

Informal document GRSP-69-19
(69th GRSP, 17 - 21 May 2021, agenda item 9)
Submitted by the Chair of hoc group of interested expert

PROPOSAL OF SUPPLEMENT TO THE 06 SERIES OF AMENDMENT OF REGULATION NO. 22 (PROTECTIVE HELMETS)

ACCESSORIES (INTERCOM SYSTEM)

HOW the series 06 of amendments is born

TOR - OBJECTIVE OF THE WORKING GROUP

The objective of the IWG is to develop additional safety provisions that were either not ready for adoption of UN Regulation No. 22 and/or required additional research. The IWG will also update/clarify existing requirements and test procedures in UN Regulation No. 22 based on new data and on-road experience.

Scope of work for IWG shall include the following items. Should additional items be proposed, the IWG will decide by consensus on their inclusion

- A. New test and criteria following the progress in research for head protection improvement (e.g.: Rotational Acceleration Protection);
- B. **Requirements for new features to take into account:**
 - 1. Lightening equipment;
 - 2. Cameras
 - 3. **Audio-phone equipment**
 - 4. Design equipment
 - 5. Aeration (to improve helmet wearing)
- C. New Type Approval Marking System (to prevent counterfeit and backup enforcement and police control)

Status Report *

- . In December 2017 GRSP agreed on the need to update UN Regulation No. 22
- . In March 2018 WP.29 gave a general support to establish the IWG on Protective Helmets
 - Geneva, 14th May 2018 – 1st IWG-PH to draft Term of Reference
 - Geneva, 10th December 2018 – 2nd IWG-PH to discuss the first proposal
 - Milan, 25th & 26th March 2019 – 3rd IWG-PH to draft & endorse the proposal to be submitted to GRSP on its 65th session
 - Geneva, 13th May 2019 – 4th IWG-PH to prepare the presentation for GRSP
 - Milan, 5th & 6th September 2019 – 5th IWG-PH to draft & endorse the proposal to be submitted to GRSP on its 66th session
 - Geneva, 9th December 2019 – 6th IWG-PH to prepare the presentation for GRSP

* Meetings data, reports and all documents were available in the IWG web site (<https://wiki.unece.org/pages/viewpage.action?pageId=60361119>)

A brief history of the REGULATION

The ECE / UN Regulation 22 is constantly evolving and has undergone numerous changes following the introduction of amendments 03, 04, 05 and 06 with the aim of having products that are increasingly safer and aligned with the latest results of continuous research.

ECE Regulation 22/02 (1982)

ECE Regulation 22/03 (1988)

- No changes regarding the general requirements and shock absorption tests.
- Introduction of the 5 ° limit referring to the maximum opening angle of the visor.
- Introduction of the roll-off test. (Max rotation 30 °)

Suppl. 1 ECE 22/03 (1991)

- Introduction of the prescriptions and tests on the optical and mechanical qualities of the visors

ECE Regulation 22/04 (1995)

- Introduces the requirements of the Highlighting Bands (Optional - required in France)
- It introduces specific tests and additional checks on the buckles and the retention system
- New procedure and limits for shock absorption tests.

ECE Regulation 22/05 (2000)

- It introduces a specific test to check the shock absorption capacity of the chin guard (point S).
- It introduces a verification of the sliding friction coefficient and a specific assessment of the roughness or the different profiles of the shell
- Possibility of homologation of visors with transmittance up to 50% and introduction of specific instrumental tests for the evaluation of refractive powers, transmittance and diffusion of light, color interference and resistance to fogging of the visors.

ECE Regulation 22/06 (2020)

- Introduction of a new headform
- Modular helmets, new procedure and double code
- Rotational acceleration tests, new procedure
- High and low energy linear impact
- Integration of the std impact points, testing extra points
- Visors - Adapting minimum light transmittance values (EN1938)
- Mechanical tests visor, high-speed particles test
- Photochromic visors
- Sun shield, characteristics and marking
- Accessories integrated to the helmets
- New procedure for production qualification tests

Many and important innovations have been introduced to offer to the users an increased safe and performing helmet.

What has NEVER changed on helmets approval Regulation

ECE R22.03 (1988) ECE R22.04 (1995) ECE R22.05 (2000)

6.3. No component or device may be fitted to or incorporated in the protective helmet unless it is designed in such a way that it will not cause injury and that, when it is fitted to or incorporated in the protective helmet, **the helmet still complies with the requirements of this Regulation.**

and in ECE 22.06

6.3. No component or device may be fitted to or incorporated in the protective helmet unless it is designed in such a way that it will not cause injury and that, when it is fitted to or incorporated in the protective helmet, **the helmet still complies with the requirements of this Regulation.**

7.3.1.3.5. Helmets placed on the market with accessories shall be examined to assess that the supplementary equipment has no adverse effect and that in any case the protective helmet and/or visor **still complies with all the requirements.**

Note: The evaluation shall be done with and without the accessory and their support with particular attention, as example, to energy absorption, sharp edges and field of vision.

No helmet shall be modified from its original specification as manufactured. Accessories must be fitted in accordance with the helmet manufacturer's instructions. **Only accessories tested during the type approval procedure of the helmet keep the type approval valid. (*)**

(*) Only the underlined sentence is under discussion.

Communication System - Technical performance consequences related to Regulation ECE 22

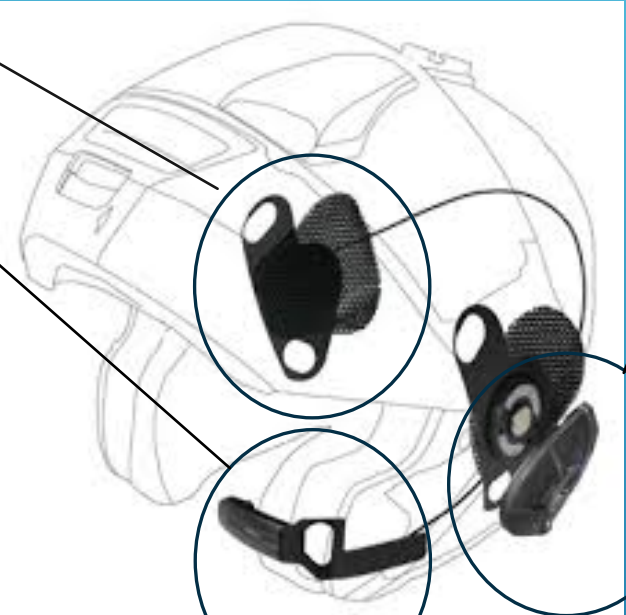
7.3. Linear Impact
Energy absorption tests X point

