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

ACCESSORIES (INTERCOM SYSTEM)
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=60361113)
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 ……


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

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

7.4. Test for projections and surface friction

Other aspect

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

Helmets Manufacturer
- Helmet Not Ready
- Helmet Original Equip.
- Helmet "Ready for"

Accessories Manufacturer
- Intercom "Ready for"
- Intercom Original to HM
- Intercom After Market

SIMULATOR
- Helmet "Ready for"
- Intercom "Ready for"

Type Approval

MARKET

Same as 22.05
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 \([30\text{mm}]\) 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 .
Rotational test on the helmets with one simulator in different positions:

<table>
<thead>
<tr>
<th>ROTATIONAL Impact</th>
<th>Standard</th>
<th>Weight Helmet</th>
<th>Weight Simulator/each</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front-lateral right 45°</td>
<td>HIC: 793.00, BrIC: 0.317, PLA: 130.76</td>
<td>1480 gr</td>
<td>250 gr</td>
</tr>
<tr>
<td>Rear 180°</td>
<td>HIC: 522.20, BrIC: 0.388, PLA: 98.35</td>
<td>2716</td>
<td></td>
</tr>
<tr>
<td>Lateral left 270°</td>
<td>HIC: 875.00, BrIC: 0.220, PLA: 150.28</td>
<td>1846</td>
<td></td>
</tr>
</tbody>
</table>

Simulator in Lateral (1480+250= 1730 gr) Variaz. %

<table>
<thead>
<tr>
<th>ROTATIONAL Impact</th>
<th>Standard</th>
<th>Variaz. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front-lateral right 45°</td>
<td>HIC: 898.90, BrIC: 0.322, PLA: 146.39</td>
<td>HIC: 13.35, BrIC: 1.58, PLA: 11.95, PRA: -4.63</td>
</tr>
<tr>
<td>Rear 180°</td>
<td>HIC: 773.60, BrIC: 0.383, PLA: 132.32</td>
<td>HIC: 11.66, BrIC: 0.26, PLA: 34.45, PRA: 24.69</td>
</tr>
<tr>
<td>Lateral left 270°</td>
<td>HIC: 973.80, BrIC: 0.193, PLA: 156.37</td>
<td>HIC: 10.72, BrIC: -12.27, PLA: 4.65, PRA: 2.67</td>
</tr>
</tbody>
</table>

Simulator in Front-Lateral (1480+250= 1730 gr)

<table>
<thead>
<tr>
<th>ROTATIONAL Impact</th>
<th>Standard</th>
<th>Variaz. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front-lateral right 45°</td>
<td>HIC: 798.00, BrIC: 0.337, PLA: 137.66</td>
<td>HIC: 0.63, BrIC: 6.31, PLA: 5.28, PRA: -3.80</td>
</tr>
<tr>
<td>Rear 180°</td>
<td>HIC: 737.20, BrIC: 0.389, PLA: 132.31</td>
<td>HIC: 0.26, BrIC: 34.53, PLA: 25.41</td>
</tr>
<tr>
<td>Lateral left 270°</td>
<td>HIC: 1061.30, BrIC: 0.217, PLA: 167.00</td>
<td>HIC: 20.67, BrIC: -1.36, PLA: 11.13, PRA: -3.90</td>
</tr>
</tbody>
</table>

Simulator in Rear (1480+250= 1730 gr)

<table>
<thead>
<tr>
<th>ROTATIONAL Impact</th>
<th>Standard</th>
<th>Variaz. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front-lateral right 45°</td>
<td>HIC: 1031.00, BrIC: 0.300, PLA: 152.32</td>
<td>HIC: 30.91, BrIC: 5.36, PLA: 10.49, PRA: -5.90</td>
</tr>
<tr>
<td>Rear 180°</td>
<td>HIC: 455.70, BrIC: 0.409, PLA: 109.68</td>
<td>HIC: -12.73, BrIC: 5.41, PLA: 11.52, PRA: 13.55</td>
</tr>
<tr>
<td>Lateral left 270°</td>
<td>HIC: 990.50, BrIC: 0.284, PLA: 176.43</td>
<td>HIC: 12.42, BrIC: 20.06, PLA: 11.36, PRA: 19.22</td>
</tr>
</tbody>
</table>
### Rotational test, comparison with one and two simulator in different position:

