Feasibility and Repeatability of the Sled Test in AECS-Annex 7

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Takashi Sawamura

National Traffic Safety and Environment Laboratory
Purpose: To verify the feasibility and repeatability using the accelerated-type sled device.

Verifications:

1. Feasibility
   * Test pulse within the corridor?
   * Velocity changes $\Delta V$ meet 68-70 km/h?

2. Repeatability
   * Verified with an AECD component weight of 100 kg taken into account.

Concerns

Conclusions

Proposed amendment of the corridor line.
Results for Feasibility

Tests No.1 - No.3: Input pulse was changed to make the test feasible.

<table>
<thead>
<tr>
<th>Test No</th>
<th>Corridor</th>
<th>ΔV</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>*</td>
<td>Fail</td>
<td>Upper limit of the corridor exceeded; ΔV limit exceeded</td>
</tr>
<tr>
<td>2</td>
<td>✔</td>
<td>Fail</td>
<td>Within the corridor; ΔV limit exceeded</td>
</tr>
<tr>
<td>3</td>
<td>✔</td>
<td>*</td>
<td>Within the corridor; ΔV adjustable</td>
</tr>
</tbody>
</table>

*If adjusted, the ΔV will be within the required range.
# Results for Repeatability

![Chart showing acceleration/deceleration over time](chart.png)

*If adjusted, the ΔV will be within the required range.

<table>
<thead>
<tr>
<th>Test No</th>
<th>Corridor</th>
<th>ΔV</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>✔️</td>
<td>*</td>
<td>Base waveform</td>
</tr>
<tr>
<td>5</td>
<td>✔️</td>
<td>*</td>
<td>Almost agreement with the base waveform (#3)</td>
</tr>
</tbody>
</table>

*If adjusted, the ΔV will be within the required range.
Concerns (Comparison with R17, R44, R100-02)

- In comparison with the other Regulations, the load to the sled is extremely high (leading to generation of a large amount of brake dust as well as a little smoke and odor due to brake friction, which is unlikely in tests of the other Regulations).
- The sled brake system could be damaged because this test is conducted at more than 80% of the capacity of the maximum specification.

**Comparison of corridors**

- **G:** 3.2 times larger
- **Inclination:** 8.4 times larger
- **Event duration is shorter (0.5 times).**

Corridor
- Blue: AECS
- Black: R17, R44, R100
Conclusions and measure

Conclusions
■ The feasibility and repeatability of sled test were confirmed.
■ However, the load to the sled was found to be extremely high, causing concerns about the possibility of the braking system being damaged if testing is conducted continuously.

■ Compared with the sled tests of other Regulations (R17,R44,R100-02), the AECD sled test has the following characteristics:
  • Shorter event duration (0.5 times);
  • Peak acceleration (3.2 times);
  • Rapid deceleration after the peak G (8.4 times).

Measure
■ It is necessary to propose minor amendment for rapid deceleration in the current corridor that can mitigate the damage of the accelerated-type sled device.
Japanese proposition: a dashed line in the figure.

- This will give more freedom to the test pulse form.
- Therefore, this can mitigate a possibility of damage to the brake system of accelerated-type sled device.
- Maximum acceleration 65 G of the lower corridor is kept as TRL proposal.
- The velocity change $\Delta V$ 68-70 km/h is kept.
Deceleration corridor based on full-width tests

- 65g, 4 ms
- 77g, 22 ms
- Proposed line
- 60 ms

AECS-07-05e
Thank you!