7.3. Linear Impact
Energy absorption tests S point

General

Helmet mass and distribution / inertia for rotational

7.13. Oblique impact test method of measuring rotational acceleration



7.4 Test for projections and surface friction

Other aspect

Installation, partial disassembly of helmet if not predisposed.
Installation made by the final user

All the prescriptions in the paragraphs 7.3, 7.4 and 7.13 are verified in type approval process, the modification have affect on the performance of the helmet

PHASE 1

ON A INTEGRATED SOLUTION ALL THIS ASPECT ARE VERIFIED AND CHECKED DURING A TYPE APPROVAL PROCESS

On helmets with and without accessories, independently of the type of the accessories.



Considerations for phase 2

The helmet is the main safety and head protection element of the motorcycle driver and accessories can contribute but the helmet performs its main function even without accessories and for this reason the legislation is constantly evolving.

As declared by the accessories Manufacturers (Doc GRSP-67-09), the market of “unverified” accessories has generated "Annual revenue turnover estimated at 150 millions of Euros“ without any safety check and homologation costs in accordance with the Regulations 22.

In the same document They complain that "Our industry will be at the mercy of helmet manufacturers' willingness to incorporate (or not) communication products depending purely on **their commercial interests**".

To tackle this problem, a new type approval and test procedure for accessory – so called PHASE 2 - in addition to the current procedure is needed.

In PHASE 1 the accessories are within the homologation of the helmet, the helmets are verified in terms of safety with and without accessories, and above all that the Helmet Manufacturer, IN THIS CASE, is also liable in civil and criminal matters for any non-compliance of the helmet itself.

In document GRSP-67-09, the proposal of the Accessory Manufacturer Consortium is described:

"Redefine the regulation text to overcome the trade barrier and to allow a safe way for the motorcycle rider to communicate while riding

- Particular tests for accessories
- Particular tests for "helmets ready for accessories"
- Set compatibility conditions to make sure the rider safety is ensured "

In document GRSP 68-15 the Accessory Manufacturer Consortium proposes:

- “
- Work with the IWG on defining an agreed test procedure for approving communication accessories.
 - Approval of the communication accessories independently and separately from the helmet test procedure. ”

The above inputs are take in count by the work done in the ad-hoc group of interested experts established by GRSP during its sixty-eighth session.

Result of the work done by the Ad-Hoc Group, in which they participated representatives, delegates and technicians from France, Belgium, Germany, Israel, Italy, Korea, Nederland, Spain, Sweden, USA as well as Clepa and Accessory Industry.

Agreement has been reached on the text and contents of the documents that will be presented at the next GRSP as a working document refer to a “Proposal for supplement to the series 06 of amendments to UN regulation No. 22”:

ECE/TRANS/WP.29/GRSP/2021/13

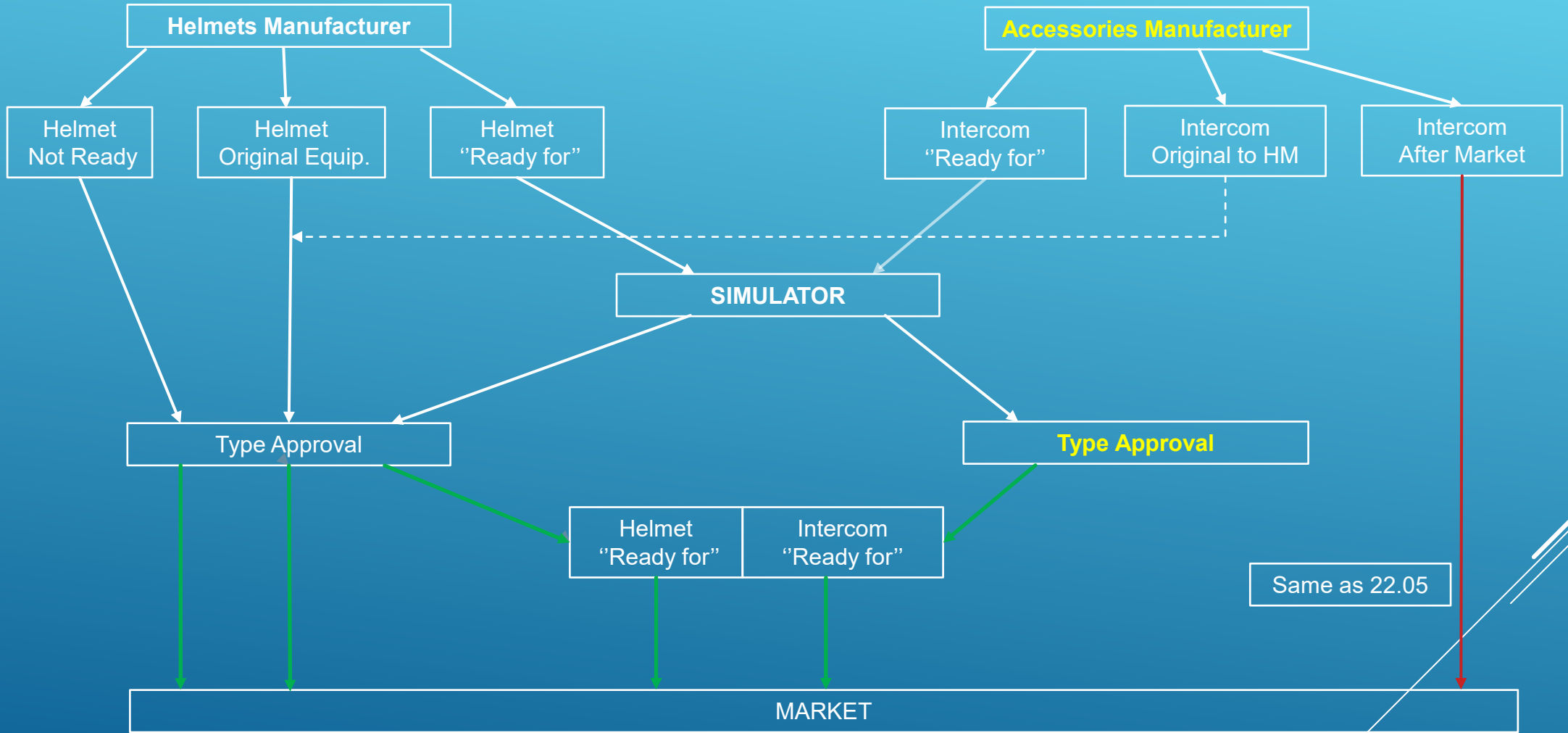
Submitted by the experts from Italy, France, Germany, Netherlands and Spain

