Flex PLI
Low Speed Inverse Testing

- Intermediate Report -

Dirk-Uwe Gehring
BGS Böhme & Gehring GmbH

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Background

• Ongoing discussions in IWG DPPS about the choice of a sensing impactor.

• Due to the unavailability of impactors of different sizes validated for the detection of pedestrians, one of the existing pedestrian legform impactors shall be used for the sensing verification of the system for the time being, alongside with a general wording in the regulations. (see next page)

• The preferred solution, the Flex PLI, should be validated as a sensing impactor by investigating its contact biofidelity.
For the time being, the FlexPLI appears to be the best available pedestrian surrogate to be used as sensing impactor, provided that

- a general wording for DPPS working as intended

“If the vehicle is equipped with a Deployable Pedestrian Protection System as defined in paragraph 2.19 of the Regulation, the test provisions laid down for type approval can, due to the complexity of testing those systems, only represent spot checks. Nevertheless it is due care of the car manufacturer that any active devices of passive pedestrian safety will ensure the necessary protection (e.g. for a variation of speeds and pedestrian statures) in order to act as intended in the event of a collision with a pedestrian.”

- a wording for the need of a number of pedestrian statures being detected by DPPS:

“Considering the unavailability of impactors validated for the detection of pedestrians, the Flex PLI shall be used for the sensing verification of the system for the time being.

Nevertheless it is due care of the car manufacturer that the system will act as intended in the event of a collision for a variation of pedestrian statures”

being included within the text of GTR9 and UN-R 127.
• The validation of the contact biofidelity should be carried out by inverse tests at the common lower bonnet deployment threshold of 25 km/h.
• Ten different impactors should be used.
• Two inverse tests with halved honeycombs should be carried out with each Flex PLI, one at the normal impact height of the inverse certification tests and one with the honeycomb impacting the legform 64 mm lower.
• The double integral of the corresponding accelerometer should be used for the evaluation.
• Background and justification of the details see IWG-DPPS-7-09.
Flex PLI inverse certification test setup

Moving ram
Total Mass including honeycomb: 8.15 ± 0.1 kg
Impact speed: 11.1 ± 0.2 m/s

Depth (d)
60 ± 2 mm at impact

Honeycomb covered by a thin paper cloth (max. 1mm thick)

Width (w)
200 ± 5 mm

Height (h)
160 ± 5 mm

Crush strength: 75 ± 10% psi
Test setups 1 and 2

Halved Honeycomb
Front view:

80 mm

Test Setup 1

Knee joint center

Accelometer

Test Setup 2

Knee joint center

64 mm

Accelometer
Test setups 1 and 2
Status

- 10 Impactors to be used for testing
- 6 Impactors tested
- 2 Impactors already at BASt for testing this week
- 2 Impactors expected soon

- Participating parties:
  - Audi
  - BMW
  - Daimler
  - Jaguar
  - Porsche
  - Renault
  - VW
  - BASt
  - (Two OEMs provide two impactors)
First Results (1)

Test Setup 1 „ 0 mm “

Graph showing Displacement [mm] over Time [ms] for different Impactors.
First Results (2)

Test Setup 2

"-64 mm"
Upcoming work

• Test execution with the 4 remaining impactors
• Evaluation and inclusion of results into the graphs
• Comparison of certification tests before and after the low speed inverse tests
• Preparation of final report for the next IWG DPPS meeting
Thank you

Dirk-Uwe Gehring
BGS Böhme & Gehring GmbH

gehring@boehme-gehring.de