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agenda item B.3.)

**PROPOSAL FOR DRAFT AMENDMENTS TO REGULATION No. 16**  
(Safety-belts)

Transmitted by the expert from France

Note: The text reproduced below was prepared by the expert from France in order to authorize the use of an acceleration test device for validation of the dynamic behaviour of a safety-belt.

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Note: This document is distributed to the Experts on Passive Safety only.

## A. PROPOSAL

Paragraph 7.7.4., amend to read:

"7.7.4. Deceleration or acceleration devices

The applicant shall choose to use one of the two following devices:

7.7.4.1.1. Deceleration test device

The trolley shall be so propelled that at the moment of impact its free running speed is  $50 \text{ km/h} \pm 1 \text{ km/h}$  and the manikin remains stable. The stopping distance of the trolley shall be  $40 \text{ cm} \pm 5 \text{ cm}$ . The trolley shall remain horizontal throughout deceleration. The deceleration of the trolley shall be achieved by using the apparatus described in annex 6 to this Regulation or any other device giving equivalent results. This apparatus shall comply with the performance hereafter specified:

The deceleration curve of the trolley, weighted with inert mass to produce a total mass of  $455 \text{ kg} \pm 20 \text{ kg}$  for safety-belts tests and  $910 \text{ kg} \pm 40 \text{ kg}$  for restraining systems tests where the nominal mass of the trolley and vehicle structure is  $800 \text{ kg}$ , must remain within the hatched area of the graph in annex 8. If necessary, the nominal mass of the trolley and attached vehicle structure can be increased by increments of  $200 \text{ kg}$ , in which case, an additional inert mass of  $28 \text{ kg}$  per increment shall be added. In no case shall the total mass of the trolley and vehicle structure and inert masses differ from the nominal value for calibration tests by more than  $\pm 40 \text{ kg}$ . During calibration of the stopping device, the speed of the trolley shall be  $50 \text{ km/h} \pm 1 \text{ km/h}$  and the stopping distance shall be of  $40 \text{ cm} \pm 2 \text{ cm}$ .

7.7.4.2. Acceleration test device

The trolley shall be so propelled that, during the test, its speed variation is  $[56 \text{ km/h} \pm 4 \text{ km/h}]$  and its acceleration curve is within the hatched area of the graph in annex 8. The trolley shall remain horizontal during the acceleration. In inert mass, the acceleration curve shall be centred in the hatched area of the graph in annex 8 and the speed variation will be  $[56 \text{ km/h} \pm 2 \text{ km/h}]$ . Despite the fulfilment of the above requirements, the technical service can use a mass of trolley (equipped with its seat), as specified in paragraph 1 of annex 6, superior to  $380 \text{ kg}$ ."

Paragraph 7.7.5., amend to read:

"7.7.5. The speed and if necessary the acceleration of the trolley, the forward displacement of the manikin and the speed of the chest at a  $300 \text{ mm}$  displacement shall be measured."

Paragraph 7.10.1., amend to read:

"7.10.1. The test report shall record the results of all the tests in paragraph 7. above and in particular: the acceleration or deceleration device, the trolley speed, the maximum forward displacement of the manikin, the place - if it can be varied - occupied by the buckle during the test, the buckle-opening force, and any failure or breakage. If by virtue of paragraph 7.7.1. the anchorages prescribed in annex 6 to this Regulation have not been respected, the test report shall describe how the belt assembly or the restraint system was installed and shall specify important angles and dimensions. The report shall also mention any distortion or breakage of the buckle that has occurred during the test. In the case of a restraint system the test report shall also specify the manner of attaching the vehicle structure to the trolley, the position of the seats, and the inclination of the seat backs. If the forward displacement of the manikin has exceeded the values prescribed in paragraph 6.4.1.3.2. above, the report shall state whether the requirements of paragraph 6.4.1.4.1. have been met."

Annex 1B, insert a new item 11. to read:

"11. Type of device: deceleration/acceleration 2/

Items 11. to 16. (former), renumber as 12. to 17.

