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Working Party on Passive Safety (GRSP)
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agenda item 3.)

PROPOSAL FOR DRAFT AMENDMENTS TO REGULATION No. 22
(Protective helmets)

Transmitted by the Expert from Germany

Note: The text reproduced below was prepared by the expert from the United Kingdom on behalf of the expert from Germany chairing the informal group on Regulation No. 22, in view of the need to introduce an oblique impact test for rotation-inducing forces caused by projections on helmets and friction against the outer surfaces of helmets. It is based on the text distributed without a symbol (informal document No. 15) during the twenty-third session of GRSP (TRANS/WP.29/GRSP/23, para. 45).

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

Paragraph 6.5., amend to read:

"..... ventilation holes may be provided in the shell. Any projections from or irregularities in the shell surface shall be tested according to paragraph 7.4.

Where means for attaching the wearing of goggles."

Paragraph 6.6., should be deleted.

Paragraph 6.7. (former), renumber as paragraph 6.6. and amend to read:

"6.6. All external projections less than [2] mm above the outer surface of the shell (e.g. rivet heads) shall be radiused."

Paragraphs 6.8. to 6.11.7. (former), renumber as paragraphs 6.7. to 6.10.7.

Paragraph 6.11.8 (former), renumber as paragraph 6.10.8. and delete the text reading "When a helmet type (such as thickest padding, etc.)."

Paragraphs 6.11.9. to 6.16.6. (former), renumber as paragraphs 6.10.9. to 6.15.6.

Paragraph 7.1., amend to read:

"7.1. The largest size of each helmet type shall be conditioned as shown below:

Test	Number of helmets to be conditioned				Total
	Solvent plus ambient-temperature and hygrometry conditioning	Solvent plus heat conditioning	Solvent plus low-temperature conditioning	Solvent plus ultra-violet radiation conditioning and moisture conditioning	
Impact absorption	2	1	1	1	5
Rigidity	2				2
Retention system	1				1
Oblique impact	2 */				2
					10

*/ For this test, an appropriate size helmet shall be selected to best fit the headform referred to in paragraph 7.4.2.6. For all other tests, the headform used is that referred to in paragraph 7.3.3.

In addition, for each smaller headform size within the size range

Paragraph 7.4., amend to read:

"7.4. Oblique impact test (Method A)

7.4.1. Description of test

7.4.1.1. Principle

The rotation-inducing forces caused by projections on the helmet and friction against the outer surface of the helmet which occur when a helmeted headform is dropped vertically to an inclined anvil are measured in the longitudinal axis of the anvil. The peak force and its integral with time over the duration of the positive impulse are used as performance criteria.

7.4.1.2. Positioning of the helmet

7.4.1.2.1. The horizontal axis of the helmet shall be determined by placing the helmet on a headform of a type referred to in paragraph 7.3.3., according to the requirements of annex 5. [The helmet shall then be removed from that headform and placed on a headform of a type referred to in paragraph 7.4.2.5.]. A load of 50 N is applied to the crown of the helmet in order to adjust the helmet on the headform such that there is contact between the crown of the headform and the inner surface of the helmet. The horizontal plane of the helmet shall then be adjusted to be within $90^\circ \pm 5^\circ$ of the vertical axis of the headform. The retention system is then adjusted under the chin of the headform; if the system includes an adjustable chin strap, the strap is tightened as much as possible.

7.4.1.2.2. The test headform shall be so positioned that the chosen impact point on the helmet is vertically above the upper part of the face of the anvil.

7.4.1.2.3. The helmet shall be tested in any condition in which it may be worn, that is both with and without detachable components such as visors, peaks, etc. that are supplied as original equipment, except that if a visor is fitted for the test, keep it in the closed position.

7.4.1.3. Test

The drop height shall be such that the unit constituted by the headform and helmet falls on the test anvil at a velocity which, immediately before impact, is equal to 8.5 (-0.0, +0.15) m/s.

