# SAFETY PERFORMANCE EVALUATION PROCEDURES FOR NEW CAR ASSESSMENT INFORMATION PROVISION PROJECT

March 26, 2018
NASVA Assess No.227

**Contents:**



## Chapter 1: General Provisions

(Objectives)

**Article 1:** Pursuant to the provisions of Article 28 of the Implementation Procedures for New Car Assessment Project by the National Agency for Automobile Safety and Victim's Aid (NASVA) (NASVA Assess No.286 of 2016) for evaluation of the results of the new car assessment tests, required matters shall be prescribed as described below.

**Chapter 2:** Collision Safety Performance Evaluation Procedure

**Article 2:** Test results obtained from collision safety performance tests shall be evaluated pursuant to the procedures prescribed below:

### Article 3: Passenger Protection Performance Evaluation

1. Evaluation by Full-wrap Frontal Collision Safety Performance Tests

(1) Evaluation Procedure for Driver's Seat

**(i) Evaluate Procedure**

Evaluation results shall be the values that correspond to the total scores in Rating Table 1.

Total points shall be the sum of the scores of each body part (head, neck, chest and lower legs).

The scores of each body part shall be calculated pursuant to the procedure shown in the following paragraphs.

**(ii) Score Calculation**

- **Head:** Score (a) is calculated from Head Injury Criterion ($HIC_{36*}$) using the evaluation functions (Figure 1).

  Score (b) is calculated from the steering wheel upper displacement value using the

evaluation functions (Figure 2). The Head Score shall be obtained by subtracting the score (b) from the score (a) and multiplying the result by the weighting factor (0.923).

- **Neck:** Score (a) of each part shall be calculated from tensile load, shearing load and extension moment using the evaluation functions (Figures 3-1 through 3-3). The Neck Score shall be obtained by multiplying the minimum value of the scores (a) by the weighting factor (0.231).
- **Chest:** Score (a) shall be calculated with the chest displacement value using the evaluation functions (Figure 4). Score (b) shall be calculated from the steering backward displacement value using the evaluation functions (Figure 5). If a secondary contact is observed between the steering wheel and the dummy's upper chest, 1 point shall be subtracted. If the chest injury criterion is 60G or higher (588m/s$^2$-3m or higher), 4 points shall be subtracted. The Chest Score shall be obtained by subtracting the score (b) from the score (a) and multiplying the result by the weighting factor (0.923). The applicable score shall be 0, if the calculated score is negative.
- **Lower Legs:** Score (a) shall be calculated from right and left femur loads using the evaluation functions (Figure 6). Score (b) shall be calculated from the left and right tibia loads (upper right, lower right, upper left and lower left) using the evaluation functions (Figure 7).

  Score (c) shall be calculated from the brake pedal upper displacement value using the evaluation functions (Figure 8).

  Score (d) shall be calculated from the brake pedal backward displacement value using the evaluation functions (Figure 9).

  If either left or right tibia axis load exceeds 8kN, 1 point shall be subtracted.

  The Lower Leg Score shall be obtained by subtracting the scores (c) and (d) from the sum of the lower value of the sore (a) and the minimum value of the score (b), and multiplying the result by the weighting factor (0.923).

- **Other:** The applicable score shall be 0, if the result of correction by body deformation value is negative.

  The total score shall be rounded to 2 decimal places.

*$HIC_{36}$ = HIC values calculated at 36 msec intervals

**(2) Front Passenger Seat Evaluation Procedure**

**(i) Evaluation Procedure**

The evaluation result shall be the values that correspond to the total scores in Rating Table 1. The total scores shall be the sum of scores for each body part (head, neck, chest and lower legs). The scores of each part shall be calculated pursuant to the procedure shown in the following paragraphs.

**(ii) Score Calculation**

- **Head:** Score (a) is calculated from Head Injury Criterion ($HIC_{15*}$) using the evaluation functions (Figure 10). The Head Score shall be the product of the score (a) and the weighting factor (0.8).
- **Neck:** Score (a) shall be calculated from tensile load, shearing load and extension moment using the evaluation functions (Figures 11-1 through 11-3). The Neck Score shall be obtained by multiplying the minimum value of the scores (a) by the weighting factor (0.2).
- **Chest:** Score (a) shall be calculated from the chest displacement value using the evaluation functions (Figure 12-1). The Chest Score shall be obtained by multiplying the score (a) by the weighting factor (0.8).
- **Abdomen:** Score (a) shall be calculated by applying the criteria of each body part (Attachment 1) to the iliac load reduction rates. The Abdomen Score shall be obtained by deducting the score (a) from 4 and multiplying the result by the weighting factor (0.8).
- **Lower Legs:** Score (a) shall be calculated from the right and left femur compression load using the evaluation functions (Figure 13). The Lower Leg Score shall be obtained by multiplying the lower of the scores (a) by the weighting factor (0.4).

*$HIC_{15}$ = HIC values calculated at 15 msec intervals

**2. Evaluation of Offset Frontal Collision Safety Performance Test**

**(1) Driver's Seat**

Same evaluation procedures with (1) Evaluation Procedure for Driver's Seat, 1. Evaluation by Full-wrap Frontal Collision Safety Performance Tests.

**(2) Backseat**

**(i) Evaluation Procedure**

Evaluation results shall be the values that correspond to the total scores in Rating Table 1.

Total points shall be the sum of the scores of each body part (head, neck, chest, abdomen and lower legs).

The scores of each body part shall be calculated pursuant to the procedure shown in the following paragraphs.

**(ii) Score Calculation**

- **Head:** Score (a) is calculated from Head Injury Criterion ($HIC_{15*}$) using the evaluation functions (Figure 10). Score (b) is calculated by checking secondary collisions for each part with the evaluation criteria (Attachment 1). The Head Score shall be obtained by multiplying the sum of the score (a) and the score (b) by the weighting factor (0.8).
- **Neck:** Score (a) shall be calculated from tensile load, shearing load and extension

moment using the evaluation functions (Figures 11-1 through 3).

Occurrence (or lack) of a secondary collision shall be confirmed by the criteria for each body part (Attachment 1).

If there is no secondary collision, the Neck Score shall be obtained by multiplying the score (a) of tensile load by the weighting factor (0.2).

If there is a secondary collision, the Neck Score shall be the multiplying of the minimum value of the scores (a) by the weighting factor (0.2).

- **Chest:** Score (a) shall be calculated from the chest displacement value using the evaluation functions (Figure 12-2) and the criteria for each body part (Attachment 1). The Chest Score shall be obtained by multiplying the score (a) by the weighting factor (0.8).
- **Abdomen:** Score (a) shall be calculated by applying the criteria for each body part (Attachment 1) to the iliac load reduction rates. The Abdomen Score shall be obtained by deducting the score (a) from 4 and multiplied the result by the weighting factor (0.8).
- **Lower Legs:** Score (a) shall be calculated from the right and left femur compression load using the evaluation functions (Figure 13). The Lower Leg Score shall be obtained by multiplying the lower of the scores (a) and the weighting factor (0.4).
- **Other:** The applicable score shall be 0, if the result of correction by the body deformation value is negative.

The total score shall be rounded to two decimal places.

*$HIC_{15}$ = HIC values calculated at 15 msec intervals

**3. Side Collision Safety Performance Test Evaluation**

**(1) Evaluation Procedure for Driver's Seat and Passenger's Seat**

**(i) Evaluation Procedure**

Evaluation results shall be the values that correspond to the total scores in Rating Table 1.

If the construction of the driver's seat and front passenger seat is same, evaluation results of the driver's seat shall be those of the front passenger seat.

The total points shall be the scores of each body part (head, chest, abdomen and lumber).

The scores of each body part shall be calculated pursuant to the procedure shown in the following paragraphs.

**(ii) Score Calculation**

- **Head:** Score (a) is calculated from Head Injury Criterion ($HIC_{15*}$) using the evaluation functions (Figure 14). The Head Score shall be the product of the score (a) and the weighting factor (1.0).

- **Chest:** Score (a) shall be calculated from the chest displacement value using the evaluation functions (Figure 15). The Chest Score shall be obtained by multiplying the minimum value of the scores (a) by the weighting factor (1.0). If the horizontal-direction shoulder load exceeds 3kN, 4 points shall be subtracted.
- **Abdomen:** Score (a) shall be calculated from the abdomen displacement value using the evaluation functions (Figure 16). The Abdomen Score shall be obtained by multiplying the score (a) by the weighting factor (0.5).
- **Lumber:** Score (a) shall be calculated from the suprapubic load using the evaluation functions (Figure 17). The Lumber Score shall be obtained by multiplying the score (a) by the weighting factor (0.5).
- **Other:** The total score shall be rounded to two decimal places.

*$HIC_{15}$ = HIC values calculated at 15 msec intervals

**4. Evaluation of Electrical Shock Protection Performance during Collision Test for Electric Vehicles, etc**

**(1) Evaluation Procedure:**

**(i) Electrical Shock Protection Performance**

- **Direct contact:** Protection against live parts of power systems shall meet IP code IPXXB.
- **Indirect contact:** The value of resistance to the electric chassis connected to exposed conductive parts and the electrical chassis that is accessible shall be less than 0.1 Ω with a current of 0.2 A or higher.
- **Insulation resistance:** The operating voltage of an AC circuit and a circuit that includes an AC circuit shall be 500 Ω / V or higher.

  The operating voltage shall be 100 Ω / V or higher when satisfying the requirements of IP code IPXXB and when the voltage of AC parts is 30 V or less.

  The operating voltage of a DC circuit shall be 100 Ω / V or higher.
- **Residual voltage:** Residual voltage of high-voltage parts as of 5 to 60 seconds after a collision shall be AC 30 V or less or DC 60 V or less.
- **Residual energy:** Energy of the high voltage parts of power systems as of 5 to 60 seconds after a collision shall be 2.0J or less.