and

ECE/TRANS/WP.29/GRSP/2021/15

Submitted by the experts from Italy and Spain

PHASE 2 "READY FOR" The concept (open to accessories approval) (*)



ADVANTAGES

For HELMETS Manufacturer:

The possibility of approving and placing on the market both version of helmets, with dedicated systems and designed to host "UNIVERSAL" intercom.

Maintaining control on particular products which, due to size or shape, may not meet the requirements if equipped with devices, and maintaining the possibility to approve them without declaring any compatibility.

Use only the SIMULATOR to check compatibility with multiple intercom devices, reduction of tests and type approval samples

For ACCESSORIES (as. Intercom) Manufacturer:

The possibility of separated homologation and sales "UNIVERSAL" (Ready for ..) systems that can be installed on all helmets designed to host "UNIVERSAL" intercoms.

The use of the ONLY proof of compliance with SIMULATOR for type approval will grant the compatibility of the intercom system with multiple helmet models, test reduction and type approval samples. **One time cost approval (*)**

The possibility to continue to sell unapproved "Ready for" devices in a similar way to what has been done up to now.

(*) As considered in Informal document GRSP 67-09.

For USER:

The opportunity to choose if buying:

- A an helmet with original intercom kit
- B an helmet approved as “ready for” and then to combine any intercom device which has been approved as “UNIVERSAL” and with the evidence that both product are tested and safe.
- C an helmet and then to combine any intercom device not “ready for” as in the habit of ECE22/05

Note:

**ONLY A and B solutions are checked to “ not cause injury and that, when it is fitted to or incorporated in the protective helmet, the helmet still complies with the requirements of this Regulation” (according § 6.3).
Only A and B shall grant the conformity of the helmet to the type approved.**

With C solution, any other modification which has not been verified in order to grant the absence of adverse SHALL NOT complies with the requirements of this Regulation.

About document ECE/TRANS/WP.29/GRSP/2021/15, developed on the basis of the document submitted by the Consortium of Accessory Manufacturers to Ad Hoc group, for to complete the document more test and information are collected, so that paragraphs and values that remain suspended in the overall text are taken into consideration to prepare the informal document GRSP-69-XX.

In order to identify the procedure and the most significant values to be considered in the document, various checks and tests were carried out.

Severe tests show that NOT all the helmets can host in safer way, for dimensional an constructive reasons, a communication system. The same system installed on different helmets can produce different results, in some cases also negative.

To better assess the correctness of these values, we checked the spaces and solutions currently available on the main helmets present on the market and ready for 22.06 approval including the possibility to install communication system.

The most significative results are show and resumed as follow:

OPEN POINT

- 6.3.1.1. If an accessory has any component to be installed on the exterior of the helmet shell within any of the impact areas foreseen in this Regulation and those parts of the accessory have a thickness of more than [3] mm, the accessory shall be tested together with the helmet and the accessory becomes Specific accessory.
- 6.3.1.2. The helmet shall have some markings on the exterior of the helmet shell or any visible component to take them as a reference for the installation of the universal accessories main external components.

The area where to fit the universal accessories shall grant at least [30mm] of distance from any point of any impact affected area to the lower edge of the helmet shell (the lower rubber rim is considered to be helmet shell for this purpose).

Proposal: to remove the square brackets the values are acceptable

Speakers and microphone pocket space:

6.3.1.5. If the helmet is prepared to fit speakers, the helmet shall have a dedicated space in the inner EPS of at least [41] mm diameter and a depth of at least [8] mm and be tested as well according to the tests foreseen in point 7.3. in the X point with the speakers simulators defined in Annex 20. In this case, the helmet will be marked as “S”.

All the data reported for this scope have been collected from helmet, parts, drawings and information provided by the manufacturers, directly or through the Technical Services in charge of the respective approvals, authorized by them.



The data expressed in summary form relate to products of the following brands:

AGV	AIROH	ARAI
CABERG	GIVI	HJC
J-TECH	LS2	NOLAN
SCHUBERT	SHARK	SHOEI

The helmets that we have taken into consideration to evaluate the size of the pockets are limited to those already tested **ready to be ECE 22.06 approved**, some of them have already been approved even with a specific communication system installed.

The same dimensions can cover more models of the same brand.

Only the really available space is considered for the scope.

Proposal: To remove the brackets and modify as “ dedicated pocket inside the helmet with dimension of at least 40 mm diameter and a depth of at least 7 mm ... “of minimum depth .

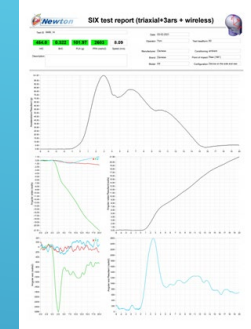
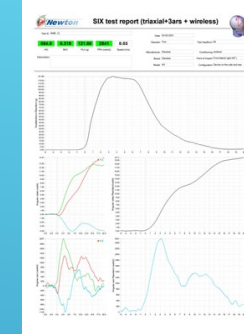
Speaker		Micr.	
Diameter	Depth	Diameter	Depth
mm	mm	mm	mm
45/70	12,5	4,3	
45	7,5		
55x51	7	24	6
45	6	33x14	8
42	10		
40	9		
42	9		
42	10		
41	8		
44	5		
36/40	7 / 9		
45	6,5		
40	8	22	5
50	10		
39x42	8		
43	6		
40	9		
62x43	10		
46	8/10		
45			
50	5,37		

Rotational test on the helmets with one simulator in different position:

ROTATIONAL Impact	Standard				Weight Helmet	1480 gr	Weight Simulator/each	250 gr
	HIC	BrIC	PLA (g)	PRA (Rad/sec2)				
Front-lateral right 45°	793,00	0,317	130,76	2052				
Rear 180°	522,20	0,388	98,35	2716				
Lateral left 270°	879,50	0,220	150,28	1846				
	Simulator in Lateral (1480+250= 1730 gr)				Variaz. %			
	HIC	BrIC	PLA (g)	PRA (Rad/sec2)				
Front-lateral right 45°	898,90	0,322	146,39	1957	13,35	1,58	11,95	-4,63
Rear 180°	773,60	0,383	132,32	3392	48,14	-1,29	34,54	24,89
Lateral left 270°	973,80	0,193	156,37	1899	10,72	-12,27	4,05	2,87
	Simulator in Front-Lateral (1480+250= 1730 gr)							
	HIC	BrIC	PLA (g)	PRA (Rad/sec2)				
Front-lateral right 45°	798,00	0,337	137,66	1974	0,63	6,31	5,28	-3,80
Rear 180°	737,20	0,389	132,31	3406	41,17	0,26	34,53	25,41
Lateral left 270°	1061,30	0,217	167,00	1774	20,67	1,36	11,13	-3,90
	Simulator in Rear (1480+250= 1730 gr)							
	HIC	BrIC	PLA (g)	PRA (Rad/sec2)				
Front-lateral right 45°	1031,00	0,300	152,32	1931	30,01	5,36	16,49	-5,90
Rear 180°	455,70	0,409	109,68	3084	-12,73	5,41	11,52	13,55
Lateral left 270°	990,50	0,284	176,43	2570	12,62	29,09	17,40	39,22

Rotational test, comparison with one and two simulator in different position:

ROTATIONAL Impact	Standard							
	HIC	BrIC	PLA (g)	PRA (Rad/sec2)				
Front-lateral right 45°	793,00	0,317	130,76	2052				
Rear 180°	522,20	0,388	98,35	2716				
Lateral left 270°	879,50	0,220	150,28	1846				
	Simulator in Rear (1480+250= 1730 gr)							
	HIC	BrIC	PLA (g)	PRA (Rad/sec2)				
Front-lateral right 45°	1031,00	0,300	152,32	1931	30,01	-5,36	16,49	-5,90
Rear 180°	455,70	0,409	109,68	3084	-12,73	5,41	11,52	13,55
Lateral left 270°	990,50	0,284	176,43	2570	12,62	29,09	17,40	39,22
	Simulator in Rear and Side (1480+500= 1980 gr)							
	HIC	BrIC	PLA (g)	PRA (Rad/sec2)				
Front-lateral right 45°	854,00	0,319	121,88	2541	7,69	0,63	-6,79	23,83
Rear 180°	454,00	0,322	101,97	2603	-13,06	-17,01	3,68	-4,16
Lateral left 270°	1063,10	0,239	157,40	1924	20,88	8,64	4,74	4,23



Several tests with double mass applied in different positions were carried out, the one considered most significant was reported to illustrate the results which in any case show values that remain within the limits set by the Regulations.

Even if for the outcome of the test the influence is minimal, we should consider, taking in consideration the observation rotational test behavior, if is the case to limit the maximum allowed weight of the accessories installed on the helmet to max 400 gr

Proposal: Limit the weight of the single accessory to 200 gr, so even if we consider the combination of several functions we could reduce the total weight added to the helmet in 400 gr.

LINEAR Impact		WO Speakers		With Speakers	
Point X	cond./anvil	HIC	g	HIC	g
XL/61	-20° Flat	1854	223	1905	242
XL/61	+50° kerb	969	153	1061	176
M/58	-20° Flat	2282	265	2045	249
M/58	+50° kerb	1576	211	1422	200
Point X	cond./anvil	HIC	g	HIC	g
XL/61	-20° Flat	1733	224	2212	257
XL/61	+50° kerb	1692	237	1492	223
Point X	cond./anvil	HIC	g	HIC	g
XXL 62/63	-20° Flat	882	136	1366	192
XXL 62/63	+50° kerb	1176	173	1140	111
M 56/57	-20° Flat	1552	198	1657	218
M 56/57	+50° kerb	1370	184	1750	98
Point X	cond./anvil	HIC	g	HIC	g
XL/62	-20° Flat	1894	233	2097	251
XL/62	+50° kerb	784	129	876	153
MS/57	-20° Flat	1833	227	1959	243
MS/57	+50° kerb	1176	164	1076	167
Point X	cond./anvil	HIC	g	HIC	g
XXL/63	-20° Flat	1453	182	1629	193
XXL/63	+50° kerb	932	125	950	130
L 58/59	-20° Flat	1751	210	1826	211
L 58/59	+50° kerb	913	131	1047	146
Point X	cond./anvil	HIC	g	HIC	g
MS 57/58	-20° Flat	1367	180	1659	195
MS 57/58	+50° kerb	1067	139	976	128
S 55/56	-20° Flat	1499	185	1542	189
S 55/56	+50° kerb	960	145	1101	135
Point X	cond./anvil	HIC	g	HIC	g
XXXL/65	-20° Flat	1929	240	1473	200
XXXL/65	+50° kerb	1245	191	2284	258
L/60	-20° Flat	1815	227	1569	230
L/60	+50° kerb	1333	196	2252	251
M/58	-20° Flat	1913	249	2335	256
M/58	+50° kerb	1376	190	1801	229

Linear impact on helmets, test without and with speakers:

LOW ENERGY	Speed 6m/s	Limit ECE 22.06		Limit ECE 22.06	
on helmet ECE 22.05		1300	180	1300	180
Point X	cond./anvil	HIC	g	HIC	g
N	Ambient / Flat	1153	192	1319	196
N ECE 22.06 version	Ambient / Flat	958	166	1135	176
SC	Ambient / Flat	934	165	1335	201

Comparison test with speakers vs simulator:

LINEAR Impact		WO Speakers		With Speakers		With 8 mm Sym.	
Point X	cond./anvil	HIC	g	HIC	g	HIC	g
1 L/60 Left	Amb. / kerb	1045	147	1093	156	1109	155
1 L/60 Right	Amb. / Flat	1862	228	1778	225	1856	233
2 XL/60 Left (Modular)	Amb. / kerb	1112	160	1134	160	1157	178
2 XL/60 Right (Modular)	Amb. / Flat	1798	219	1882	221	1594	203

Are shown values obtained on suitably prepared ECE 22.06 helmets and with the simulacrum of 8 mm thick to align with the values measured in the compression of the speakers

6.19.8. When the accessories to be fitted have any component, different from speakers or, microphone or clamping, to be installed on the interior of the helmet shell, the component shall fulfil the following requirements:

6.19.8.1. The material has to be flexible and of a maximum thickness of [2] mm or

Proposal: to remove the square brackets the values is acceptable

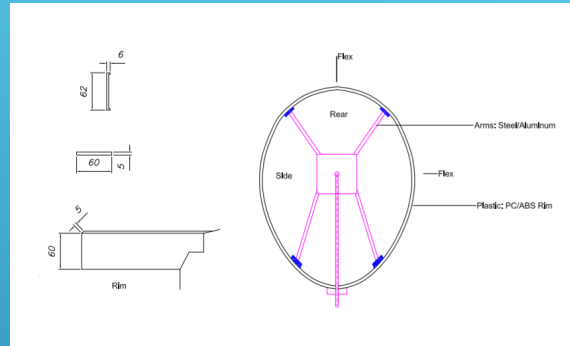
7.13.4. Helmets marked as “UA” must be tested as well with each of the accessory simulators and/or a combination of them, the total weight of the accessories with which the helmet will be tested will not exceed [500gr]. The tests done will be specified in the test report. The accessories simulators are defined in Annex 20, Part 3.

Proposal: To remove the brackets and limit to 400 gr.

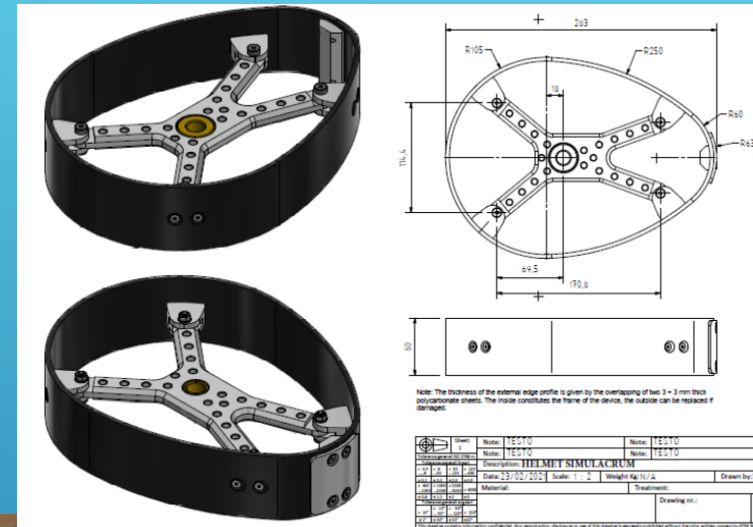
ANNEX 8 - Figure 1d

Example of a helmet SIMULATOR for accessories projections and surface friction (method B)

The idea:



The object:



Other polycarbonate layers of different thicknesses can be superimposed on the base frame to achieve the desired stiffness. The outer layers can be easily replaced in case of damage in the surface friction test.

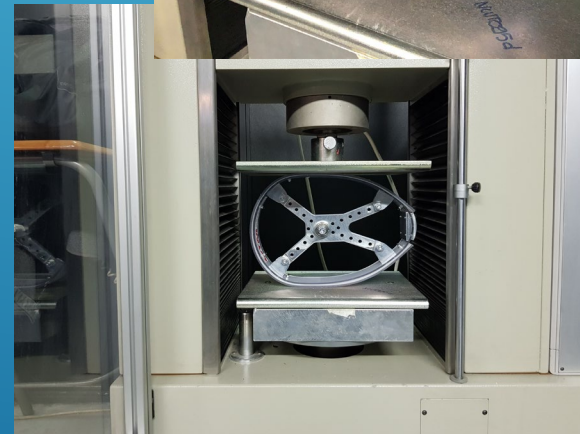
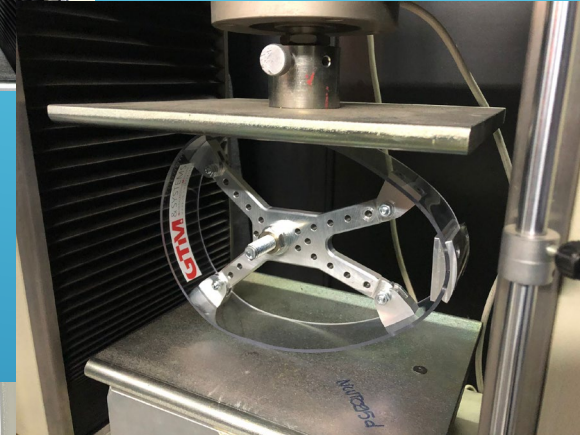
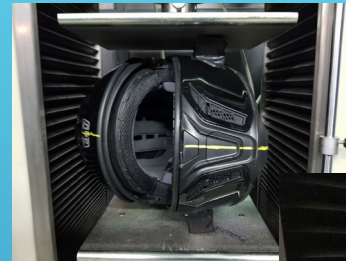
Mechanical Validation:

Helmet simulacrum

Rigidity load/deformation

Load (Kgf)	Deformation (mm)		
	Simulator 3 mm	Simulator (3+3) 6 mm	Helmet Rim
10	7	3,4	3,4
12,5	10	4,6	4,5
20	16,2	7,2	6,8
27	20	9,8	9
35	//	12,7	11,5
40	//	14,2	13,4