7.4.2. Apparatus (see annex 8, Figure 1b)

7.4.2.1. Description

The test apparatus shall comprise:

An anvil rigidly fixed to a base;

A free fall guidance system;

A mobile system supporting the helmeted headform;

A headform conforming to that referred to in paragraph 7.4.2.6.;

A system which may be adjusted such that the point of impact can be brought into correspondence with the upper part of the face of the anvil;

A means of recording the continuously changing transmitted anvil force during the impact;

A suitable energy-absorbing base and catch net to prevent damage to the helmet after the impact.

7.4.2.2. Base

This shall conform to the requirements specified in paragraph 7.3.2.2.

7.4.2.3. Anvil

7.4.2.3.1. The anvil is mounted securely at an angle of 15° to the vertical with provision for fore and aft adjustment. The anvil has a width of 200 mm and is adaptable to carry either of the two different impact surfaces as follows:

7.4.2.3.1.1. The bar anvil consists of a series of at least 5 horizontal bars at 40 mm centres. Each bar is made from a 6 x 25 mm steel strip with its uppermost edge machined to a 1 mm radius and the lower 15 mm of its face chamfered at an angle of 15° so that, as mounted, the upper edge of each bar is fully exposed vertically from above. The bars are case-hardened to a depth of approximately 0.5 mm.

7.4.2.3.1.1.1. The bar anvil should be used to assess the tangential forces and their integrals with time caused by projections on the helmet, e.g. visor fittings, screws, press studs and steps in the shell surface, etc.

7.4.2.3.1.2. The abrasive anvil is a sheet of grade 80 closed-coat aluminium oxide abrasive paper with a minimum supported length

of 225 mm and is securely clamped to the base of the anvil to prevent slippage.

- 7.4.2.3.1.2.1. The abrasive anvil should be used to assess the tangential forces and their integrals with time caused by friction against the outer surface of the helmet. This is particularly applicable to selected areas of helmets, the outer surface of which either have significant variations of curvature or are made of more than one material.
- 7.4.2.3.2. The anvil is fitted with force transducer(s) connected to the recording apparatus so that the transmitted longitudinal force component can be measured and continuously recorded with an accuracy of ± 5 per cent during a glancing blow to any part of its exposed surface.
- 7.4.2.4. Mobile system and guides
- The mobile system supporting the headform shall be such that its characteristics do not affect the measurement of force in the anvil. It shall also be such that any point in the area ACDEF can be positioned vertically above the anvil. The guides shall be such that the impact velocity is not less than 95 per cent of the theoretical velocity.
- 7.4.2.5. Force and measuring assembly
- The force transducers fitted to the anvil shall be capable of withstanding a maximum force of [20,000 N] without damage. The measuring system including the anvil assembly shall have a frequency response in accordance with channel frequency class (CFC) 1000 of the International Standard ISO "Road vehicles - Techniques of measurement in impact tests - Instrumentation" (Ref. No. ISO 6487-1980).
- 7.4.2.6. Headform
- The headform shall be that referred to in paragraph 7.3.3. characterized by the symbol J.
- 7.4.3. Selection of impact points
- Any point on the helmet shell may be selected. The impact point should be selected with regard to the anvil against which the helmet is to be tested for impacting taking account of the function of the anvils given in paragraphs 7.4.2.3.1.1.1. and 7.4.2.3.1.2.1. A helmet may be tested as many times as necessary to ensure that all notable features are evaluated. Reorient the helmet as necessary to allow impact from any direction. When the bar anvil is used, evaluate all different external projections greater than

[2] mm. When the abrasive anvil is used, evaluate areas of the outer surface which are likely to produce the highest force and the highest impulse.

The rim of the shell does not constitute a projection for the purpose of this test.

7.4.4. Requirements

7.4.4.1. When tested against the bar anvil, the helmet shall satisfy the following requirements:

7.4.4.1.1. the peak longitudinal force measured on the anvil shall not exceed 2,500 N, nor shall its integral with time exceed 9 Ns for any of the selected impact points.