**(ii) REESS Electrolyte Leakage Performance**

- Electrolyte shall not leak into the passenger compartment.
- When there is electrolyte leakage to the outside of the passenger compartment, the amount of leakage in 30 minutes from the collision shall be 7% or less of the total electrolyte amount. However, for open-type traction batteries, the amount shall be

7% or less of the total electrolyte amount or 5 L or less.

**(iii) REESS Anchorage Performance**

- For the REESS inside the passenger compartment, it shall be anchored in a prescribed position.
- For the REESS outside the passenger compartment, it shall not penetrate into the passenger compartment.

**(iv) Checking the Operation of Automatic Shutoff Device**

- During a collision, the automatic shutoff device shall be activated and the high voltage circuit shut off.

**(2) Evaluation Results**

When the vehicle meets the requirements for electric shock protection performance, REESS electrolyte leakage performance, REESS anchorage performance and operational check of the automatic shutoff device, compliance label (Fig. 18) is given.

**5. Rear Collision Performance Evaluation**

**(1) Evaluation Procedure for Driver's Seat and Passenger's Seat**

**(i) Evaluation Procedure**

Evaluation results shall be the values that correspond to the total scores in Rating Table 1.

Further, the evaluation results of the selected seat shall be deemed those of both seats. Also, when the test is conducted on both seats by commissioned selection and the like, the evaluation results of each seat shall the evaluation results of the seats concerned.

Total points shall be the sum of the scores of each body part (phase 1 *1 and phase 2 *2 [upper neck and lower neck]).

The scores of each body part shall be calculated pursuant to the procedures shown in the following paragraphs:

**(ii) Score Calculation**

**Phase 1:** Score (a) shall be calculated from Neck Injury Criterion (NIC*3) (Neck Injury Value or Neck Injury Criterion Value) using the evaluation functions (Figure 19).

The Phase 1 score shall be the product of the score (a) and the weighting factor (1.0).

**Phase 2 :** Scores (a) of the upper and lower neck are calculated from the shearing load (from the back of the neck) using the evaluation functions (Figure 20).

Score (a) is calculated from the tensile load (from above) using the evaluation functions

(Figures 21-1 and 21-2).

Scores (a) on the flexed and extended sides are calculated from the left and right axis turning moment using the evaluation functions (Figure 22).

The Phase 2 score shall be obtained by multiplying the minimum value of the scores (a) by the weighting factor (2.0).

**Other:** The total score shall be rounded to two decimal places.

*1 Phase 1 = Time between the start of the test and the moment the dummy's head contacts the head restraint

*2 Phase 2 = Time between the moment dummy's head contacts the head restraint and the ”backward flexion”.

*3 NIC = Neck Injury Criterion

**Article 4: Pedestrian Head Protection Performance Evaluation**

**1. Pedestrian Head Protection Performance Test Evaluation**

**(1) Evaluation Procedure**

Evaluation results shall be the values that correspond to the total scores in Rating Table 1.

**(2) Score Calculation**

Equally-spaced grids shall be marked on the exterior surface of the vehicle in relation to the evaluation area. Prior to testing, a vehicle manufacturer, etc shall submit to NASVA the in-house data that show performance for every grid. NASVA selects impact points (test grids) at random and conduct testing. The results shall be used as the performance of the grids and for verification of the performance of the data submitted by the vehicle manufacturer, etc. Projected values of vehicle performance by all grids submitted by the vehicle manufacturer, etc shall be corrected to obtain scores.

・ **Submission of Head Impactor Data (projected data) by Vehicle Manufacturers, etc:**

Vehicle manufacturers, etc must submit projected data showing performances at all grid points. Data shall be provided in the colors that correspond to the projected HIC in accordance with the table below:

| | | | | | |
|---|---|---|---|---|---|
| Green | | | $HIC_{15}$ | < | 650 |
| Yellow | 650 | ≤ | $HIC_{15}$ | < | 1000 |
| Orange | 1000 | ≤ | $HIC_{15}$ | < | 1350 |
| Brown | 1350 | ≤ | $HIC_{15}$ | < | 1700 |
| Red | 1700 | ≤ | $HIC_{15}$ | | |

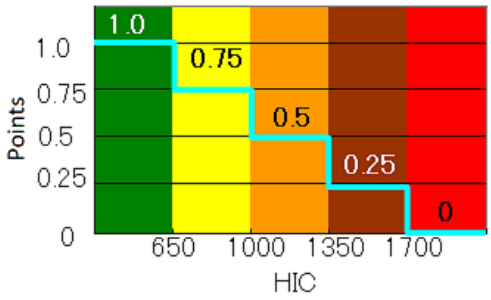
・ **Scoring**

The maximum score for the head is 4 points. The total score for all grid points is calculated as a percentage to the maximum achievable score, which is then multiplied by 4 points.

**・HIC and Point Allocation**

Following points are awarded to each grid in accordance with the color (HIC):

| | | | | | |
|---|---|---|---|---|---|
| Green | | $HIC_{15}$ | < | 650 | 1.00 pt. |
| Yellow | 650 ≤ | $HIC_{15}$ | < | 1000 | 0.75 pt. |
| Orange | 1000 ≤ | $HIC_{15}$ | < | 1350 | 0.50 pt. |
| Brown | 1350 ≤ | $HIC_{15}$ | < | 1700 | 0.25 pt. |
| Red | 1700 ≤ | $HIC_{15}$ | | | 0.00 pt. |




If the performance cannot be predicted, the vehicle manufacturer, etc can color a limited number of grid points blue. For the blue grid point, a test is conducted for one position in each blue zone and the points obtained in accordance with the HIC shall be used for results of the blue zone grid points.

**・Conducting the Test**

For the grids excluding default green, default red and blue, test grids shall be selected at random for 10 default grids and additional grids (up to 10 grids) requested by the manufacturer depending on the proportions of the number of colors declared by the manufacturer, and tests shall be conducted.

When a test result of a test grid that differs from the color of HIC from the predicted data is obtained, the color of the predicted data shall be replaced with the color of the test result. Further, for the colors declared by a manufacturer, at least one hit point shall be selected for each color.

**・Correcting Performance Predicted by Manufacturers, etc**

The predicted performance (score) of the whole vehicle submitted by the vehicle manufacturer, etc shall be corrected using correction coefficients excluding test grids. For correction, the results of test grids shall be used. For test grids, the test results shall be used as-is.

**・HIC Permissible Tolerance**

Since test results may fluctuate between predicted data, a permissible tolerance of 10% is applied to the HIC value of the test results, when calculating correction coefficients. The permissible tolerance is applied in both directions. For example, even when a test result is better than the predicted data, if it lies within the permissible tolerance, the predicted data is applied. When it is out of the permissible tolerance, the color (score) of the test result shall be applied. However, permissible tolerance is used only for

calculating correction coefficients.

| Estimate | $HIC_{15}$ Range | Score | Permissible $HIC_{15}$ Range for Correction Coefficient Calculation |
|---|---|---|---|
| Green | $HIC_{15} < 650$ | 1.00 pt. | $HIC_{15} < 722.22$ |
| Yellow | $650 \leq HIC_{15} < 1000$ | 0.75 pt. | $590.91 \leq HIC_{15} < 1111.11$ |
| Orange | $1000 \leq HIC_{15} < 1350$ | 0.50 pt. | $909.09 \leq HIC_{15} < 1500.00$ |
| Brown | $1350 \leq HIC_{15} < 1700$ | 0.25 pt. | $1227.27 \leq HIC_{15} < 1888.89$ |
| Red | $1700 \leq HIC_{15}$ | 0.00 pt. | $1545.45 \leq HIC_{15}$ |

・**Correcting Predicted Data Scores**

The correction coefficient shall be obtained by dividing the total grid score by the predicted data score of the same grid.

$$\text{Correction coefficient} = \frac{\text{Test grid score}}{\text{Predicted data score of same grid}}$$

(Correction coefficients are rounded to three decimal places.)

The total score of the grids, excluding the grids for which default scores are given, blue points and test grids, for which all of the predicted data are submitted, is multiplied by this correction coefficient.

Further, this method is only applied when the correction coefficients range between 0.750 and 1.250. If this is not the case, the cause shall be investigated, and discussions held between NASVA and the vehicle manufacturer, etc. If the above condition is met, the Head Score after the above correction shall be used.

・**Calculating the Total Score**

The sum of the default green score, blue point score, test grid score and the corrected score performed in the correction of predicted data score shall be divided by the total number of grids. This value shall be multiplied by 4 points to obtain the total Head Score.

