SUV - Windshield Head Impacts
Windscreen Information

Impact to windshield:
- Midway between base and top of windshield
- 1/4 windshield width inboard from passenger side of vehicle

Windshield marking (replacement part only):
Laminated GS
DOT-376 ASI M334
Trans 75% MIN
AP Technoglass.
43R-000052
Impact Conditions

- SUV vehicle (GVW 2160 kg FWD / 2209 kg AWD)
- Windshield angle 55°
- ISO adult headform (4.5 kg)
- Impact speed 35 km/h
- Impact angles 35°, 40° & 65°
- 1 test with OEM windshield
  2 tests per impact angle with replacement windshield
  = 7 impact tests in total, all to the same vehicle
- Same impact point for each test (mid height, ¼ width)
- No secondary impact
### Test Results

<table>
<thead>
<tr>
<th>Test Number</th>
<th>Impactor Type</th>
<th>Velocity (km/h)</th>
<th>Impact Angle</th>
<th>HIC</th>
<th>Max Accel (g's)</th>
<th>Max Displ (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L65787</td>
<td>ISO Adult Head</td>
<td>35.2</td>
<td>35°</td>
<td>150</td>
<td>127</td>
<td>135.0</td>
</tr>
<tr>
<td>L65788</td>
<td>ISO Adult Head</td>
<td>35.2</td>
<td>35°</td>
<td>730</td>
<td>155</td>
<td>90.4</td>
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<tr>
<td>L65789</td>
<td>ISO Adult Head</td>
<td>35.2</td>
<td>40°</td>
<td>690</td>
<td>158</td>
<td>90.8</td>
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<tr>
<td>L65790</td>
<td>ISO Adult Head</td>
<td>35.3</td>
<td>65°</td>
<td>870</td>
<td>166</td>
<td>74.2</td>
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<tr>
<td>L65791</td>
<td>ISO Adult Head</td>
<td>35.1</td>
<td>65°</td>
<td>180</td>
<td>149</td>
<td>142.0</td>
</tr>
<tr>
<td>L65792</td>
<td>ISO Adult Head</td>
<td>35.3</td>
<td>40°</td>
<td>760</td>
<td>161</td>
<td>75.8</td>
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<tr>
<td>L65793</td>
<td>ISO Adult Head</td>
<td>35.5</td>
<td>35°</td>
<td>760</td>
<td>157</td>
<td>77.5</td>
</tr>
</tbody>
</table>
Test Results

Tests 2, 3, 4, 6 and 7:

Windshield bounces before fracturing

\[ x = \text{headform travel distance at the time of the first contact} \]
Test Results

Tests 1 and 5:

• Lower HIC
• Greater intrusion of headform

Only difference: Windshield fractures immediately after being contacted by the headform

x = headform travel distance at the time of the first contact
Conclusions

- Impact angles 35°, 40°, 65° do not appear to have a significant effect on HIC levels.
- HIC and intrusion depend on timing of windshield fracture.
- Secondary impacts due to intrusion seen as biggest concern.
- Test results are unpredictable.
- Design towards compliance seems impossible.
- Further research necessary, especially regarding the behavior of the windshield glass.