7.4.4.2. When tested against the abrasive anvil, the helmet shall satisfy the following requirements:

7.4.4.2.1. the peak longitudinal force measured on the anvil shall not exceed 4,000 N, nor shall its integral with time exceed 28 Ns for any of the selected impact points."

Insert a new paragraph 7.5., to read:

"7.5. Oblique impact test (Method B)

7.5.1. Description of test

7.5.1.1. Principle

The rotation-inducing forces which result when [remaining text to be provided by the informal group on Regulation No. 22]."

Paragraphs 7.5. to 7.11.3.5. (former), renumber as paragraphs 7.6. to 7.12.3.5.

Annex 8,

Figure 1, renumber as Figure 1a.

Insert a new Figure 1B, to read:

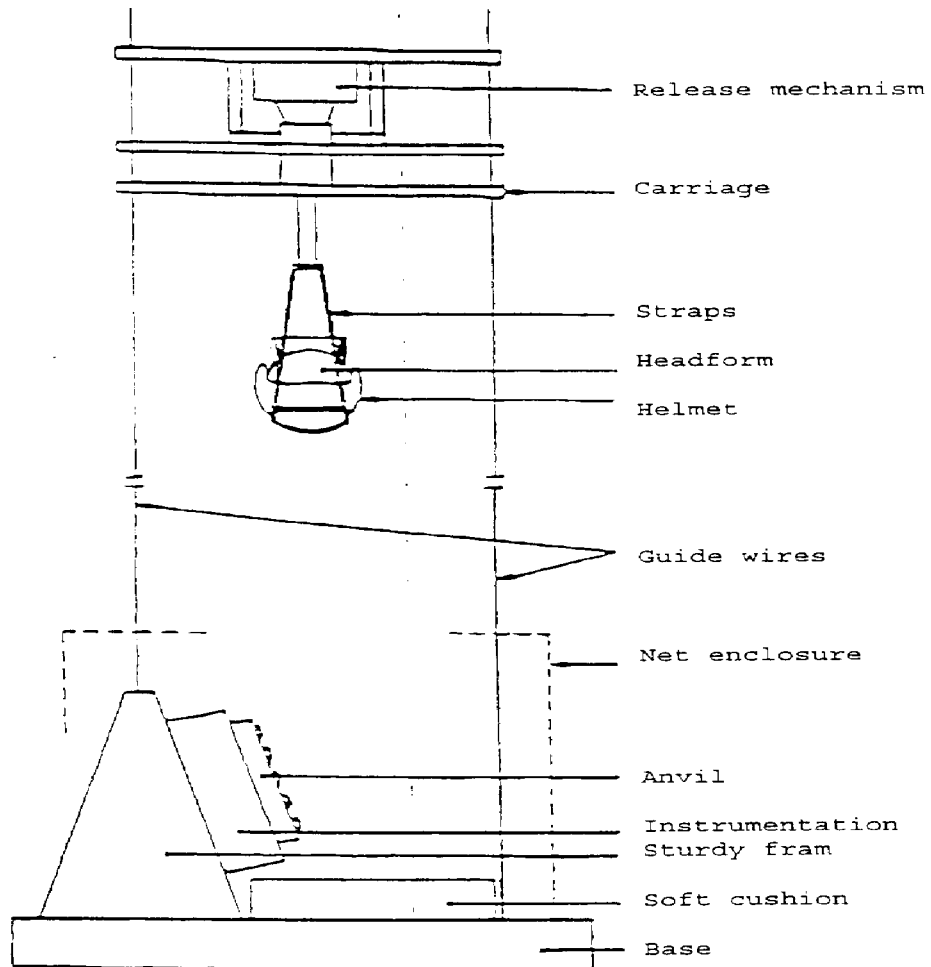


Figure 1b
