

PROPOSAL FOR CORRIGENDUM TO PROPOSAL TO DEVELOP AMENDMENTS TO  
GLOBAL TECHNICAL REGULATION NO. 9 (PEDESTRIAN SAFETY)  
(ECE/TRANS/WP.29/GRSP/2010/2)  
BASED ON THE 11<sup>TH</sup> FLEX-TEG MEETING RESULTS

Note: The text reproduced below was prepared by the expert from Japan in order to propose a corrigendum to proposal to develop amendments to global technical regulation No. 9 (ECE/TRANS/WP.29/GRSP/2010/2) to reflect the 11<sup>th</sup> Flex-TEG meeting (April 2010) results. The modifications to the proposed amendments to global technical regulation No. 9 (ECE/TRANS/WP.29/GRSP/2010/2) are marked in bold or strikethrough characters.

A. PROPOSAL

Paragraph 111., amend to read:

"111. With regard to knee shearing limits, the informal group selected a limit of 6 mm for the EEVC WG 17 pedestrian lower legform impactor, based on the analysis of PMHS by EEVC WG17 and WG10 that showed that a 6 mm shear displacement corresponds to a 4 kN shear force. The 4 kN shear force in the TRL device approximates the 3 kN average peak shearing force acting at the knee joint level that was found associated in the PMHS tests with diaphysis/metaphysis failure. **With regards to the occurrence of pedestrian cruciate ligament injuries in vehicle-to-pedestrian accidents, the members of TEG agreed that there is a need for the assessment of ACL and PCL elongations with the FlexPLI in order to provide at least the same level of protection as with the currently used EEVC WG 17 pedestrian legform impactor. However, considering that there is only limited biomechanical data available, some members of TEG felt the need to gain sufficient experience and to collect more data with the new impactor before the establishment of a mandatory threshold value. Therefore, and in order to ensure technical feasibility for fulfillment of a mandatory ACL/PCL requirement, TEG strongly recommends to the contracting parties of the 98 agreement to monitor the ACL/PCL elongation against a threshold value of 13 mm for the first five years after the agreement of the incorporation of the FlexPLI into the gtr. After five years, the threshold value for ACL should be set as 13 mm mandatory unless the results of possible new research will lead to additional biomechanical data, providing additional information on biomechanical limits, allowing the development of a set of injury risk curves, and the derivation of corresponding threshold values. Based on the results, it should then also be decided whether the PCL criterion should be introduced as a mandatory threshold value or kept on being monitored against the ACL threshold. As for the FlexPLI, a limit of anterior cruciate ligament (ACL) elongation and a limit of posterior cruciate ligament (PCL) elongation at the knee are both set as [ (1) [13] mm only for monitoring purposes or nothing because the percentage of isolated ACL/PCL damage in car pedestrian accidents is very small (3 per cent). Besides only two biomechanical data are available for the ACL/PCL threshold values (JAMA and ACEA opinion), or (2) 13 mm as mandatory threshold value because the current gtr 9 sets shearing displacement requirement for the EEVC WG17 pedestrian legform impactor and because of existing though limited biomechanical data (BAST opinion)]."**

Paragraph 113., amend to read:

"113. In summary...at the following limits:

For EEVC WG 17 pedestrian lower legform impactor

Maximum lateral knee bending angle  $\leq 19.0^\circ$ ;

Maximum lateral knee shearing displacement  $\leq 6.0$  mm;

Maximum lateral tibia acceleration  $\leq 170g$ .

For FlexPLI

Maximum MCL elongation  $\leq 22$  mm;

Maximum Tibia bending moment  $\leq 340$  Nm;

~~{Maximum ACL and PCL elongation  $\leq \{13\}$  mm only for monitoring purposes for first five years (see Paragraph 111 for details) or nothing or mandatory}. "~~

Paragraph 115., amend to read:

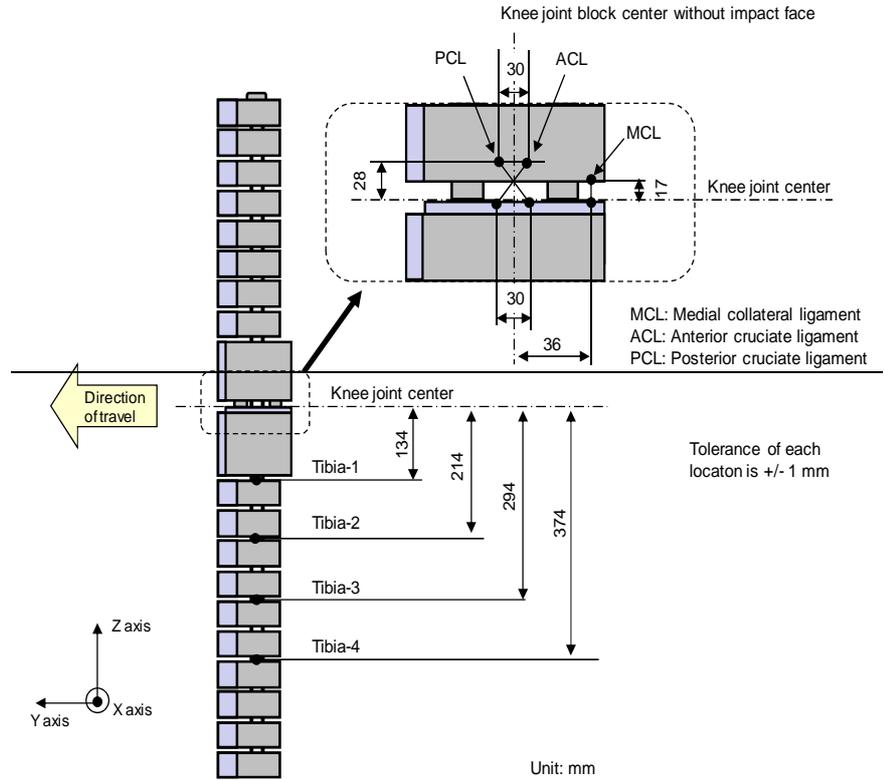
"115. In order.....For feasibility reasons, this gtr allows manufacturers to nominate bumper test widths up to 264 mm in total where the acceleration measured at the upper end of the tibia of the EEVC WG 17 pedestrian lower legform impactor shall not exceed 250g. The relaxation zone of 264 mm corresponds to an area that is twice the width of the legform. ~~{As for the FlexPLI, for the need for a tibia relaxation zone for the bumper area, TEG is proposing to introduce relaxation zones with a total width of 264 mm, allowing a maximum tibia bending moment of 380 Nm for the first five years after the agreement of the incorporation of the FlexPLI into the gtr, providing the possibility to verify its technical need. Corresponding data should be collected and evaluated until the end of this monitoring period. Based on those results the relaxation zone should be kept, modified or dropped. for feasibility reasons, the TEG proposed to allow manufacturers, if necessary, based on TEG technical feasibility study results, to nominate bumper test widths up to 264 mm in total where the tibia bending moment of the FlexPLI shall not exceed TBD Nm}.~~"