Annex 8, amend to read:

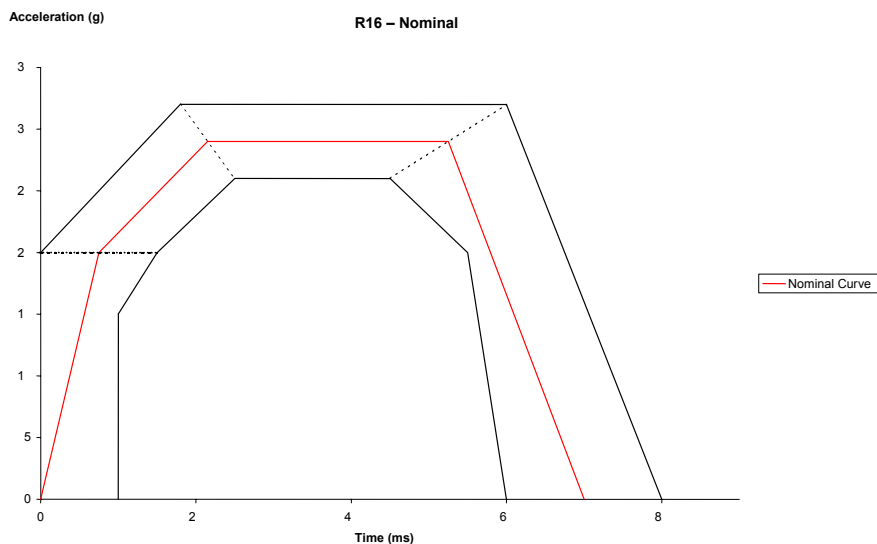
"Annex 8

DESCRIPTION OF CURVE OF TROLLEY' S DECELERATION (ACCELERATION)  
AS FUNCTION OF TIME

In both the above cases the calibration and measuring procedures shall correspond to those defined in the International Standard ISO 6487 (1980); the measuring equipment shall correspond to the specification of a data channel with a channel frequency class (CFC) 60.

Definition of the nominal curve

| Time (ms) | Acceleration (g)<br>nominal curve |
|-----------|-----------------------------------|
| 0         | 0                                 |
| 7,5       | 20                                |
| 21,5      | 29                                |
| 52,5      | 29                                |
| 70        | 0                                 |



\* \* \*

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## B. JUSTIFICATION

### General:

Acceleration test device (called Hyge sled) are precise test equipments capable of reproducing with a very good repeatability the invert acceleration of a deceleration crash pulse.

It was shown by previous studies that even if the two test devices cannot be considered as totally equivalent, the Hyge sled can be used as an alternative test equipment.

### Re. Paragraphs 7.7.4.to 7.7.4.2:

The current definition of the trolley and the calibration method remain for the deceleration test device.

An alternative definition of the acceleration test device has been added, including a calibration procedure. The principle of such equipment needs more precise definitions in term of speed variation and nominal g level instead of impact speed, stopping distance and deceleration pulse corridor.

### Re. Paragraphs 7.7.5., 7.10.1. and Annex 1B:

Inclusion in the test report and in the communication, of the type of device (acceleration or deceleration) used during type approval test.

The proposed complement authorizes the use of and acceleration test device for type approval of safety belts and restraint systems.

### Re. Annex 8:

Parts of annex 8 have been put in paragraph 7.7.4. in order to use the same annex 8 for the two test devices (acceleration and deceleration).

As it can be seen in the table below the actual pulse corridor permits a wide range of variation of speed if there is no defined impact speed.

It is for that reason that a variation of speed of 56 km/h has been defined for the acceleration test device. This variation of speed corresponds to nominal curve and also to actual variation of speed on deceleration test devices including impact speed plus rebound speed.

#### Calculation of velocities

| Curve         | Velocity (km/h) |
|---------------|-----------------|
| Low corridor  | 39.46           |
| High corridor | 75.29           |
| Nominal curve | 55.47           |

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