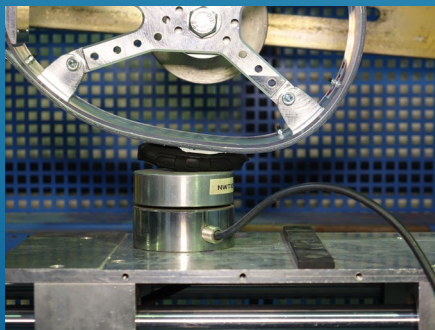
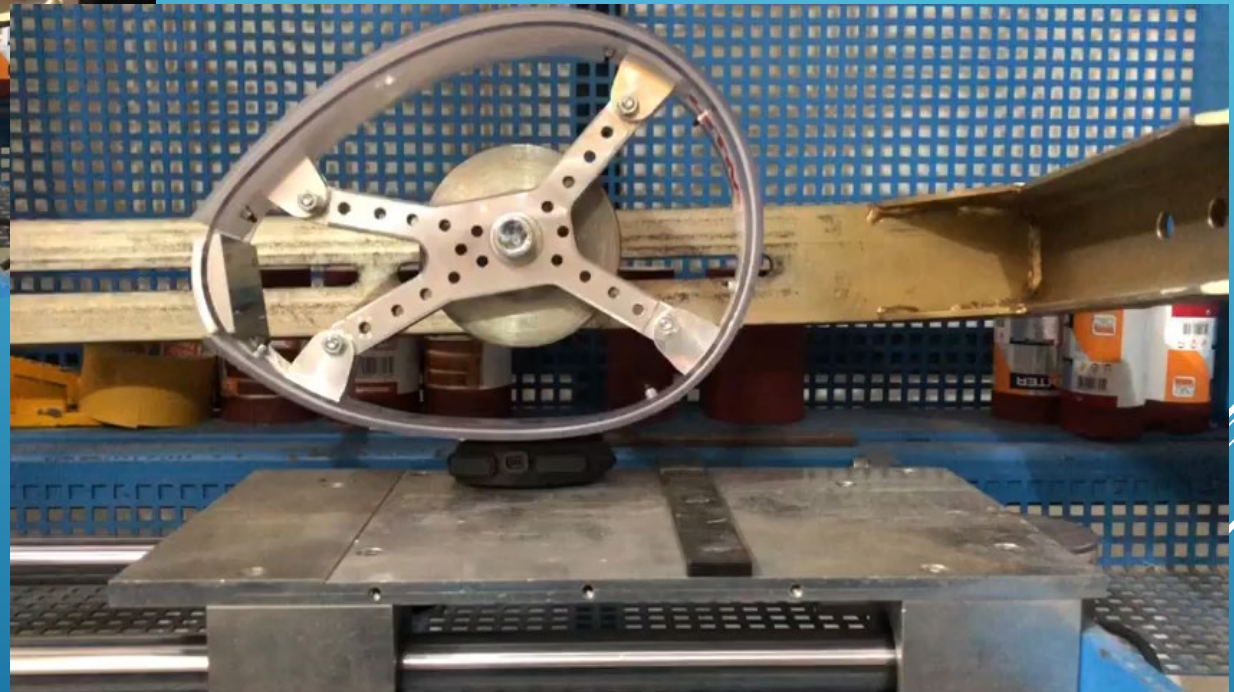
The simulacrum has about the same longitudinal and transverse stiffness of a helmet, the stiffness represents a compromise as it would be anyway because it is impossible to have an exact value that can represent full/modular and jet helmets in the same way or in composite or plastic material.



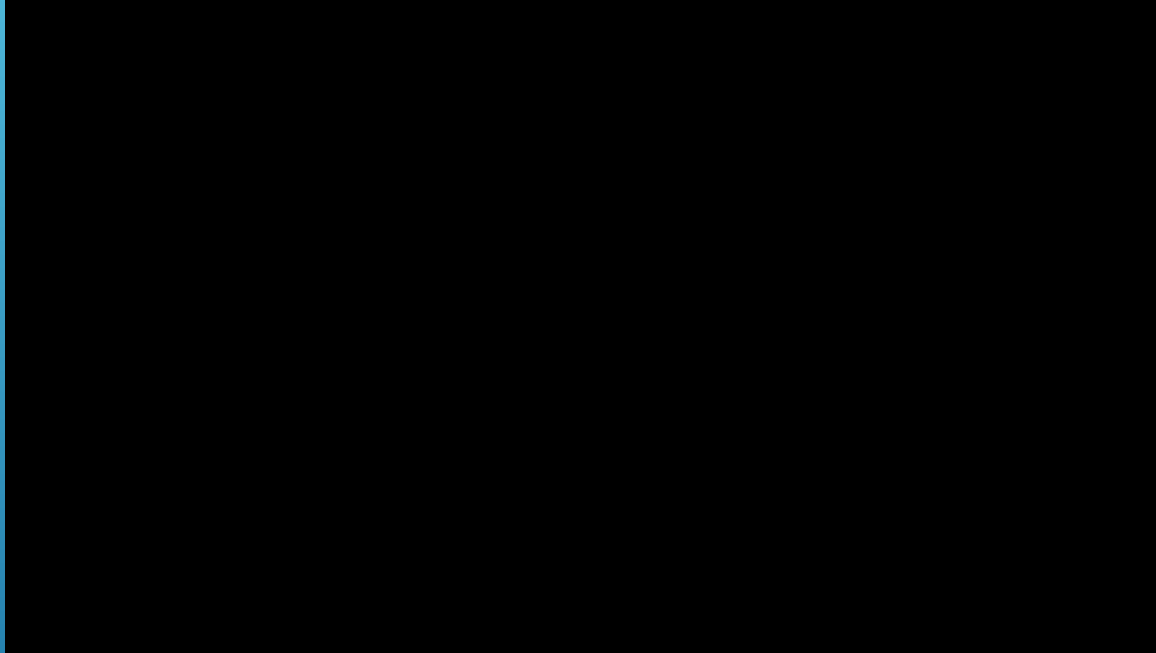
Comparison Test:



The effective load applied on the device is in both cases checked directly on the device itself, independently from the support.



Double Check, all Accessories Systems were tested first on the helmet and then on the simulacrum with similar results



7.4.2.1.3.1. Test of projection


The headform is adjusted in order to have the chosen projection on the carriage so that the shear edge is positioned 50 mm from the projection and makes lateral contact with the projection after the drop weight is released from its upper position.