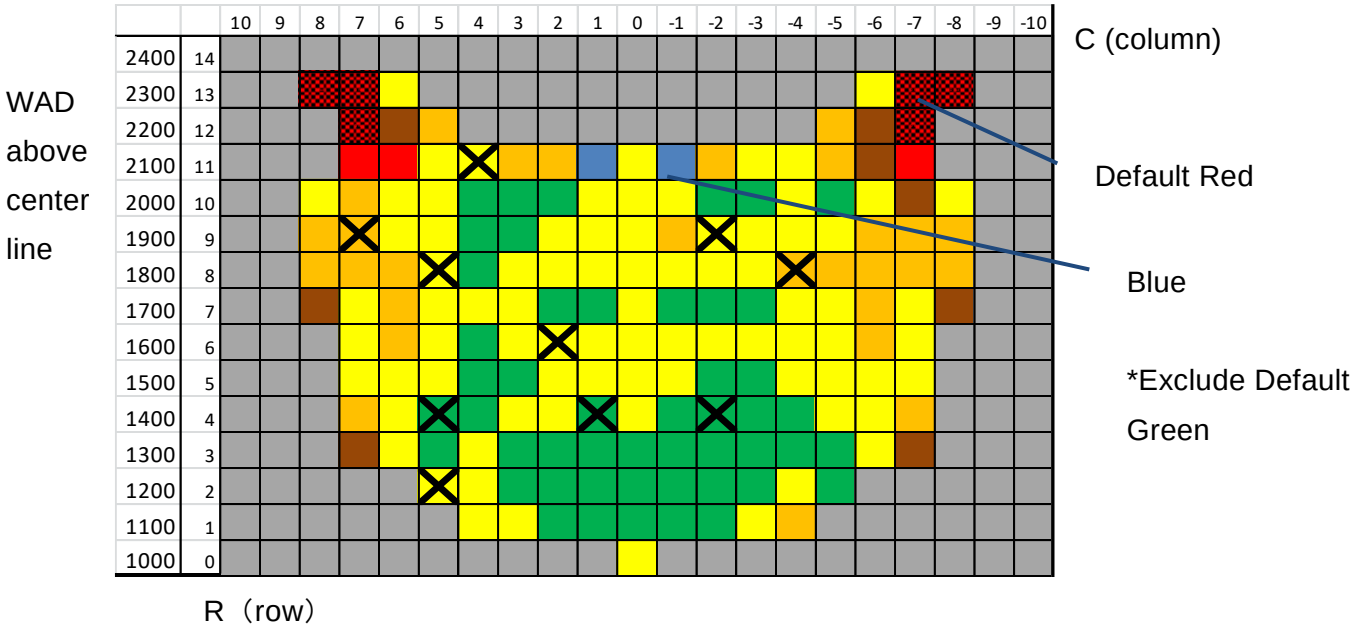
Further, the final score never exceed 4 points, regardless of the correction coefficient.

When multiplying the submitted data from the vehicle manufacturer, etc by the correction coefficient, the output figures shall be rounded to three decimal places. Additionally, when calculating the percentage of the total score to the perfect score, the output figures shall be rounded to three decimal places.

・**Example of Score Calculation**

A vehicle manufacturer, etc submits the following predicted performance for 168 grids (excluding blue, default green and default red) out of the total 176 grids (highest score of 176.)

<Vehicle Manufacturer-Supplied Predicted Performance (color, points)>




The predictions for this example are as follows:

| | | |
|---|---|---|
| Green | 49 grids x 1.00 = | 49.00 |
| Yellow | 80 grids x 0.75 = | 60.00 |
| Orange | 28 grids x 0.50 = | 14.00 |
| Brown | 8 grids x 0.25 = | 2.00 |
| Red | 3 grids x 0.00 = | 0.00 |
| | 168-Grid | 125.00 pts. |

| | | |
|---|---|---|
| Default Green | 0 grid x 1.00 = | 0.00 |
| Default Red | 6 grids x 0.00 = | 0.00 |
| Blue | 2 grids | |
| | 8-Grid | 0.00 pts. |

<Test Grid>

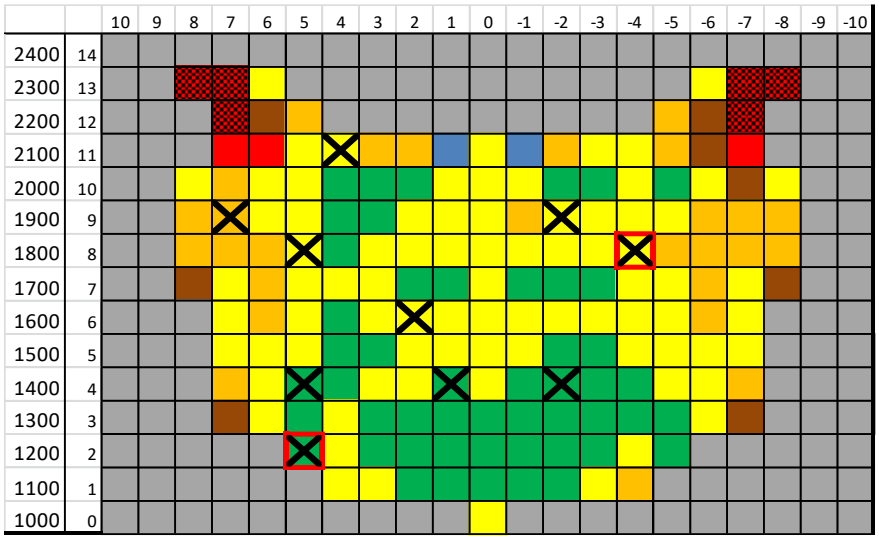
Tests for 10 grids shall be carried out by NASVA. (Grids with X)

Predicted Data and Test Grid Test Results (Child data begins with C and adult data with A)

| Grid | R2 C5 | R4 C-2 | R4 C1 | R8 C5 | R6 C2 | R4 C5 | R9 C7 | R9 C-3 | R8 C-4 | R11 C4 | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Predicted Data (color, score) | 0.75 | 1 | 1 | 0.75 | 0.75 | 1 | 0.5 | 0.75 | 0.5 | 0.75 | 7.75 |
| Test Grid Test Results (HIC) | 595.0 | 438.0 | 496.0 | 836.0 | 820.0 | 519.0 | 1200.0 | 976.0 | 863.0 | 885.0 | |
| Test Grid Test Results (color, score) | 1 | 1 | 1 | 0.75 | 0.75 | 1 | 0.5 | 0.75 | 0.75 | 0.75 | |
| Correction Factor (color, score) | 0.75 | 1 | 1 | 0.75 | 0.75 | 1 | 0.5 | 0.75 | 0.75 | 0.75 | 8.00 |
| | | | | | | | | | | Correction Factor | 1.032 |

The Test Grid scores shall be determined by the test results (□). For the C, 2, +5 (Child, row 2, column 5), A, 8, -4 (Adult, row 8, column -4) grid, the color (scoring) has changed after testing, so the predicted data performance shall be corrected (□).

WAD Above Center Line




For the C, 2, +5 Grid, since the results are within an $HIC_{15}$ permissible error, the predicted color (score) submitted by the vehicle manufacturer, etc shall be used for calculating correction coefficient.

$$\text{Correction coefficient} = \frac{Test\ grid\ sore}{Predicted\ data\ score\ of\ same\ grid} = \frac{8.00}{7.75} = 1.032$$

<Corrections of Performance Predicted by Vehicle Manufacturer, etc>

Excludes Test Grid from Predicted data.

| | | |
|---|---|---|
| Green | 46 grids x 1.00 = | 46.00 |
| Yellow | 75 grids x 0.75 = | 56.25 |
| Orange | 26 grids x 0.50 = | 13.00 |
| Brown | 8 grids x 0.25 = | 2.00 |
| Red | 3 grids x 0.00 = | 0.00 |
| | 158 grids | 117.25 pts. |

| | | |
|---|---|---|
| Default Green | 0 grid x 1.00 = 0.00 | |
| Default Red | 6 grids x 0.00 = 0.00 | |
| Blue | 2 grids | |
| | 8 grids | 0.00 pts. |

(Red text are portions which changed by the test results)

Performance data (scores) of the grids other than those for which tests are conducted shall be multiplied by the correction coefficient.
117.25×1.032 = 121.002 pts.

<Blue Grid NASVA Performance Test>
2 Blue Zones including 2 Blue Grids shall be tested by NASVA.

| Blue Zone | 1 | 2 |
|---|---|---|
| Grid | R11 C1 | R11 C-1 |
| Test Grid's Test Results (HIC) | 1199.0 | 902.0 |
| Test Grid's Test Results (color, score) | 0.50 | 0.75 |

<Calculating the Total Score>

| | | |
|---|---|---|
| Predicted 158 grids | | 121.002 |
| Default Green | 0 grids | 0.000 |
| Default Red | 6 grids | 0.000 |
| Test Green | 4 grids | 1.00×4 = 4.000 |
| Test Yellow | 5 grids | 0.75×5 = 3.750 |
| Test Orange | 1 grid | 0.50×1 = 0.500 |
| Blue Test Orange | 1 grid | 0.50×1 = 0.500 |
| Blue Test Yellow | 1 grid | 0.75×1 = 0.750 |
| 176 grid Points | | 130.502 pts. |

The percentage to the perfect score is: 130.502/176＝74.1488 → 74.149%
The final Head Score is: 4×0.74149＝2.9659 → 2.96 pts.

**2. Pedestrian Leg Protection Performance Evaluation**

**(1) Evaluation Procedure**

Evaluation results shall be the values that correspond to the total scores in Rating Table 3.

The total score shall be the average of areas L1, L2 and L3.

The scores of each area shall be the average of the subdivided areas.

The subdivided area score shall be the sum of Tibia Score (a) and Knee Score (b).

**(ii) Score Calculation**

・**Calculating the Tibia Score**

The following formula shall be used to calculate scores for Tibia 1 to Tibia 4 (perfect score 4 points) and the lowest value shall be the Tibia Score.

Coloring shall be conducted using the color chart by the leg injury value.

306 Nm < Tibia **Flexion** Moment: Tibia Score: = 0

202 Nm ≦ Tibia **Flexion** moment ≦ 306 Nm : Tibia Score

$$= 4 - \frac{\text{Tibia Flexion moment} - 202}{26}$$

Tibia **Flexion** moment < 202 Nm : Tibia Score = 4

- **Knee Score Calculation**

For the medial collateral ligament (MCL) stretch amount, a score (perfect score 4 points) shall be calculated by the following formula. However, the Knee Score shall be 0 point when either the anterior cruciate ligament (ACL) stretch amount or the posterior cruciate ligament (PCL) stretch amount exceeds 13mm.

Coloring shall be conducted using the color chart by the leg injury value.

19.8mm < MCL stretch amount: Knee Score = 0

14.8mm ≤ MCL stretch amount: Knee Score = 4 - 4/5 (MCL stretch amount - 14.8)

MCL stretch amount < 14.8mm Knee Score = 4

- **Leg Score Calculation**

Leg Scores for each impact point shall be calculated by following formula, using Tibia and Leg Scores. The Leg Score shall be the average the scores of the subdivided areas.

