Lateral Impact Test Procedure

GRSP IG CRS December 7th 2010 Geneva
Mandate from September Meeting

• Review severity level and corridor in order to
  – address timing issues of ISO Corridor
  – address severity resulting from UTAC/LAB tests
  – address PU tube capabilities
• Review head containment plane
  – location
  – feasibility with booster seats
Analysis Timing Maximum Head Acceleration

- mean
- standard deviation
- max
Consideration of Timing in Intrusion Velocity Corridor according to ISO PAS 13396

velocity corridor:

- older cars (before 1995)
- newer cars (after 1995)

approx. 3 m/s at time of maximum head acceleration
Intrusion Velocity from Car-to-Car Tests

- Golf-Golf
- Freelander-Golf
- Golf-Fiesta
- Freelander-Fiesta
- AE-MDB-Fiesta

Front door velocity [m/s]

Time [s]
Intrusion Velocity from Car-to-Car Tests

![Graph showing intrusion velocity from car-to-car tests](image-url)
Discussion of Corridor

• An optimal test method would represent
  – Car acceleration
  – Intrusion velocity profile

• The proposed test procedure is a simplified test method

• For the simplified test method it is important to represent car data at crucial point in time
Discussion of Corridor

• It is felt that the period between start of dummy loading from intrusion and maximum dummy loading is most important

• Original corridor is representative with respect of intrusion velocity at time of first contact between CRS and car

• New corridor proposal is representative with respect to intrusion velocity at time of maximum head acceleration
Proposed Criteria According to latest Draft Version of Standard

<table>
<thead>
<tr>
<th></th>
<th>Q0</th>
<th>Q1</th>
<th>Q1.5</th>
<th>Q3</th>
<th>Q6</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIC</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>800</td>
<td>800</td>
</tr>
<tr>
<td>a3ms head</td>
<td>75g</td>
<td>75g</td>
<td>75g</td>
<td>80g</td>
<td>80g</td>
</tr>
</tbody>
</table>
Comparison Sled old Corridor with UTAC/LAB Tests

- BabyShell Q1.5 old corridor
- Group 1 FF TT Q3 old corridor
- Babyshell Q1.5 AEMDB test
- Group I FF TT Q3 AEMDB test

Actual measurement / limit [%]

HIC  head a3ms
New Corridor

Side Impact Velocity-Time Corridor

- Proposed lower corridor
- Proposed upper corridor
- 3m/s @ 40ms
Comparison Sled new Corridor with UTAC/LAB Tests

actual measurement / limit [%]

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<th>Group 1 FF TT Q3 old corridor</th>
<th>Group 1 FF TT Q3 new corridor</th>
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HIC: Head Injury Criterion
a3ms: Acceleration in milliseconds
Proposal for Head Containment Plane

- Location of the head containment plane has a distance of [55 mm] to the padding material (i.e., first contact surface of the CRS)
- Dummy‘s head must not cross this head containment plane
Reproducibility Tests

• Labs
  – Britax (PU tubes)
  – Dorel (hydraulic brake)
  – IDIADA (acceleration sled / sled on sled)
  – TUB (bar brakes)

• Approach
  – 3 labs conducting 2 tests
  – coefficient of variation for all tests in one batch
Reproducibility Tests

• Products
  – Baby shell SL (Q1.5)
  – Group 1 RF SL (Q3)
  – Group 1 FF SL (Q1)
  – Group 1 FF TT (Q3)
Reproducibility Tests

- Group 0+
- Group 1 RF
- Group 1 SL
- Group 1 TT

- Head a3ms
- HIC
- Neck F
- Neck M
- Chest a3ms
- Pelvis a3ms

Coefficient of Variation [%]

- Two labs only
- Head two labs only

The graph shows the reproducibility of measurements in different anatomical regions for various groups.
Newest Issues

• Problem
  – description in the draft standard seems not to be sufficiently clear
    • meaning of delta-v corridor for acceleration sled

• Solution
  – statement in the text:
    • relative velocity corridor between dorr panel and test bench
Cooperation within the Group

• Subgroup for lateral impact test procedure
  – started December 2009
  – open for everyone willing to contribute

• Contributors sled tests:
  – BASSt (planned)
  – Britax
  – CSI (planned)
  – Dorel
  – IDIADA
  – TNO (planned)
  – TUB
Cooperation within the Group

- Contributors dummy tests:
  - Humanetics
- Contributors CRS:
  - Bellelli
  - Britax
  - Dorel
  - Graco
  - RECARO
  - TUB (seats available on stock Bobob, TeamTex, …)
  - HTS
Cooperation within the Group

• Contributors car test results:
  – UTAC/LAB (new barrier to car tests)
  – RDW (analysis of crash worthiness car-to-car test data)
  – TUB (analysis of old car test data)
Cooperation within the Group

• Task force:
  – BASt
  – Britax
  – CSI
  – CORS International
  – Dorel
  – Humanetics
  – IDIADA
  – RDW
  – TNO
  – TUB
Cooperation within the Group

• Contributors invested in the lateral impact test procedure
• Looking at the current discussion concerning frontal impact test procedure some members fear that this investment could be wasted
• It is unlikely that large testing programme could be repeated
Latest Discussions

• Forward component was not taken into account
  – ISO analysed
    • accident data from Germany, Sweden and US
    • Influence of forward component in a test with intrusion
  – ISO concluded
    • purely perpendicular tests are most sever w.r.t. dummy readings
    • Influence of forward component w.r.t. head containment is minor
Latest Discussions

• Forward component was not taken into account
  – DOREL tested
    • 90° door
    • 80° door
  – DOREL concluded
    • Almost no difference in dummy readings
    • Influence of forward component w.r.t. head containment is minor
Latest Discussion

• Moveable ISOFIX anchorages are unrealistic
  – The moveable anchorages avoid severe damages on test equipment and following increase repeatability and reproducibility
  – Analysis of CRS movement in the tests shows that the CRS is mainly moving after the loading phase of the dummy
  – Dorel conducted tests with a restriction in anchorages moveability up to 40 mm without differences to the free anchorages