Brand	Model	Test of projection and surface		
		Adesive	Clip	Abrasive
1	A	Pass		Pass
	B	Pass	Pass	Pass
2	A	Pass		
	B	Pass	Pass	
	C	Pass		Pass
	D	Pass	Pass	Pass
	E	Pass	Pass	Pass
3	A	Pass	Pass	Pass
	B	Pass	Pass	Pass
4	A	-	Pass	
	B	-	Pass	Pass



7.4.2.1.3.2. Test of outer surface

The abrasive paper is mounted on the carriage in the position specified in paragraph 7.4.2.2.2. The chosen outer surface of the helmet is lowered on to the abrading carriage at the centre of the flat surface without abrasive paper. A loading mass is applied in accordance with paragraph 7.4.2.2.8. The drop weight is released from its upper position in accordance with paragraph 7.4.2.2.5. The abrasive paper shall be changed after every test.



ANNEX 20

Part 1. Accessories assessment

1. Measurement of the maximum dimensions of externally fitted accessories:

For the measurement of the dimensions, only the accessory plus the support, if any, have to be measured. If the device is fitted with a foldable antenna, the system must fit in the fixture with the antenna in folded position. If the antenna is flexible, the antenna may exceed the fixture dimensions.

Flexible, thin components can exceed the volume or can be assembled separately on the shell.

1.1 For front mounted accessories:

Accessories must fit in the following fixtures dimensions: (See different figure for different position)

Accessories must fit in the following fixtures dimensions

It is hard to define agreed fixture

Proposal : Maintain the measurements of the simulacrum as proposed in the document prepared by the Consortium of Accessory Manufacturers. Some products currently on the market do not meet these requirements but with larger dimensions they would occupy the test area on the helmet.

2. Maximum dimensions of speakers and microphones:

Brand	Model	Speaker		Micr.		Boom	Total
		Diameter	Depth	Diameter	H or L	Diameter	weight
		mm	mm	mm	mm	mm	gr
1	A	36	8	13	27	4	80
	B	40	10	16,5	27	4	130
2	A	30	7	14	10	4	113
	B	30	7	14	10	4	87
	C	30	7	14	10	4	103
	D	30	7	14	10	4	125
	E	30	7	14	10	4	102 (24)
	F	40	8	14	10	4	110 (24)
3	A	40	10	10,5 x 7,5	28,3	5	150
	B	40	10	10,5 x 7,5	28,3	5	120
	S1	46,2 (42,2x6,5)	10				
4	A*	40	7	13x8	34	4,5	173
	B*	40	7	-	-	-	182
	S1	40	6,5				
	S2	40	10				
5	A	40	9,5	15	10	5	108 (40)
6	A	40	10	11	28	5	130 (45)
7	A	40	7				86 (40)

A screening of the dimensions of the main and most popular systems available was carried out on

AGV; CARDO; INTERPHONE by CELLULAR LINE; MIDLAND; NOLAN N-COM; SENA

*** NOT possible include on simulator proposed in annex 20 part 1.**

2.1 Speakers

The speakers must be contained in a cylinder of [40] mm diameter and [14] mm thick.

Proposal: Remove the brackets to 40 diameter and limit to 12 mm the thick without comfort cover and to add the note: Speakers with diameter up to 45 mm shall be approved, as options, in order to be installed only on helmets specially approved up to this dimension.

There are also solutions on the market with speakers of larger diameter, perhaps it is appropriate to provide for the possibility of approving also these devices as well, which can only be housed on helmets that will have an adequate pocket. This combination will be listed in the user manual.

2.2 Microphone

The microphone must be contained in a parallelepiped of the following dimensions:

Length: 35 mm

Width: 18 mm

Height (dimension from the chin protective padding towards the headform): 11,5 mm

The boom, if any, must be flexible and not have an external diameter of more than [10] mm

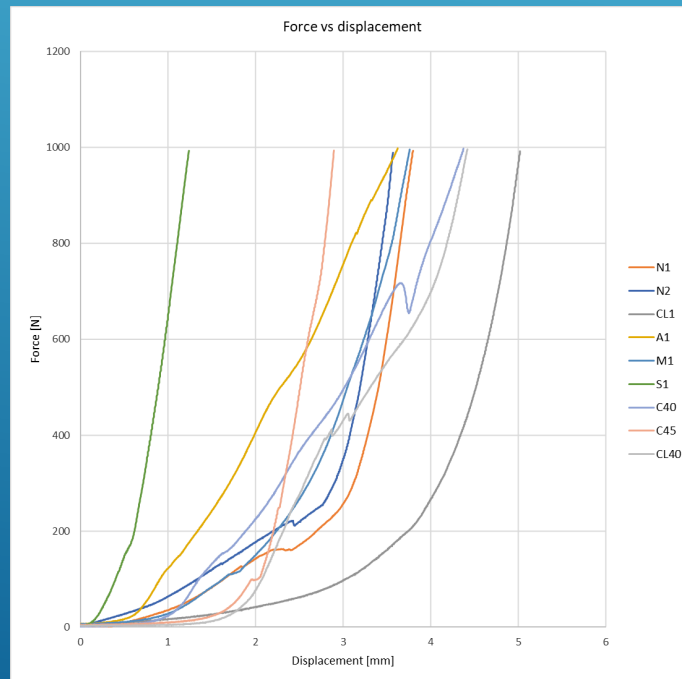
Proposal: Remove the brackets and limit to 8 mm the diameter of the boom.