Leg Score of an impact point = Tibia Score x 0.73 + Knee Score x 0.27

- **Head Protection Performance Test Evaluation**
- **Rounding:**

The Head Protection Performance Test Scores shall be rounded to two decimal places.

- **Leg Protection Performance Test Evaluation**
- **Rounding:**

The Leg Safety Performance Test Scores shall be rounded to two decimal places.

- **Calculating the Pedestrian Protection Scores**
- **Calculation Method:**

The Pedestrian Safety Score shall be calculated by the following formula, using the Head and Leg Scores.

**Pedestrian Protection Score = 32.00/4 x Head Score + 5.00/4 x Leg Score**

・**Rounding:**

Scores shall be rounded to two decimal places.

**Article 5: Seatbelt Alarm Evaluation**

**1. Seatbelt Alarm Performance Test Evaluation**

**(1) Evaluation Procedure**

・For seatbelt alarms including the change of status alarms (front passenger seatbelt alarm, back seatbelt alarm), the items suited for each seatbelt alarm by the type of alarm (audio or visual) shall be the subject of evaluation.

・Evaluation results shall be the values that correspond to the total scores in Rating Table 5.

・The total score shall be the sum of scores that are calculated based on the evaluation criteria by the target seat, the type of alarm and the like.

**(2) Evaluation Criteria**

・Based on the total score (perfect score 100 points) of visual and audio alarms, levels are indicated in scale of five.

・Evaluation scores for the alarms shall be as outlined in the chart below.

**Front Passenger Seatbelt Alarm:** The sum of the Visual and Audio alarm scores shall be the total score.

| | | |
|---|---|---|
| Visual Alarm | When the alarm indicator can be confirmed from either the driver or the front passenger seat | Score<br>10 |

| | | |
|---|---|---|
| Audio Alarm | When the alarm sound can be confirmed from the driver and the front passenger seat | Score<br>40 |
| | When the alarm sound can be confirmed from either the driver or the front passenger seat | 20 |

- If the front seats are a bench seat or if there are multiple seats, the scores shall be those that can be confirmed by dividing the values above by the number of seats.

**Backseat Seatbelt Alarm:** The sum of the Visual and Audio alarm scores shall be the total score.

| | | | |
|---|---|---|---|
| Visual Alarm | Display Position | | Score |
| | Rearview mirror, center console (including center meter) | When the alarm at one of the locations on the left can be confirmed from the driver seat and the backseat | 25 |
| | | When the alarm at one of the locations on the left can be confirmed from either the driver seat or the backseat. | 12.5 |

| | | | |
|---|---|---|---|
| | In the speedometer, in front of driver's seat, in front of front passenger seat | If the alarm indicated at the locations on the left can be confirmed from the driver seat. | 12.5 |
| | Ceiling, backseat center section, in front of window backseat | If the alarm indicated at the locations on the left can be confirmed from the backseat. | 12.5 |

- When there are multiple backseats, the scores shall be those that can be confirmed by dividing the backseat score in the above list (12.5 pts.) by the number of all backseats.
- For the indication on the center console of the backseat visual alarm visibility, the score allocation per seat confirmed by the eye point position shall be as follows.

  ・If it can be confirmed from eye points of both men and women: 1

  ・If it can be confirmed from an eye point of either men or women: 0.5

  ・If it cannot be confirmed from eye points of men or women: 0

  (For two eyes, it is acceptable if visibility can be confirmed from a position of either eye.)
- Double points shall not be added when multiple visual alarms can be confirmed from the same seat.

| | | Score |
|---|---|---|
| Audio Alarm | When the alarm sound can be confirmed from both the driver seat and the backseat. | 25 |
| | When the alarm sound can be confirmed from either the driver seat or the backseat. | 12.5 |

- When there are multiple seats, the scores shall be those that can be confirmed by dividing the backseat scores in the above list (12.5 pts.) by the number of all backseats.

・The total score shall be rounded to two decimal places.

**Article 6: Collision Safety Performance Evaluation**

**(1) Evaluation Procedure:**

The evaluation results shall be the values that correspond to the total scores in Rating Table 6.

The total score shall be the sum of the passenger safety protection evaluation, pedestrian protection performance evaluation and the seatbelt reminder scores.

The scores shall be calculated as follows:

**(2) Score Calculation**

**(i) Passenger Protection Performance Evaluation**

The score of the passenger protection performance evaluation shall be the sum of the scores of full-wrap frontal collision safety performance test, the offset frontal collision

safety performance test, the side collision safety performance test and the rear collision neck protection performance test. Each score shall be calculated as follows.

・**Full-wrap Frontal Collision Safety Performance Test:**

The full-wrap frontal collision safety performance test score shall be calculated by multiplying the sum of the driver's seat and front passenger seat scores by the weighting factor of 0.875.

・**Offset Frontal Collision Safety Performance Test:**

The offset frontal collision safety performance score shall be calculated by multiplying the sum of the driver's seat and front passenger seat scores by the weighting factor of 0.875.

・**Side Collision Safety Performance Test:**

The side collision test score shall be calculated by multiplying the sum of the driver's seat and front passenger seat scores by the weighting factor of 0.625.

・**Rear Collision Neck Protection Performance Test:**

The rear collision test scores shall be calculated by multiplying the sum of the driver's seat and front passenger seat scores by the weighting factor of 0.0833.

**(ii) Pedestrian Protection Performance Test**

The pedestrian protection performance test score shall be the sum of scores of the pedestrian head protection performance test and the pedestrian leg protection performance test.

Each evaluation score shall be calculated as follows.

・**Pedestrian Head Protection Performance Test**

The Pedestrian Head Safety Performance Score shall be calculated by multiplying the Head Score by the weighting factor of 8.000.

・**Pedestrian Leg Protection Performance Test**

The Pedestrian Leg Protection Performance Score shall be calculated by multiplying the average scores of each part by the weighting factor of 1.250.

**(iii) Seatbelt Reminder Alarm Evaluation**

The Seatbelt Reminder Evaluation Score shall be calculated by multiplying the sum of scores of front passenger seat and backseat seatbelt reminder test scores by the weighting factor of 0.04.

**(3) Other**

If an evaluation score is lower than the highest rating by two or more levels, the vehicle shall not receive a 5-star rating. Further, the seatbelt reminder evaluation shall be excluded.

[Rating Table 1] (Full-wrap, offset, side collision, rear collision)

| Evaluation Results | Total Score |
|---|---|
| Level 5 | 10.5 or more |
| Level 4 | 9.0 ~ 10.4 |
| Level 3 | 7.5 ~ 8.9 |
| Level 2 | 6.0 ~ 7.4 |
| Level1 | Under 6.0 |

[Rating Table 2] (Pedestrian Head)

| Evaluation Results | Total Score |
|---|---|
| Level 5 | 3.14 or higher |
| Level 4 | 2.61 ~ 3.13 |
| Level 3 | 2.07 ~ 2.60 |
| Level 2 | 1.54 ~ 2.08 |
| Level 1 | Under 1.54 |

[Rating Table 3] (Pedestrian Leg)

| Evaluation Results | Total Score |
|---|---|
| Level 5 | 3.50 or higher |
| Level 4 | 3.00 ~ 3.49 |
| Level 3 | 2.50 ~ 2.99 |
| Level 2 | 2.00 ~ 2.49 |
| Level 1 | Under 2.00 |

[Rating Table 4] (Pedestrian Legs) Color-coding by Leg Injury Criterion

| Display | Tibia (Nm) | Knee (MCL: mm) | Knee (ACL&PCL) |
|---|---|---|---|
| | ~ 202.0 | ~ 14.8 | When under 13.0mm, represented by MCL. |
| | 202.1 ~ 253.0 | 14.9 ~ 17.7 | |
| | 253.1 ~ 283.0 | 17.8 ~ 18.9 | |
| | 283.1 ~ 305.9 | 19.0 ~ 19.7 | |
| | 306.0 ~ | 19.8 ~ | 13.0mm or more |

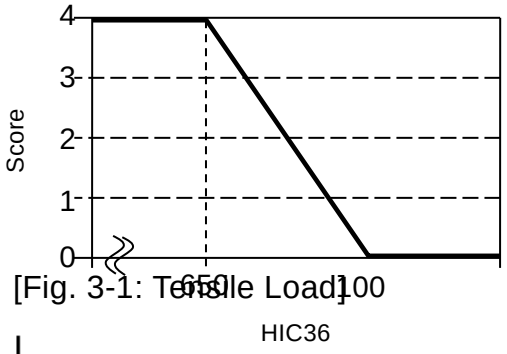
[Rating Table 5] (Seatbelt Reminder)

| Evaluation Results | Total Score |
|---|---|
| Level 5 | 90.0 points or more |
| Level 4 | 75.0 ~ 89.9 |
| Level 3 | 60.0 ~ 74.9 |
| Level 2 | 45.0 ~ 59.9 |
| Level 1 | Under 45.0 |

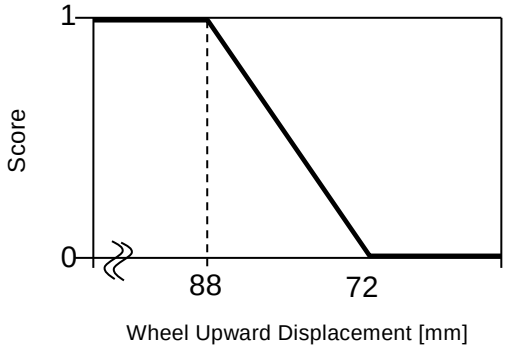
[Rating Table 6] (Collision Safety Performance Evaluation)

| Evaluation Results | Total Score |
|---|---|
| ★★★★★ | 82.0 points or more |
| ★★★★ | 72.5 ~ 81.9 |
| ★★★ | 63.0 ~ 72.4 |
| ★★ | 53.5 ~ 62.9 |
| ★ | Under 53.5 |

