

## **Supplementary document to GRSP/2021/2**

### **Proposal for Addendum 1 to Mutual Resolution No. 1 (Specifications for the Construction, Preparation and Certification of the 50<sup>th</sup> percentile male Biofidelic Rear Impact Dummy, (BioRID-II UN) anthropomorphic test Device)**

On 14 November 2012, the World Forum for Harmonization of Vehicle Regulations (WP.29) adopted Mutual Resolution No. 1 (M.R.1) concerning the description and performance of test tools and devices necessary for the assessment of compliance of wheeled vehicles, equipment and parts according to the technical prescriptions specified in UN ECE Regulations and global technical regulations made under the 1958 and the 1998 Agreements respectively. Mutual Resolution No. 1 contains a reserved section for the introduction of provisions for the BioRID dummy (Addendum 1).

At its 54<sup>th</sup> session (December 2013) GRSP received a provisional draft for Addendum 1 to Mutual Resolution No. 1 (GRSP/54/05). This document contained the procedures for dismantling, assembling and adjusting the dummy. It also contained an index of engineering drawings that defined the essential characteristics of the dummy. The document reflected the work of the GRSP GTR7 Informal Working Group that had established a specification for the dummy to satisfy the requirements for its use as a regulatory tool; BioRID-II UN. However, the document noted the need to introduce a procedure for the certification of the dummy to ensure that its performance would be maintained over time. A Technical Evaluation Group (a sub group of the Informal Working Group) continued to work on this issue and Addendum 1, Annex 3 was reserved for their proposal.

At its 181<sup>st</sup> session (23 – 25 June 2020) the World Forum for Harmonization of Vehicle Regulations adopted a proposal from GRSP to amend global technical regulation No. 7 (GTR 7) which, among other things, introduced the option for national administrations to use the BioRID-II UN dummy for the assessment of head restraint efficacy when using dynamic testing. This amendment entered into force on 18 January 2021 (ECE/TRANS/180/Add.7/Amend.1).

Document GRSP/2021/2, builds upon document GRSP/54/05. The text associated with the procedures for dismantling, assembling and adjusting the dummy has received editorial review. Proprietary names have been removed and masses and dimensions are now shown in metric units only (except in cases where imperial values are necessary). Referencing to various areas of the document have been checked and revised as necessary and the drawing index has been simplified.

The body of the proposal introduces the general design of the dummy, including the essential dimensions and how they are checked. A table of mass values for individual assemblies is also provided. It also lists the mandatory instrumentation and the optional instrumentation that may be installed, and their locations are illustrated.

Annex 1 contains the detailed information regarding the disassembly of the dummy, the procedures for its re-assembly and the instructions for adjusting the spine profile and muscle substitute settings. The text includes details for the installation of the instrumentation and the instrumentation cabling. The TEG identified the importance of the intervertebral bumpers to the performance of the dummy; their replacement frequencies are specified with their replacement dates being checked as part of the certification process. The procedure for changing the cervical spine bumpers has changed compared to that shown in GRSP/54/05. A new procedure uses an installation tool that provides a more accurate placement of the bumper in the vertebrae.

Annex 2 lists the engineering drawings for the dummy and for certain tools that are referenced in Annex 1.

The significant change from GRSP/54/05 is the introduction of Annex 3 – the result of the work of the TEG. Annex 3 details the requirements and procedures for the certification of the dummy jacket, the lower torso (pelvis) and the upper torso and neck assembly.

The tests of Annex 3 require the use of an acceleration sled system. An example of such a system and the procedure to validate its performance is included in Appendix 1 to Annex 3. The components that comprise the sled system are defined and details for the instrumentation and data handling are provided. The proposal does not preclude alternative sled systems from being used and the performance criteria that are specified allow for this.

Appendix 2 to Annex 3 contains a design check list (Part 1) and a maintenance checklist (Part 2). These checklists are provided as aids to support the confirmation of the use of the correct parts and adjustment of the dummy during assembly and certification.

The proposal also details monitoring requirements for the compression of the jacket and lower torso. These requirements do not require additional tests but do require the analysis of data captured during the tests to establish actual compression figures that can be compared to indicative values for both the jacket and the lower torso. The calculation process is set out in detail.

The compression value must be established at least every 12-months and recorded as part of the certification process. The TEG looked at data concerning jacket/lower torso compression. Differences were present in products, but the history of use was not robust. The introduction of a monitoring requirement will permit analysis to understand whether it is necessary to introduce further controls on this parameter in the future.

The minimum information required to be recorded at the completion of the certification test is provided.

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