EXPLANATORY PRESENTATION TO CLEPA NECK LOAD LIMITS PROPOSAL

Submitted by the experts from CLEPA

67th session of GRSP, 20-23rd July 2020
ECE/TRANS/WP.29/GRSP/2019/19 proposed chest vertical acceleration limits for Q0, Q1 and Q1.5 dummies

- Justification was potential for increased neck loading in rear-facing CRS with a supine seating position
- R129 requires tensile neck force and flexion moment to be measured for monitoring only

GRSP deferred discussion to allow analysis of neck loads collected during R129 type-approvals
- Data provided by VCA and CLEPA
ANALYSIS METHOD

Overview

1. VCA and CLEPA samples combined
2. Data separated for each dummy by impact direction and CRS orientation
3. Worst-case condition identified for each dummy
4. Statistical analyses carried out (95th percentile; Mean+2SD)
5. Limits proposed based on statistical analyses and outliers
Caveats

• SAE J211 sign convention may not have been used in all tests in VCA sample (especially flexion moment)

• Timing of peak value is unknown and may have been generated in rebound (especially flexion moment)

• VCA and CLEPA samples may not be representative of the wider CRS market

• Any limits are pragmatic and their relationship to real-world injury risk is unknown
PROPOSAL

Tensile neck force

<table>
<thead>
<tr>
<th>Dummy</th>
<th>95th %ile</th>
<th>Mean + (2*SD)</th>
<th>Limit proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q0</td>
<td>732</td>
<td>680</td>
<td>[700]</td>
</tr>
<tr>
<td>Q1</td>
<td>933</td>
<td>1032</td>
<td>[950]</td>
</tr>
<tr>
<td>Q1.5</td>
<td>2264</td>
<td>2419</td>
<td>[2300]</td>
</tr>
</tbody>
</table>

Tensile neck force (N)
**PROPOSAL**

**Neck flexion moment**

<table>
<thead>
<tr>
<th>Dummy</th>
<th>95th %ile</th>
<th>Mean + (2*SD)</th>
<th>Limit proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q0*</td>
<td>9.8</td>
<td>7.9</td>
<td>[10]</td>
</tr>
<tr>
<td></td>
<td>8.6</td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>Q1</td>
<td>16.3</td>
<td>13.6</td>
<td>[15]</td>
</tr>
<tr>
<td>Q1.5</td>
<td>28.5</td>
<td>29.5</td>
<td>[30]</td>
</tr>
</tbody>
</table>

* Worst-case is unclear for Q0 dummy
MOVING FORWARD

• The analysis and limits presented here are based on samples from VCA and CLEPA only

• Can other Contracting Parties provide their anonymised monitoring data to support our analysis and confirm the proposed limits?

• A formal working document proposal will be submitted at GRSP-68 in December 2020
MANY THANKS FOR YOUR ATTENTION