Shoes for the BioRID and Hybrid III

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Background

- GTR no. 7 specifies the shoes for the dummy used for dynamic testing.
- Different requirements are given for the shoes of the Hybrid III and BioRID II in the draft GTR no. 7 text.
- Hybrid III is used in European regulation (UN-R94) and consumer testing (Euro NCAP) with instrumented legs.
- FMVSS does not require instrumented legs.
- BioRID is used mainly in consumer testing (p. ex. Euro NCAP, JNCAP, KNCAP, IIHS etc.)
Specifications

Hybrid III

• UN-R94

• “The foot shall be fitted with the shoe specified in Annex 5, paragraph 2.9.2.”

• §2.9.2. A size 11XW shoe, which meets the configuration size, sole and heel thickness specifications of the US military standard MIL S 13192, revision P and whose weight is $0.57 \pm 0.1$ kg, shall be placed and fastened on each foot of the test dummies.

• Euro NCAP

• Each dummy shall be fitted with shoes equivalent to those specified in MIL-S13192 rev P. (size XW)
Specifications

BioRID Ilg

- GTR no. 7

Shoes are men’s dress oxford type, US size 11 (European size 45) extra wide that meet military specifications MIL-S-13192P. Each shoe weighs \([0.613 \pm 0.2 \text{ kg}]\) and has an overall length of 320-325 mm.

- Euro NCAP (Whiplash Testing Protocol 3.1, June 2011)

  7.4.1. The dummies feet should be shod with size 11 (45 European or 279 mm) Oxford-style, hard-soled, work shoes (e.g., MIL-S-13192P).

- RCAR-IIWPG: (RCAR-IIWPG Seat/Head Restraint Evaluation Protocol (Version 3))

  6.3 Clothing

  ..... The dummies feet should be shod with size 11 (45 European or 27.9 cm) Oxford-style, hard-soled work shoes (e.g., MIL-S-13192P).
Example (BASSt Dummies)

Hybrid III 50%

BioRID II
Conclusion

Weight range for dummy shoes:

Hybrid III UN-R94: \[0.57 \pm 0.1 \text{ kg} = 0.47 \ldots 0.67 \text{ kg}\]

BioRID UN GTR No. 7: \[0.613 \pm 0.2 \text{ kg} = 0.413 \ldots 0.813 \text{ kg}\]

Weight range of Hybrid III shoes specified in UN-R94 is sub range of GTR no. 7 BioRID UN weight range.

Proposal: UN-R94 weight specification for BioRID shoes.
Lenght range for dummy shoes

<table>
<thead>
<tr>
<th>Foot</th>
<th>Mondopoint</th>
<th>EU L</th>
<th>UK</th>
<th>US N</th>
<th>US M (Athl.)</th>
<th>US W (TIA)</th>
<th>US W (Athl.)</th>
<th>JPN/CHN</th>
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<tr>
<td></td>
<td>203</td>
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<td>210</td>
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<td>330</td>
<td>335</td>
<td>340</td>
<td>345</td>
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</tbody>
</table>

Table: Foot length and shoe size, source Wikipedia

There is a significant difference in the length range of the shoes for GTR no. 7 and Euro NCAP. Both requirements are based on the same shoe definition MIL-S-13192P (size 11 equal to 45 European size).

Euro NCAP and RCAR IIWPG specifies 279 mm, GTR no. 7: 320-325 mm, max difference 46 mm!
Conclusion

Length range for dummy shoes:

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<tr>
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<td>2</td>
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<td>9½</td>
<td>9⅓</td>
<td>9⅓</td>
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<td>280-285</td>
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<td>10½</td>
<td>11</td>
<td>11½</td>
<td>28</td>
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<tr>
<td></td>
<td>290-295</td>
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<td>10</td>
<td>11½</td>
<td>11½</td>
<td>12</td>
<td>12½</td>
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<td>300-305</td>
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<td>14</td>
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</table>

Conclusion

Length range for dummy shoes (example):

**Hybrid III UN-R94**: no length specification

**BioRID UN GTR No. 7**: 320 – 325 mm

**Euro NCAP / RCAR**: 267 mm

<table>
<thead>
<tr>
<th>Dummy</th>
<th>Right shoe</th>
<th>Left shoe</th>
<th>Brand</th>
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<tr>
<td>HIII 50% A</td>
<td>325</td>
<td>325</td>
<td>Bates Vibram</td>
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<td>HIII 50% B</td>
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<tr>
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<td>New shoe</td>
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</table>

Shoe length of 279 mm specified in Euro NCAP and RCAR-IIWPG seems to be an error/typo as it is much shorter than European size 45 or 11 US-size. Measurements from some shoes show that the shoes currently in use are borderline or above the proposed specifications.

Proposal: ? New limits?
Thank you for your attention!

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