 35<sup>th</sup> 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 endorsed. The second progress report (document ECE/TRANS/ WP.29-157-21) was distributed with an official symbol for November 2012.

8. The third meeting of the informal group 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.

9. The fourth meeting of the informal group took place on 17 to ~~19~~18 September 2012 in Washington DC, 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.

10. The fifth meeting ~~will be~~was held on ~~56~~ and ~~67~~ December 2012 in Bergisch Gladbach, Germany.

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

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

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)

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- 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 UN 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).

## IV History of the discussions

### 12. Benefit and costs

At the third and fourth meeting the pedestrian experts reviewed again the information from JASIC on the benefit of the FlexPLI. The Alliance of Automobile Manufacturers in the United States of America has undertaken an investigation of the methodology that was presented by JASIC.

One major concern of the Alliance was that the data used does not correctly reflect the current accident situation in the United States due to the outdated dataset and the assumptions ~~for the injury levels taken~~[made for pedestrian lower limb injuries on the national level by using regional US traffic accident data](#) as a basis for the benefit calculation.

During the meeting no agreement on a common position was reached. The item will stay on the agenda and some participants offered to supply additional information for the next meeting of the informal group.

### 13. Biofidelity

This item was re-discussed. The informal group has received additional information on the superior performance of the FlexPLI compared to the current lower legform impactor.

The discussion on the limitations of the FlexPLI in assessing knee injuries [was adressed by Japan in presenting information which showed for the Flex-PLI a slightly lower correlation ratio with the human model regarding medial collateral ligament \(MCL\) elongation, however it has a very good correlation ratio for the anterior cruciate ligament \(ACL\) elongation as well as tibia bending moment. The topic](#) was closed pending for the submission of new information regarding this subject.

### 14. Accident analysis

NHTSA informed delegations about a research project in the USA to investigate the accident situation for pedestrians using the Pedestrian Crash Data Study (PCDS) and the German In-Depth Accident Study (GIDAS). Submission of the final document was

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announced for end of October 2012. The discussion on the accident analysis is planned to be finalised at the fifth meeting of the informal group.

15. TF-RUCC (certification procedures)

Japan gave a status report of the activities of the task force reviewing and updating the certification corridors. A round robin certification test series confirmed a stable performance of the legform impactors. The task force has finalised the work and succeeded in proposing updated certification corridors to be used for the calibration of the flexible legform impactors on the assembly and component level.

The corridors were agreed by the informal group as final. It was also indicated that an evaluation of the stability of performance of the flexible legform impactors will be done during vehicle testing.

16. Technical specifications and user manual

Humanetics presented information on the updated version of the user manual that is going to be distributed to the informal group. The updated manual will be available before the fifth meeting of the informal group.

The chairman informed the participants about the on-going activity at WP.29 to set up a [Special Resolution No. 2 in future as a](#) repository for dummies and other test devices used in UNECE regulations. It was noted that the representatives of the UK and the USA will together make a proposal at the upcoming WP.29 session in November 2012 to [introduce set up](#) a resolution, named mutual resolution, which can be used for both legislative frameworks of the UNECE regulations, the 1958 and the 1998 [Agreements agreement](#).

Humanetics [will confirmed that they are going to](#) provide drawings [and technical specifications for of](#) the FlexPLI in November 2012. The informal group agreed to start the discussion and the procedure of reviewing the [technical specifications drawings](#) at the next meeting.

17. Review and exchange of test results

The informal group discussed the plan to start an international vehicle round robin test programme. A work plan and guidelines for the testing were agreed. It is planned to finalise vehicle testing end of January 2013.

[First results of this test programme were presented by BASt. The legform impactors showed a repeatable performance, while the measurements were found to be at a lower level compared to the test results with former flexible legform impactors tested with the same cars. NHTSA indicated that this could have an influence on the discussion about thresholds and injury criteria. Japan explained that results from former flexible legform impactors conditions should not be used for the evaluation but the results with the updated flexible legform impactor.](#)

The Concept Tech GmbH presented information on the influence of friction with regard to the test device used for inverse testing. The informal group is planning to resolve this issue at the next meeting by introducing limits for the friction of test devices.

OICA announced that a proposal will be submitted for the fifth session of the informal group to introduce requirements for the definition of the vehicle setup in terms of riding height.

18. Test procedure

Within the informal group a task force bumper test area (TF-BTA) was established after the second meeting of the informal group based on a request of the [the](#) European Commission. The necessity [was shown](#) to improve the procedure for the lower legform test ~~was shown~~, as the size of the area of the bumper tested is ~~often~~ quite limited due to some design features on the front of [some](#) vehicles that interact with the current test procedure. The expert of the European Commission has become the chairman of this task force.

A first web meeting of the task force took place on 4 September 2012, where a work plan and an action list to be worked on were ~~adopted-discussed~~ [\(not finalized\)](#). The next meeting will be held on 5 December 2012. The task force is expected to forward if possible a proposal to update the lower legform test procedure within the ~~GTR~~ [GTR](#) No. 9 to the informal group.

19. Activity list and schedule

The informal group has reviewed the activity list in terms of identifying outstanding issues to be resolved at the next meetings. ~~Amongst several topics, one~~ [One](#) main issue which was not yet covered is the topic performance and injury criteria. The discussion on this subject will be started at the 5th meeting of the informal group.

~~It was announced at the fourth meeting that according~~ [According](#) to the overall schedule Japan and Germany will provide a first draft informal document for the discussion at the next meeting of the informal group and the GRSP session in December 2012.

V. Work schedule

20. Work schedule

**Overall Schedule**

P.R.: Progress Report

Year	2011			2012												2013														
Month	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11				
WP29		○																												
GRSP																														
IG-GTR9-PH2		○	○			○		○							○															
		const.	1st			2nd		3rd						4th													5th		6th	

- 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 Constitutional meeting of the IG GTR9-PH2  
(Bonn, DE)
- November 2011 Report to WP.29 on activities of IG
- 01/02 December 2011 First meeting of the IG GTR9-PH2  
(Geneva, CH)
- 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

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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
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

## VI. Documents

### 21. Documents for the meetings

ECE/TRANS/WP.29/ GRSP/2011/13 GRSP-49-38	Japan Japan and Germany	Proposal for Amendment 2 to global technical regulation No. 9 (Pedestrian safety) 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)
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)

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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
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
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



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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
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
TF-RUCC-2-03	BASt	FlexPLI Inverse Certification Corridors-Further Test Results
TF-RUCC-2-04	ACEA	Comments on Inverse Certification Test Procedure
TF-RUCC-2-05	Humanetics	Humanetics Inverse and Round Robin Leg Preparation
TF-RUCC-2-06	BGS Boehme & Gehring	Status of the FlexPLI – Inverse Certification
TF-RUCC-2-07r1	TF-RUCC chair	Japan Progress Report: Review and Update Certification Test Corridors and Test Methods

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