



NHTSA

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

NHTSA Concerns with Proposed Amendment 3 to GTR 9

ECE/TRANS/WP.29/2021/53

For the 69th GRSP

Summary of Proposal

- The Amendments in the documents can be divided into four categories:
 - Amendments to the child and adult headform test areas
 - Amendments to the targeting procedure – “measurement point”
 - Editorial corrections regarding impactors
 - Editorial corrections necessary due to other amendments
- NHTSA’s concerns only relate to the first two categories.

Child and Adult Headform Test Areas

“Bonnet top test area” is composed of the child headform test area and the adult headform test area as defined in paragraphs 3.14. and 3.1 respectively.



Reason for Amendment

- NHTSA had difficulty understanding the rationale for this amendment in the Final Progress Report (ECE/TRANS/WP.29/2021/54).
- Paragraph 7 refers to a “discrepancy in the headform test area definition” which would allow manufacturers “to assign the less challenging criterion to areas that cannot be tested.”
- The paragraph then states the amendments make it clear that “HIC value is to be calculated only for the area to be tested” leading to a “smaller HIC 1700 area in total which will contribute to increased pedestrian safety.”
- We first note that these conclusion can only be correct if the manufacturer is able to assign the more challenging HIC 1000 criterion to areas that cannot be tested.

Differing Interpretations

- As we will explain, we agree that the amendment will provide for increased safety if it is possible to interpret the current language of the GTR to allow a manufacturer to assign any of the require HIC 1000 zone to the no test areas.
- However, NHTSA has never interpreted the GTR this way, and believes the existing language clearly does not allow this.

Existing Language of the GTR

- Section 3 provides definitions of adult and child headform test areas which do not include the 82.5mm no test zone.
- Section 5 defines requirements for the adult and child headform test areas:
 - That measurement shall not exceed HIC 1000 over
 - $\frac{1}{2}$ the child headform test area, and
 - $\frac{2}{3}$ the child and adult headform test area
 - That measurement shall not exceed HIC 1700 over remaining areas
 - NHTSA sees this section as defining the size of the area that must meet each requirement only
- Section 7 discusses requirements for impact points, and this is where the idea of the no test zone is introduced
 - The area requirements determined in Section 5 are used to determine possible impact points allowed by Section 7.

Comparison of HIC Areas between US and Amendment Methods

To evaluate how the US interpretation of the existing language and the proposed amendment compare, NHTSA looked at different vehicles from its original evaluation of the GTR.

2010 Acura MDX

Values are Percent of Bonnet Top

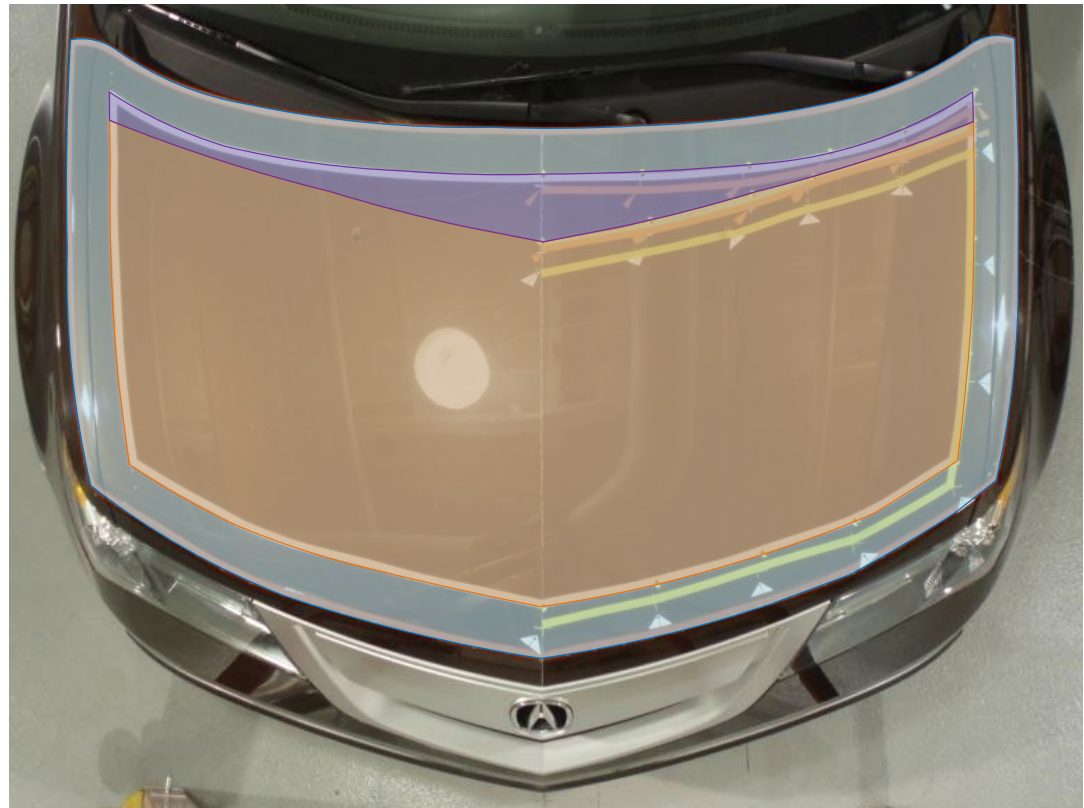
| | NHTSA | Amendment |
|------------|-------|-----------|
| Child Test | 84% | 67% |
| Adult Test | 16% | 6% |
| No Test | 27% | 27% |
| HIC1000 | 67% | 49% |
| HIC1700 | 7% | 24% |