3. Mechanical characterization of the speakers:

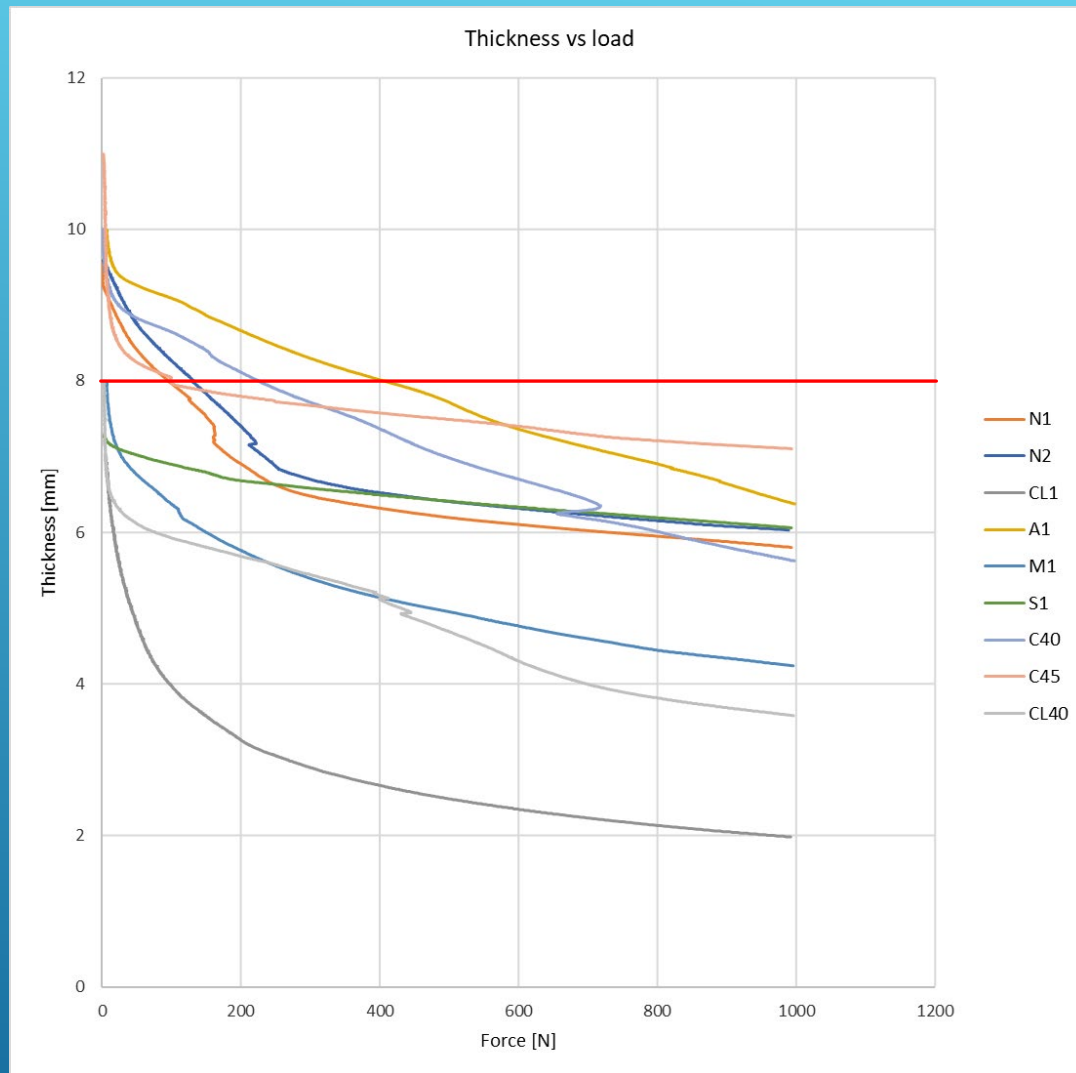
Testing procedure to be drafted. Limits to be set.

The obtained chart for the speakers must fall below the line defining the upper corridor limit

Mechanical characterization: have been carried out compression tests on the available speakers, with the dynamometer, to check the force vs displacement curves and see to what minimum thickness they are reduced in order to consider them rigid. On base of this data also define in detail the thickness of the speakers simulator. The thickness currently in brackets is parameterized to the available heights of the pockets, so be able to consider the possibility that even the EPS works, in any case, a little before having the simulator directly in contact with the headform.



Note: The graphs show the trend of the curve from the beginning of compression of the rigid part, the compression of any protective padding does not generate force.



Proposal:

Procedure:

Compression test load/displacement at 5 mm/min up to 1kN.

Criteria:

The height of the speaker when subjected to compression with a load of 1kN must be less than or equal to 8 mm.

Note:

The graphs show the decreasing of thickness due the compression load

Rationale to choose for compression test of the speaker 1000N to be sure the residual thickness is below 8mm.

1. Speaker simulator (rigid) to make impact test is 8 mm thick;
2. Actual speaker when compressed to 8mm due to a potential impact shall not induce damage to the user. → this means AIS0.

Limit to AIS 0 according CEN technical report CEN/TR 16148:2011 (Head and neck impact, burn and noise injury criteria. A Guide for CEN helmet standards committees) will imply a max peak impact to 50g

Quasi static test method → typically between same events in quasi static and impulse there is a difference factor of X3 in the acceleration results.

Limit in acceleration in quasi static = $50/3=16g$ - $F=ma \implies 6,2 \times 16 \times 9,8 = 972N$

4. Speakers and microphone simulators for helmet testing

4.1 Speakers simulator

The speaker simulator will be made from rigid plastic and will have a dimension of $[40+0-1]$ mm diameter and $[5]$ mm thick

Material characteristics to be defined

Proposal: Remove the brackets and limit to 8 mm (Value from compression test) mm the thick. Material characteristics, if rigid, have only influence on simulator.

Insert for the helmet Manufacturer the possibility to allow the installation of speakers up to 45 mm with specific tests and instructions.

4.2 Microphone simulator

The microphone simulator will be made from rigid plastic and will have a parallelepiped shape with the following dimensions:

Length: [35] mm (horizontal transversal dimension)

Width: [18] mm (vertical dimension)

Height: [11,5] mm (horizontal longitudinal dimension)

Material characteristics to be defined

Proposal: Remove the brackets and to introduce as alternative a cylinder of 10 mm diameter and 11 mm height. Material characteristics have no influence.

Insert the possibility only for full face integral helmet to use a specific simulator in line with the dedicated microphone available.

Part 3. Accessories simulators for the tests foreseen in 7.13

The shape will be like the correspondent fixture depending on the helmet positioning and will have the following mass:

- (a) Front mounted accessories: [250 g]
- (b) Side mounted accessories: [250 g]
- (c) Rear mounted accessories: [250 g]

Proposal: To remove the brackets and limit to 200 gr.

Last but not least

The time to implement this supplement is really important in order to reduce the number of helmets and accessories that could already be compliant the new supplement of R22.06 but that could already be sold as approved in the period up to the entering into force of the supplement.

There would in any case be an important number of helmets and accessories not marked "Ready for ..." which, although identical to those approved after the supplement, would immediately become obsolete at the entering into force of the supplement.

Thanks for your attention ..