Paragraph 5.1.1.2., amend to read:

"5.1.1.2. When tested in accordance with paragraph 7.1.2., the maximum dynamic medial collateral ligament elongation at the knee shall not exceed 22 mm, and the dynamic bending moments at the tibia shall not exceed 340 Nm. ~~{The maximum dynamic anterior cruciate ligament and posterior cruciate ligament elongation shall not exceed 13 mm. TEG recommends to the contracting parties of the 98 agreement to monitor the ACL/PCL elongation against this threshold value for the first five years after the agreement of the incorporation of the FlexPLI into the gtr. be monitored with a reference value of 13 mm or nothing or mandatory with a reference value of 13 mm}. [In addition, the manufacturer may nominate bumper test widths up to a maximum of 264 mm in total where the tibia bending moment of the FlexPLI shall not exceed 380 Nm for initial five years [...]. Nm]. A contracting party may restrict application of the relaxation zone requirement in its domestic legislation if it decides that such restriction is appropriate.~~

Figures 17., amend to read:

Instruments locations



Instruments locations

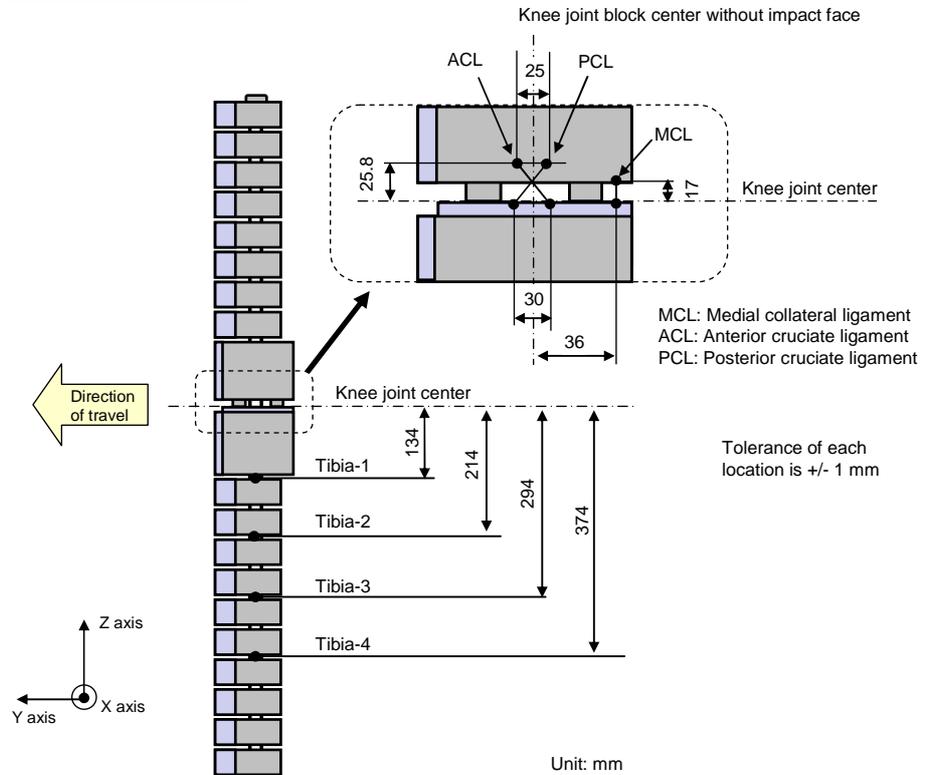


Figure 17: FlexPLI; instrument locations »

Paragraph 6.3.1.2.6.4., add to read:

**“6.3.1.2.6.4 The measurements for the FlexPLI must be taken only for the major impact with the vehicle prior to the rebound phase. All maxima occurring during or after the rebound phase shall be ignored. For example, the zero crossing after the maximum of the MCL elongation or of the tibia bending moments shall be considered as the end of the major impact with the vehicle. The major impact with the vehicle and therefore the measurement interval should normally not exceed 50 ms after the first contact. Maxima occurring near the end of the 50 ms timeframe should be reviewed individually.”**

B. JUSTIFICATION

Based on the results of the 11<sup>th</sup> Flex-TEG (April 2010), the expert from Japan updated the above mentioned draft amendments to the gtr on pedestrian protection (gtr No. 9) (ECE/TRANS/WP.29/GRSP/2010/2) following the responsibility of the TEG chairmanship.

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