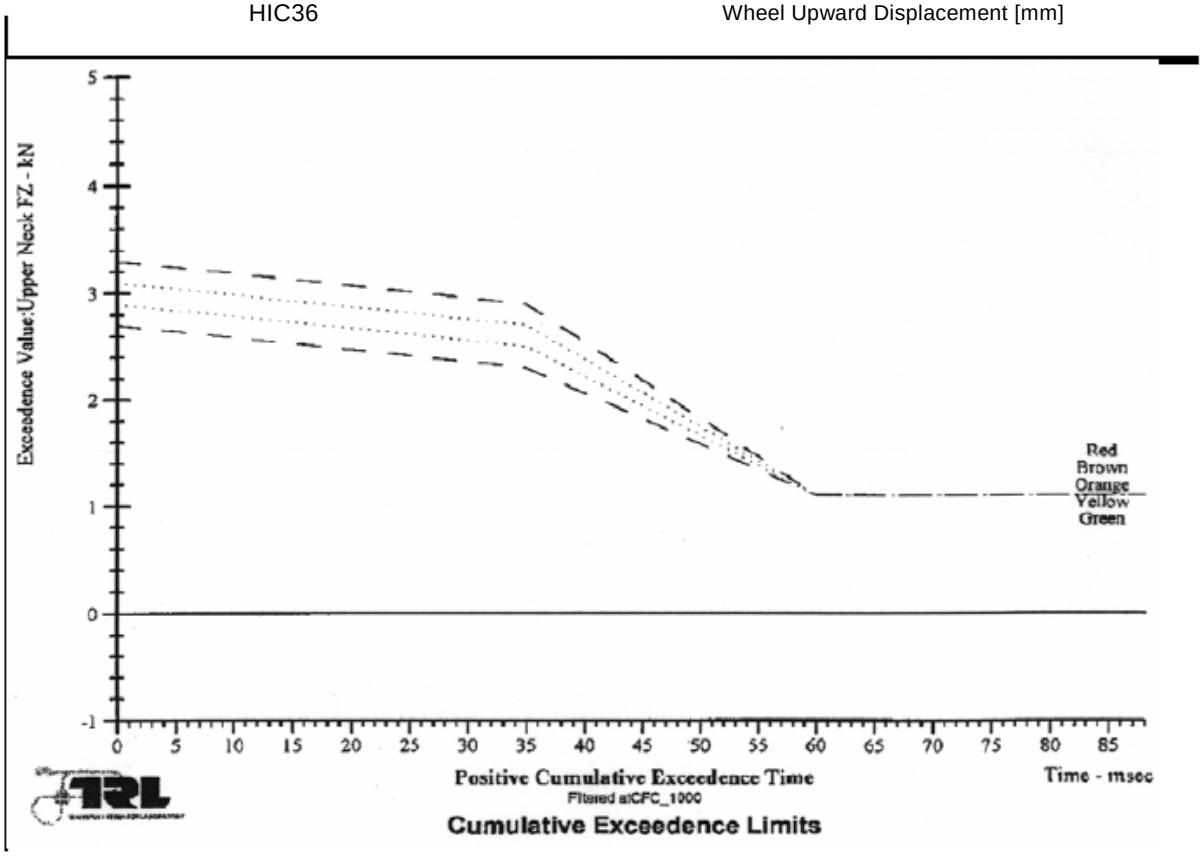
[Fig. 1: Head Injury Criterion]



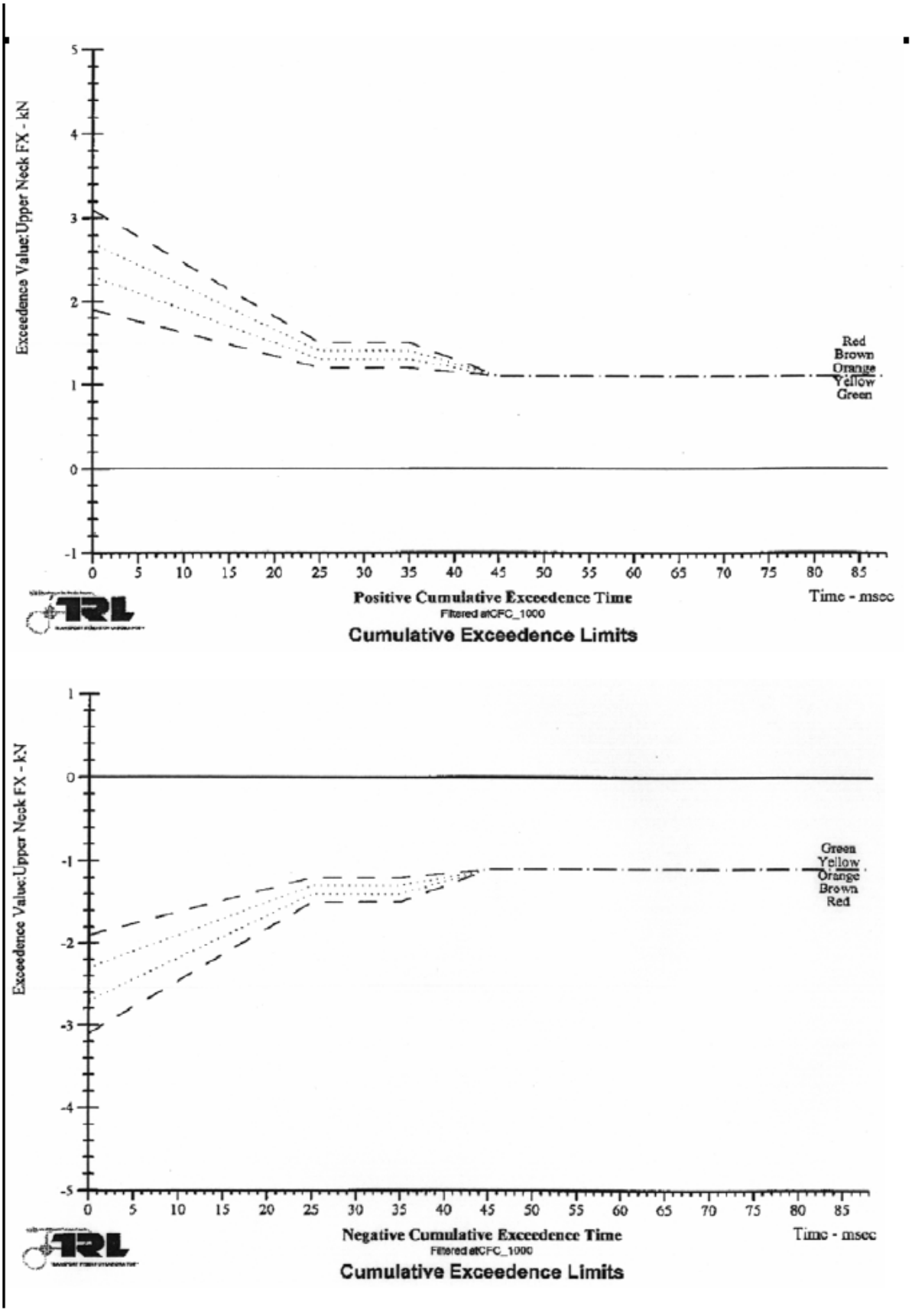

[Fig. 2: Degree of Wheel Upward Displacement]



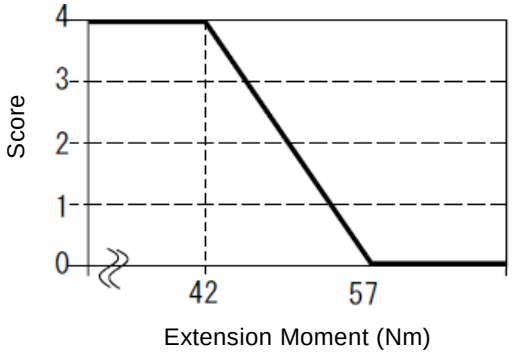

[Fig. 3-1: Tensile Load]



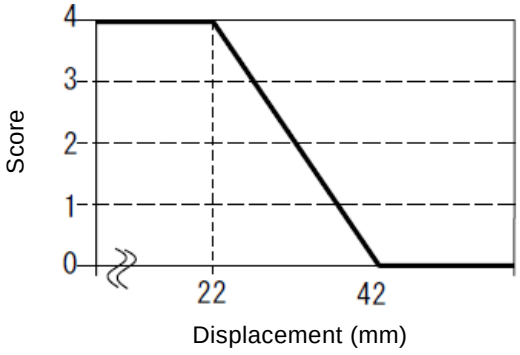
[Fig. 3-2-1: Shearing Load (1) (Top)]  [Fig. 3-2-1: Shearing Load (2) (bottom)]



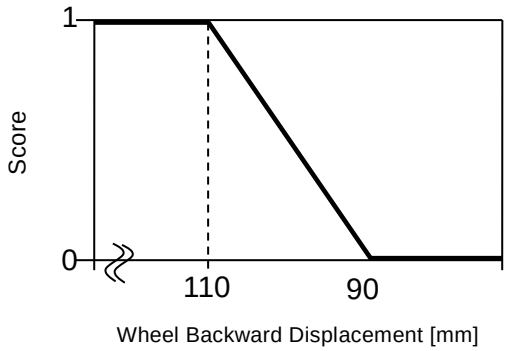
[Fig. 3-3: Extension Moment]



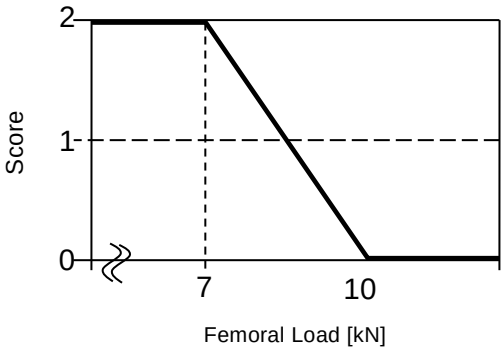

[Fig. 4: Chest Displacement Amount]