Color Key

No Test
(NT)

Child - NT

Adult - NT



2010 Buick LaCrosse

Values are Percent of Bonnet Top

| | NHTSA | Amendment |
|------------|-------|-----------|
| Child Test | 94% | 78% |
| Adult Test | 6% | 0% |
| No Test | 22% | 22% |
| HIC1000 | 67% | 52% |
| HIC1700 | 11% | 26% |

Color Key

No Test
(NT)

Child - NT

Adult - NT



2011 Honda Odyssey

Values are Percent of Bonnet Top

| | NHTSA | Amendment |
|------------|-------|-----------|
| Child Test | 100% | 69% |
| Adult Test | 0% | 0% |
| No Test | 31% | 31% |
| HIC1000 | 67% | 46% |
| HIC1700 | 2% | 23% |

Color Key

No Test
(NT)

Child - NT



2011 Hyundai Tucson

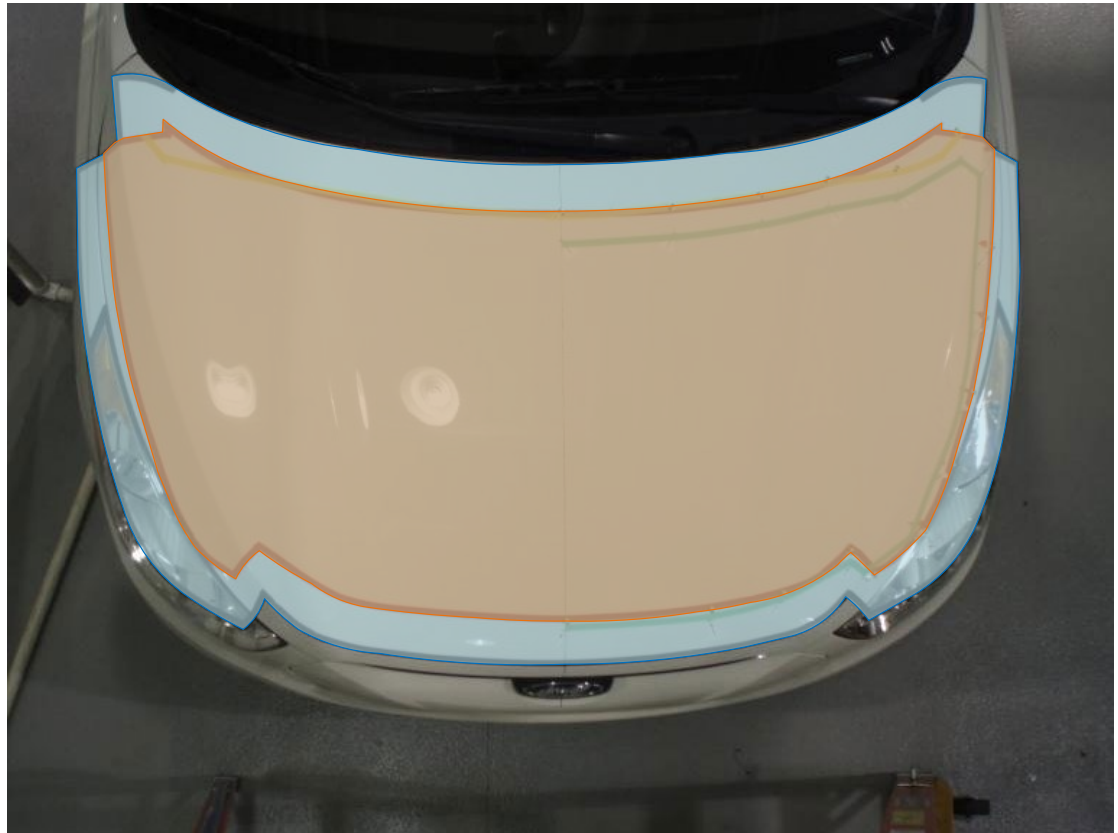
Values are Percent of Bonnet Top

| | NHTSA | Amendment |
|------------|-------|-----------|
| Child Test | 100% | 76% |
| Adult Test | 0% | 0% |
| No Test | 24% | 24 |
| HIC1000 | 67% | 51 |
| HIC1700 | 10% | 25 |