<table>
<thead>
<tr>
<th>ROTATIONAL Impact</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HIC</td>
</tr>
<tr>
<td>Front-lateral right 45°</td>
<td>793,00</td>
</tr>
<tr>
<td>Rear 180°</td>
<td>522,20</td>
</tr>
<tr>
<td>Lateral left 270°</td>
<td>879,50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Simulator in Rear (1480+150= 1730 gr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIC</td>
</tr>
<tr>
<td>Front-lateral right 45°</td>
</tr>
<tr>
<td>Rear 180°</td>
</tr>
<tr>
<td>Lateral left 270°</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Simulator in Rear and Side (1480+500= 1980 gr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIC</td>
</tr>
<tr>
<td>Front-lateral right 45°</td>
</tr>
<tr>
<td>Rear 180°</td>
</tr>
<tr>
<td>Lateral left 270°</td>
</tr>
</tbody>
</table>

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  
--- | --- | ---  
XL/61 -20° Flat | 1854 223 | 1905 242  
XL/61 +50° kerb | 969 153 | 1001 176  
XL/61 -20° Flat | 2282 265 | 2045 249  
XL/61 +50° kerb | 1576 211 | 1422 200  
XXL 62/63 -20° Flat | 882 136 | 1366 192  
XXL 62/63 +50° kerb | 1176 173 | 1140 111  
M/58 -20° Flat | 1552 198 | 1657 218  
M/58 +50° kerb | 1370 184 | 1750 98  
XXL/63 -20° Flat | 1453 182 | 1629 193  
XXL/63 +50° kerb | 932 125 | 950 130  
L/60 -20° Flat | 1499 185 | 1532 186  
L/60 +50° kerb | 960 145 | 1101 135  
XXXL/65 -20° Flat | 1929 240 | 1473 200  
S/55/56 -20° Flat | 1245 191 | 1589 204  
S/55/56 +50° kerb | 1007 139 | 1068 172  
L/60 -20° Flat | 1851 227 | 1569 220  
L/60 +50° kerb | 1333 196 | 1592 210  
M/58 -20° Flat | 1913 249 | 2065 249  
M/58 +50° kerb | 1376 190 | 1485 178  

Linear impact on helmets, test without and with speakers:

Low Energy Speed 6m/s | 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** | **cond./anvil** | **WO Speakers** | **HIC** | **g** | **With Speakers** | **HIC** | **g** | **With 8 mm Sym.** | **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.
The idea:

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.

The object:
Mechanical Validation:

Helmet simulacrum

<table>
<thead>
<tr>
<th>Load (Kgf)</th>
<th>Deformation (mm)</th>
<th>Simulating</th>
<th>Simulator (3+3) 6 mm</th>
<th>Helmet Rim</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>7</td>
<td>3,4</td>
<td>3,4</td>
<td></td>
</tr>
<tr>
<td>12,5</td>
<td>10</td>
<td>4,6</td>
<td>4,5</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>16,2</td>
<td>7,2</td>
<td>6,8</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>20</td>
<td>9,8</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>//</td>
<td>12,7</td>
<td>11,5</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>//</td>
<td>14,2</td>
<td>13,4</td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Brand</th>
<th>Model</th>
<th>Test of projection and surface</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Adhesive</td>
</tr>
<tr>
<td>1</td>
<td>A</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pass</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>Pass</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Pass</td>
</tr>
<tr>
<td>4</td>
<td>A</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>-</td>
</tr>
</tbody>
</table>
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.
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:**

<table>
<thead>
<tr>
<th>Brand</th>
<th>Model</th>
<th>Speaker</th>
<th>Micr.</th>
<th>Boom</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Diameter</td>
<td>Depth</td>
<td>Diameter</td>
<td>H or L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
</tr>
<tr>
<td>1</td>
<td>A</td>
<td>36</td>
<td>8</td>
<td>13</td>
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<td>A</td>
<td>40</td>
<td>7</td>
<td>12</td>
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</table>

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 ==> 6,2 x 16 x 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.
AFTER ADDITIONAL TEST AND INFORMATION COLLECTED - THE PROPOSAL

ECE/TRANS/WP:29/GRSP/2121/15 AS AMENDED BY INFORMAL DOCUMENT

GRSP-69-XX IS CONSIDERED READY TO BE PRESENTED TO GRSP BY:

• ITALY
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 ..