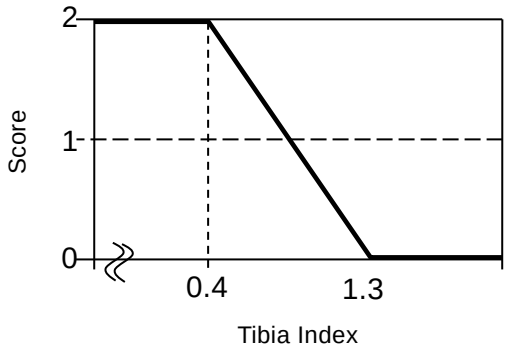

[Fig. 5: Steering Backward Displacement]



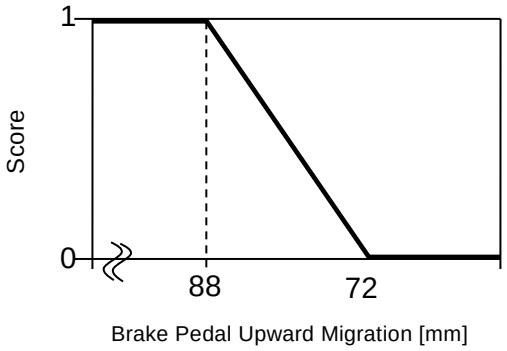

[Fig. 6: Femoral load]



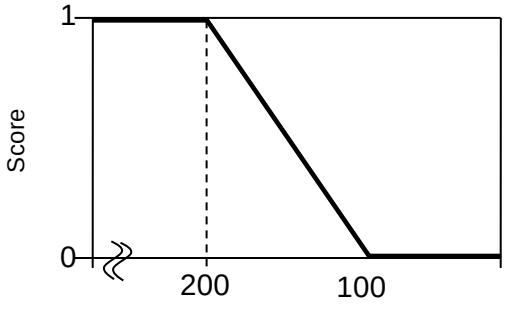

[Fig. 7: Tibia Index]



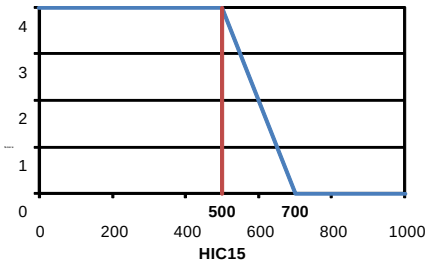

[Fig. 8: Brake Pedal Upper Displacement]



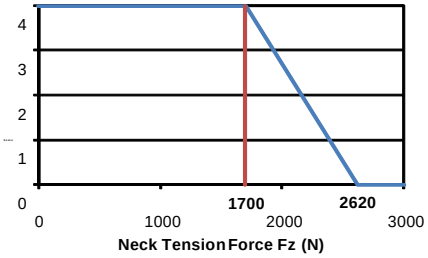

[Fig. 9: Brake Pedal Backward Displacement]



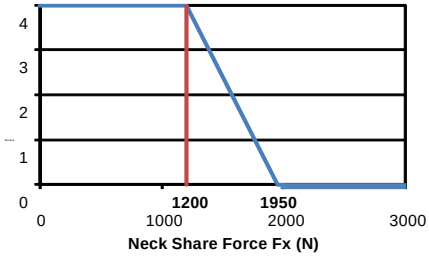

[Fig. 10: Head Injury Criterion]



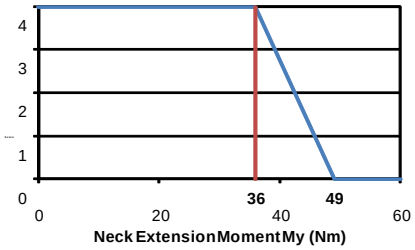
[Fig. 11-1: Tensile Load]



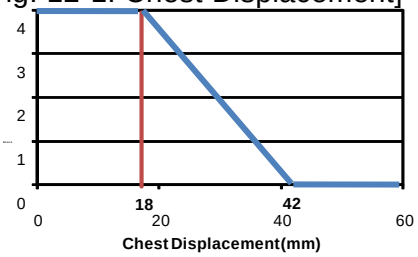

[Fig. 11-2: Shearing Load]



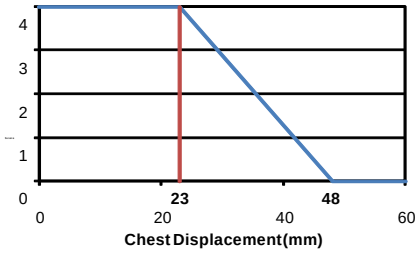

[Fig. 11-3: Extension Moment



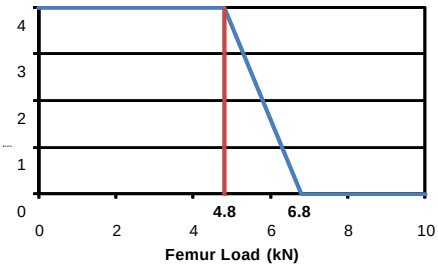

[Fig. 12-1: Chest Displacement]



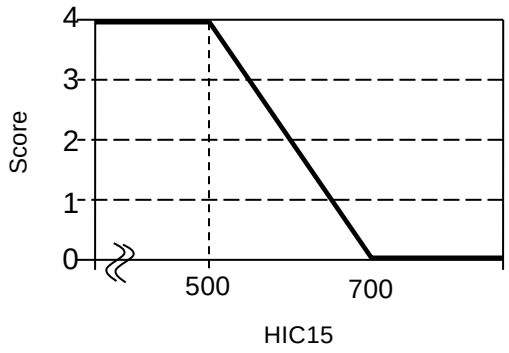

[Fig. 12-2: Chest Displacement]



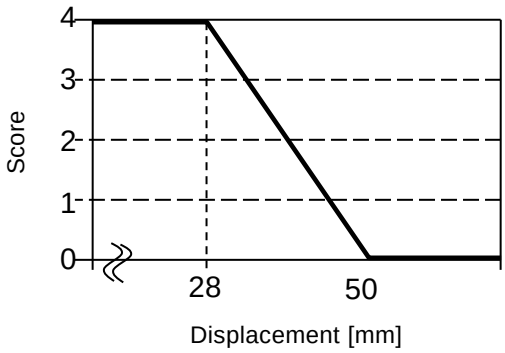

[Fig. 13: Femur Load]



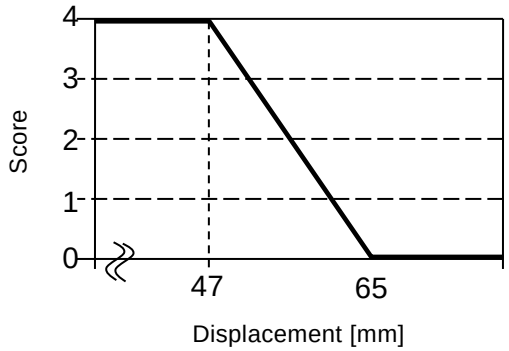

[Fig. 14: Head Injury Criterion]



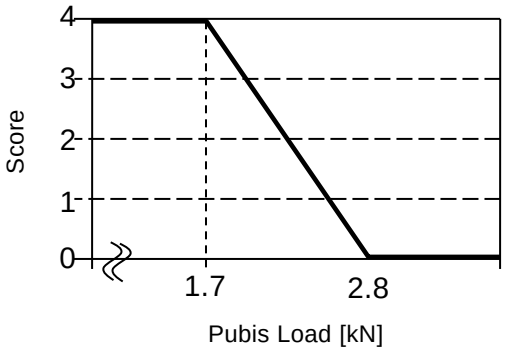

[Fig. 15: Chest Displacement]




[Fig. 16: Abdominal Displacement]

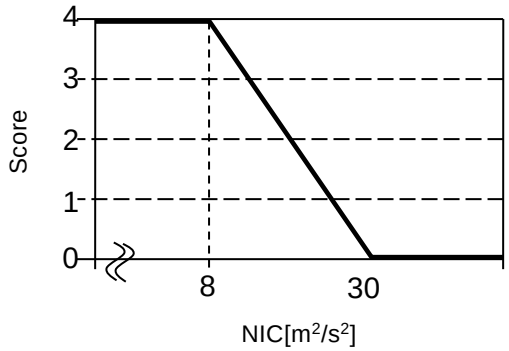



[Fig. 17: Suprapubic Load]

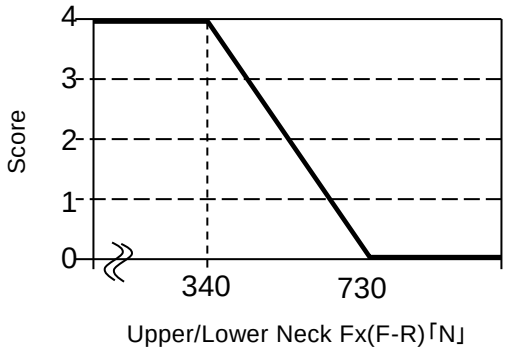


[Fig. 18: Compliance Label]

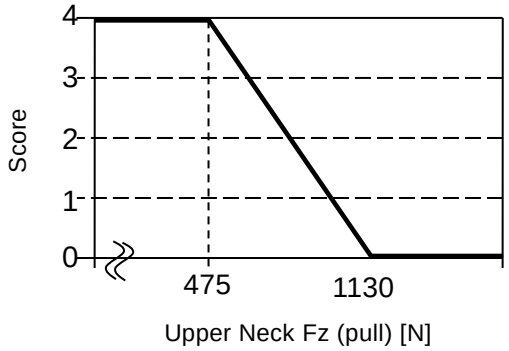

[Fig. 19: Neck Injury Criterion]