Color Key

No Test
(NT)

Child - NT



2011 Jeep Charokee

Values are Percent of Bonnet Top

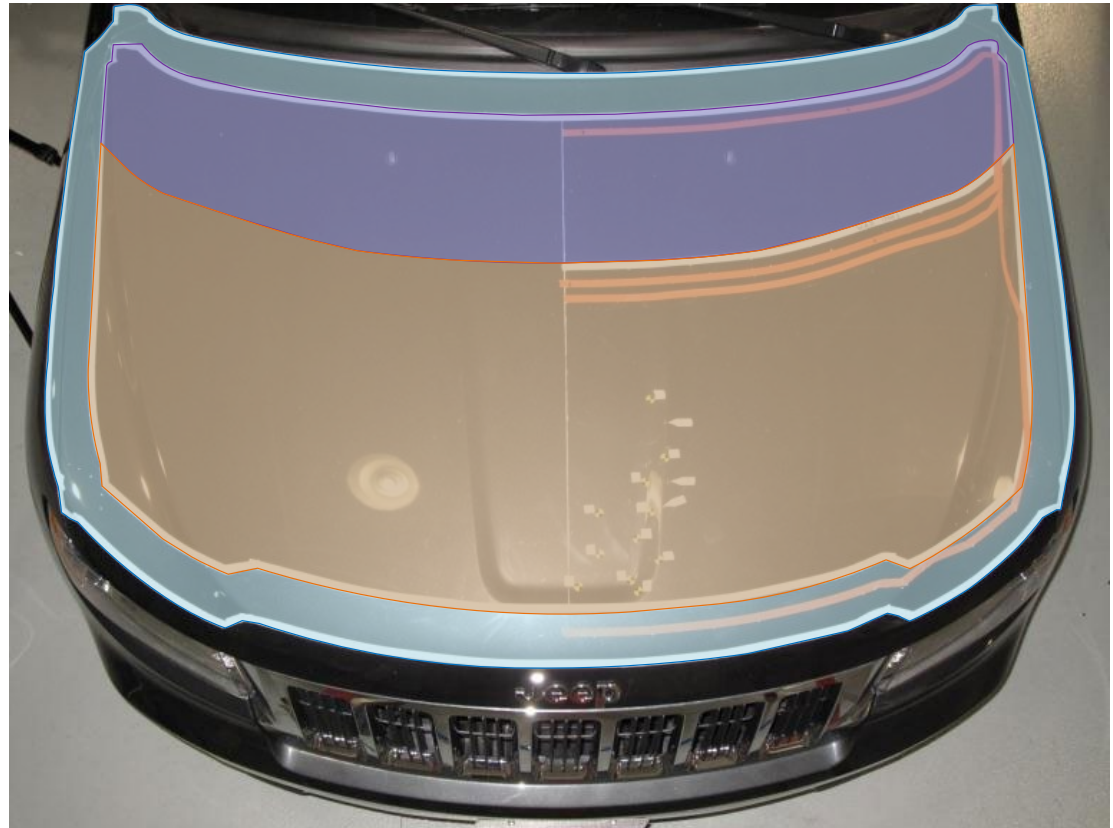
| | NHTSA | Amendment |
|------------|-------|-----------|
| Child Test | 71% | 57% |
| Adult Test | 29% | 22% |
| No Test | 21% | 21% |
| HIC1000 | 67% | 52% |
| HIC1700 | 12% | 26% |

Color Key

No Test
(NT)