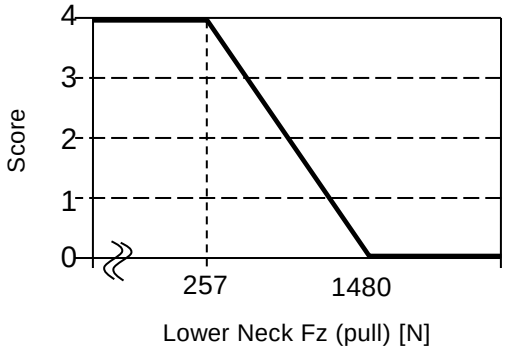

[Fig.20: Neck Shearing Load (front/rear)]



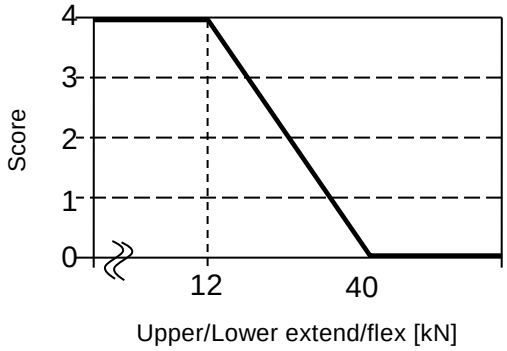

[Fig. 21-1: NIC: Upper-Neck]



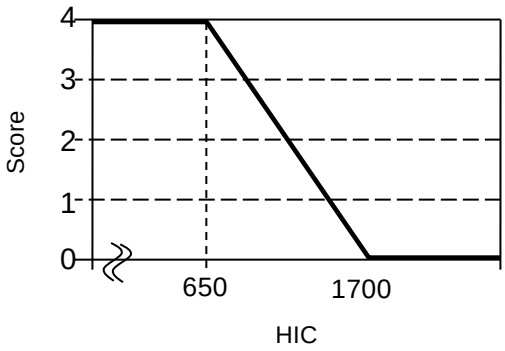

[Fig. 21-2: NIC: Lower-Neck]



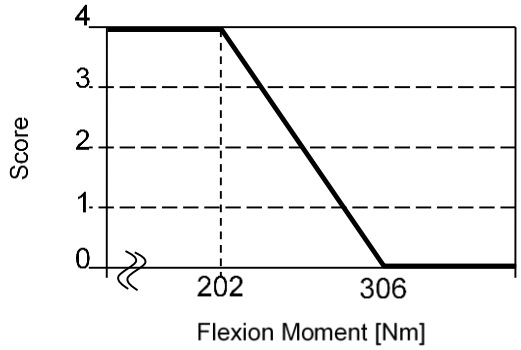

[Fig. 22: Neck Extension Moment]



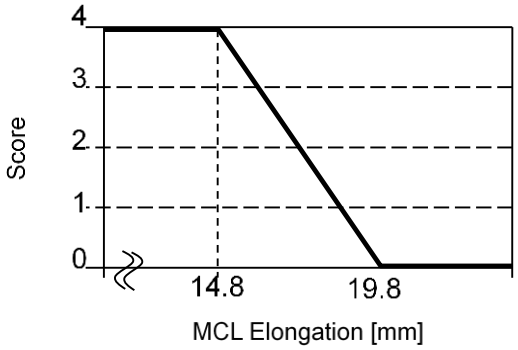

[Fig. 23: Head Injury Criterion]



[Fig. 24: Tibia Flexion Moment




[Fig. 25: Knee Extension Moment]



## Chapter 3: Preventative Safety Performance Evaluation Procedure

**Article 7:** Results of the preventive safety performance tests shall be evaluated by the following method.

**Article 8: Autonomous Emergency Braking System (car to car) Performance Test**

Based on the test subjects (AEBS or FCWS), the test scenarios (CCRs or CCRm) and the following scoring table specified for each test speed, the evaluation results for each condition shall be calculated by multiplying by the test results of the velocity reduction rate under each condition. The total score shall be rounded to one decimal place and shall be the evaluation score of the system.

Additionally, even if the test ends in mid-course upon satisfying the termination conditions of the test, the velocity reduction rate obtained under the vehicle speed condition at the time of termination is valid and added as an evaluation score.

| Test Scenario | Speed Condition | Evaluation Score AEBS Test | Evaluation Score FCWS Test |
|---|---|---|---|
| CCRs | 10 km/h | 1.0 | 1.0 |
| | 15 km/h | 1.0 | 1.0 |
| | 20 km/h | 1.0 | 1.0 |
| | 25 km/h | 1.0 | 1.0 |
| | 30 km/h | 1.0 | 1.0 |
| | 35 km/h | 2.0 | 2.0 |
| | 40 km/h | 2.0 | 2.0 |
| | 45 km/h | 1.5 | 1.5 |
| | 50 km/h | 1.0 | 1.0 |
| | 55 km/h | (0.5) (*) | 0.5 |
| | 60 km/h | (0.5) (*) | 0.5 |
| CCRm | 35 km/h | 0.5 | 0.5 |
| | 40 km/h | 0.5 | 0.5 |
| | 45 km/h | 1.0 | 1.0 |
| | 50 km/h | 1.0 | 1.0 |
| | 55 km/h | 0.5 | 0.5 |
| | 60 km/h | 0.5 | 0.5 |

(*) Because the Target Test Vehicle (Target) is capable of handling up to 50 km / h, this test shall currently not be carried out due to safety concerns.

**Article 9: Autonomous Emergency Braking System (car to pedestrian) Performance Test**

**[Daytime Conditions]**

Based on the following scoring table specified for each test vehicle speed in the standard evaluation test and partial evaluation test under each test scenario (without obstruction [CPN], with obstruction [CPNO]), base scores for each condition shall be calculated by multiplying the test results of the velocity reduction rate under each condition.

Further, for the additional conditions (the wrap rates of 25%, 75%, the walking speed of 8 km/h, child target), the velocity reduction rate of the vehicle speed condition for which testing is not carried out shall be calculated, while assuming that the velocity reduction rate shall be equivalent under the vehicle speed conditions of other than the representative vehicle speed based on the "proportions of velocity reduction ratios between the standard evaluation test results and the partial evaluation test results".
Then, from the base scores under each condition, a correction coefficient shall be obtained for the test results under the standard conditions (wrap ratio 50%, pedestrian speed 5/km/h, adult target), which shall be multiplied for each test scenario to determine the evaluation scores of each test scenario. These total scores shall be rounded to one decimal place.

Moreover, regarding the conditions under which the FCWS test was carried out, the same calculation shall be carried out upon equally dividing the scores of the AEBS test and the FCWS test, and the sum of the AEBS test results and the FCWS test results shall be the evaluation score of the system.

Additionally, even if the test ends in mid-course upon satisfying the termination conditions of the test, the velocity reduction rate obtained under the vehicle speed condition at the time of termination is valid and added as an evaluation score.

Base Point Allocation for Standard Evaluation Tests

(without obstruction ①, with obstruction②)

| Speed Condition | w/o obstruction ① | w/obstruction ② |
|---|---|---|
| 10km/h | 1 | - |
| 15km/h | 1 | - |
| 20km/h | 2 | - |
| 25km/h | 2 | 1 |
| 30km/h | 2 | 1 |
| 35km/h | 3 | 1 |
| 40km/h | 3 | 1 |
| 45km/h | 2 | 1 |
| 50km/h | 2 | - |
| 55km/h | 1 | - |
| 60km/h | 1 | - |
| TOTAL | 20 | 5 |

## Basic Point Allocation for Partial Tests

③Lap Ratio Cond. (w/o obstruction) ④ Ped. Speed Cond. (w/o obstruction) ⑤PT Cond. (w/o obstruction)

| Speed km/h | CPN-5kph- Adult | | |
|---|---|---|---|
| | 25% | 50% | 75% |
| 10 | 0.2 | 0.6 | 0.2 |
| 15 | 0.2 | 0.6 | 0.2 |
| 20 | 0.4 | 1.2 | 0.4 |
| 25 | 0.4 | 1.2 | 0.4 |
| 30 | 0.4 | 1.2 | 0.4 |
| 35 | 0.6 | 1.8 | 0.6 |
| 40 | 0.6 | 1.8 | 0.6 |
| 45 | 0.4 | 1.2 | 0.4 |
| 50 | 0.4 | 1.2 | 0.4 |
| 55 | 0.2 | 0.6 | 0.2 |
| 60 | 0.2 | 0.6 | 0.2 |
| Base Score | 4 | 12 | 4 |
| Allocation Ratio | 1 | 3 | 1 |

| Speed km/h | CPN-50%-Adult | |
|---|---|---|
| | 5kph | 8kph |
| 10 | 0.9 | 0.1 |
| 15 | 0.9 | 0.1 |
| 20 | 1.8 | 0.2 |
| 25 | 1.8 | 0.2 |
| 30 | 1.8 | 0.2 |
| 35 | 2.7 | 0.3 |
| 40 | 2.7 | 0.3 |
| 45 | 1.8 | 0.2 |
| 50 | 1.8 | 0.2 |
| 55 | 0.9 | 0.1 |
| 60 | 0.9 | 0.1 |
| Base Score | 18 | 2 |
| Allocation Ratio | 9 | 1 |

| Speed km/h | CPN-50%-5kph | |
|---|---|---|
| | Adult | Child |
| 10 | 0.9 | 0.1 |
| 15 | 0.9 | 0.1 |
| 20 | 1.8 | 0.2 |
| 25 | 1.8 | 0.2 |
| 30 | 1.8 | 0.2 |
| 35 | 2.7 | 0.3 |
| 40 | 2.7 | 0.3 |
| 45 | 1.8 | 0.2 |
| 50 | 1.8 | 0.2 |
| 55 | 0.9 | 0.1 |
| 60 | 0.9 | 0.1 |
| Base Score | 18 | 2 |
| Allocation Ratio | 9 | 1 |