Child - NT

Adult - NT



2010 Kia Forte

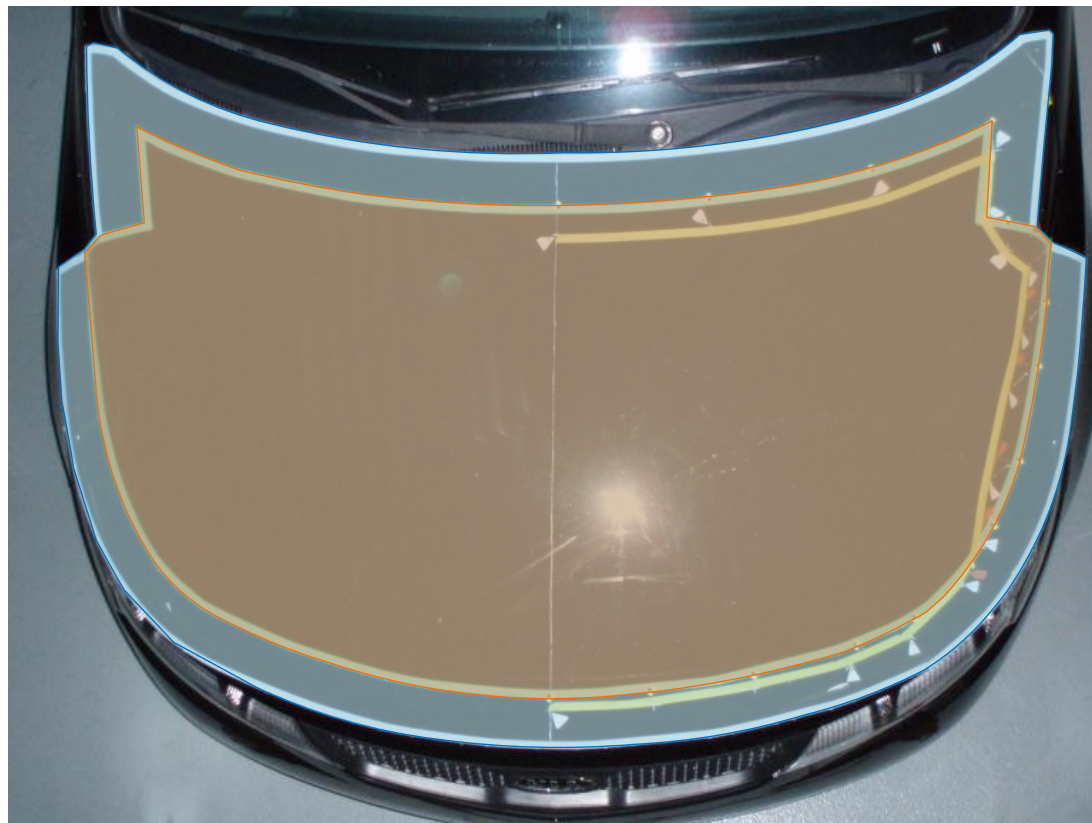
Values are Percent of Bonnet Top

| | NHTSA | Amendment |
|------------|-------|-----------|
| Child Test | 100% | 76% |
| Adult Test | 0% | 0% |
| No Test | 24% | 24% |
| HIC1000 | 67% | 51% |
| HIC1700 | 9% | 25% |

Color Key

No Test
(NT)

Child - NT



Targeting Procedure – “Measuring Point”

"Measuring point" for the headform test means a point on the vehicle's outer surface selected for assessment. The measuring point is where the headform's profile contacts the vehicle's outer surface cross section in a vertical longitudinal plane through the center of gravity of the headform (see Figure 6A).



Need for Amendment

- “There are points on the bonnet surface that may be identified as being of interest (due to underlying structures, hard points, etc.) but where a direct first contact is impossible due to the bonnet design.” Final Progress Report (ECE/TRANS/WP.29/2021/54), paragraph 4.
 - While the current GTR determines which requirements apply by the location of the first contact point, nothing in the GTR implies that every point on the bonnet must be contactable.
 - The headform simulates a human head, so a point the headform cannot contact would simulate real world interactions.
 - In reality, curvatures, etc which keep the headform from impacting an area could be a countermeasure.

NHTSA research

- NHTSA research compared 3D Point of First Contact (3DPOFC) (GTR), Aiming Point (AP) (EuroNCAP) and 2D Measuring Point (MP) (amendment 3)
- Evaluation determined that the MP is a hybrid – points at the front and rear boundaries are similar to 3DPOFC and points at the side boundaries similar to AP
- Comparing 3DPOFC to AP for 6 vehicles - % reduction in testable area was 0.2% to 9.2% - average 5.7%
- Since the MP is a hybrid, anticipate results would be between these results, so 0% to 5.7%

Additional concerns

- Large portion of reduction in testable area was in the more rigid areas of the hood i.e., the boundaries therefore the anticipated impact would be disproportionate to the size of the reduction.
- Hoods with more curvature showed larger reductions and current designs trending this way.
- The proposed solution does not preclude the existence of “untouchable points” or multiple contacts.
 - Undulations exists in the fore-aft direction on many bonnets due to the presence of air scoops.
 - The proposed “sagittal slice” will contact multiple points near the scoop, while “untouchable points” will still exist.



Questions?