⑥Lap Ratio Cond. (w/obstruction)　⑦Ped. Speed Cond. (w/obstruction)　⑧PT Cond. (w/obstruction)

| Speed km/h | CPNO | | |
|---|---|---|---|
| | 25% | 50% | 75% |
| 10 | – | – | – |
| 15 | – | – | – |
| 20 | – | – | – |
| 25 | 0.2 | 0.6 | 0.2 |
| 30 | 0.2 | 0.6 | 0.2 |
| 35 | 0.2 | 0.6 | 0.2 |
| 40 | 0.2 | 0.6 | 0.2 |
| 45 | 0.2 | 0.6 | 0.2 |
| 50 | – | – | – |
| 55 | – | – | – |
| 60 | – | – | – |
| Base Score | 1 | 3 | 1 |
| Allocation Ratio | 1 | 3 | 1 |

| Speed km/h | CPNO | |
|---|---|---|
| | 5kph | 8kph |
| 10 | – | – |
| 15 | – | – |
| 20 | – | – |
| 25 | 0.9 | 0.1 |
| 30 | 0.9 | 0.1 |
| 35 | 0.9 | 0.1 |
| 40 | 0.9 | 0.1 |
| 45 | 0.9 | 0.1 |
| 50 | – | – |
| 55 | – | – |
| 60 | – | – |
| Base Score | 4.5 | 0.5 |
| Allocation Ratio | 9 | 1 |

| Speed km/h | CPNO | |
|---|---|---|
| | Adult | Child |
| 10 | – | – |
| 15 | – | – |
| 20 | – | – |
| 25 | 0.9 | 0.1 |
| 30 | 0.9 | 0.1 |
| 35 | 0.9 | 0.1 |
| 40 | 0.9 | 0.1 |
| 45 | 0.9 | 0.1 |
| 50 | – | – |
| 55 | – | – |
| 60 | – | – |
| Base Score | 4.5 | 0.5 |
| Allocation Ratio | 9 | 1 |

## Correction by Additional Conditions and Calculation Method of Evaluation Scores

| Additional Conditions | CPN Results | Correction Factor | CPN Score | CPNO Results | Correction Factor | CPNO Score | Evaluation Score |
|---|---|---|---|---|---|---|---|
| Wrap Ratio | ③ | =③／① | =① × The 3 correction factors on the left | ⑥ | =⑥／② | =② × The 3 correction factors on the left | =CPN SCORE + CPNO SCORE |
| Pedestrian Speed | ④ | =④／① | | ⑦ | =⑦／② | | |
| PT | ⑤ | =⑤／① | | ⑧ | =⑧／② | | |
| Standard Evaluation Test Results | ① | | | ② | | | |

**[Nighttime Conditions: With Street Light]**

Based on the following scoring table specified for each test vehicle speed of the standard evaluation test and the partial evaluation test for each test scenario (without obstruction [CPF], with obstruction [CPFO]), base scores for each condition shall be calculated by multiplying the test results of the velocity reduction rates under each condition. Further, for the additional conditions (the wrap rate of 25%, 75%, the walking speed of 8 km/h, child target), the velocity reduction rate of the vehicle speed condition for which testing is not carried out shall be calculated, while assuming that the velocity reduction ratio shall be equivalent under the vehicle speed conditions of other than the representative vehicle speed based on the “proportion of velocity reduction ratios between the standard evaluation test results and the partial evaluation test results".

Then, from the base scores under each condition, a correction coefficient shall be obtained for the test results under the standard conditions (wrap ratio 50%, pedestrian speed 5/km/h, adult target), which shall be multiplied for each test scenario to determine the evaluation scores of each test scenario. These total scores shall be rounded to one decimal place.

Furthermore, regarding the conditions under which the FCWS test was carried out, the same calculation shall be carried out upon equally dividing the scores of the AEBS test and the FCWS test, and the sum of the AEBS test results and the FCWS test results shall be the evaluation score of the system.

Additionally, even if the test ends in mid-course upon satisfying the termination conditions of the test, the velocity reduction rate obtained under the vehicle speed condition at the time of termination is valid and added as an evaluation score.

Basic Point Allocation for Standard Evaluation Tests

(without obstruction (i), with obstruction (ii))

| Speed Condition | w/o obstruction (1) | w/obstruction (2) |
|---|---|---|
| 30km/h | **2** | **1** |
| 35km/h | **4** | **1** |
| 40km/h | **6** | **1** |
| 45km/h | **6** | **2** |
| 50km/h | **6** | **1** |
| 55km/h | **5** | **1** |
| 60km/h | **3** | **1** |
| Total | **32** | **8** |

## Point Allocation for Partial Evaluation Tests

(iii) Wrap Ratio Condition(w/o obstruction)

| Speed km/h | CPF-5kph | | |
|---|---|---|---|
| | 25% | 50% | 75% |
| 30 | 0.40 | 1.20 | 0.40 |
| 35 | 0.80 | 2.40 | 0.80 |
| 40 | 1.20 | 3.60 | 1.20 |
| 45 | 1.20 | 3.60 | 1.20 |
| 50 | 1.20 | 3.60 | 1.20 |
| 55 | 1.00 | 3.00 | 1.00 |
| 60 | 0.60 | 1.80 | 0.60 |
| Base Score | 6.40 | 19.20 | 6.40 |
| Allocation Ratio | 1 | 3 | 1 |

(iv) Pedestrian Speed Condition(w/obstruction)

| Speed km/h | CPF-50% | |
|---|---|---|
| | 5kph | 8kph |
| 30 | 1.80 | 0.20 |
| 35 | 3.60 | 0.40 |
| 40 | 5.40 | 0.60 |
| 45 | 5.40 | 0.60 |
| 50 | 5.40 | 0.60 |
| 55 | 4.50 | 0.50 |
| 60 | 2.70 | 0.30 |
| Base Score | 28.80 | 3.20 |
| Allocation Ratio | 9 | 1 |

(v) Wrap Ratio Condition (w/obstruction)

| Speed km/h | CPFO | | |
|---|---|---|---|
| | 25% | 50% | 75% |
| 30 | 0.20 | 0.60 | 0.20 |
| 35 | 0.20 | 0.60 | 0.20 |
| 40 | 0.20 | 0.60 | 0.20 |
| 45 | 0.40 | 1.20 | 0.40 |
| 50 | 0.20 | 0.60 | 0.20 |
| 55 | 0.20 | 0.60 | 0.20 |
| 60 | 0.20 | 0.60 | 0.20 |
| Base Score | 1.60 | 4.80 | 1.60 |
| Allocation Ratio | 1 | 3 | 1 |

(vi) Ped. Speed Condition (w/obstruction)

| Speed km/h | CPFO | |
|---|---|---|
| | 5kph | 8kph |
| 30 | 0.90 | 0.10 |
| 35 | 0.90 | 0.10 |
| 40 | 0.90 | 0.10 |
| 45 | 1.80 | 0.20 |
| 50 | 0.90 | 0.10 |
| 55 | 0.90 | 0.10 |
| 60 | 0.90 | 0.10 |
| Base Score | 7.20 | 0.80 |
| Allocation Ratio | 9 | 1 |

Correction by Additional Conditions and Calculation Method of Evaluation Scores

| Additional Conditions | CPF Results | Correction Factor | CPF Score | CPFO Results | Correction Factor | CPFO Score | Evaluation Score |
|---|---|---|---|---|---|---|---|
| Lap Ratio | ③ | =③／① | =① ×The 2 correction factors on the left | ⑤ | =⑤／② | =② ×The 2 correction factors on the left | =CPF SCORE+ CPFO SCORE |
| Pedestrian Speed | ④ | =④／① | | ⑥ | =⑥／② | | |
| Standard Evaluation Test Results | ① | | | ② | | | |

**Article 10: Lane Departure Prevention Device Performance Test**

On the basis of the separately established lane departure prevention device performance test results, the sum of the following scores (1) through (3) (perfect score: 16 points) shall be rounded to two decimal places to calculate the evaluation scores of the device.

(1) Evaluation Scores for LDP and LKA Functions in Standard Tests:
For each test condition applied in standard tests (BL60, BR60, BL70, BR70), the following evaluation scores shall be granted depending on the deviation amount:

| | |
|---|---|
| Deviation Amount. Evaluation Score: ≤ 0.5m | 4.0 pts. |
| Deviation Amount Evaluation Score: over 0.5m ~ 1.0m or less | 2.0 pts. |

(2) Correcting the Evaluation Score by LDWS:
For each test condition carried out in standard tests (BL60, BR60, BL70, BR70), if the LDWS is judged "conformed," the evaluation scores shall be obtained by the formula below and granted:

2.00 - (LDP and LKA Evaluation Scores from Standard Tests) × 0.50

Further, if there is only one type of warning device (limited to tactile or audio), when the deviation direction is easy to confirm, the above shall be the evaluation score; Otherwise, the above divided by 2 shall be the evaluation score.

(3) Manual Reset-type Device Test Evaluation Score

(i) Of the standard tests of (1) above, for those devices on which the LDP and LKA function evaluation scores under the test speed conditions of 70 km/h (BL70 and/or BR70) fall in between over 0.5m and 1.0m or less, if the evaluation value of the departure amount in the manual reset-type device test under the same conditions (EL70 and/or ER70) is 0.5m or less, the evaluation score shall be calculated by the formula below and granted:

(1.0 – [LDWS evaluation score in a standard test] x 0.50) / 2

(ii) If the standard test is not conducted, or for those devices on which the evaluation value of the LDP or LKA function under the test conditions of vehicle speed of 70km/h (BL70 and/or BR70) is over 1.0m, the evaluation scores shall be obtained by the following formula depending on the evaluation values of departure amount in the manual reset-type device test under the same conditions (EL70 and/or ER70) and granted:

A. If the evaluation score is less than 0.5m:

1.00 - (LDWS evaluation score in a standard test) x 0.25

B. If the evaluation score is between over 0.5m and 1.0m or less:
(1.00 - [LDWS evaluation score in a standard test] x 0.25) / 2

**Article 11: Rearview Monitor Performance Test**

The maximum achievable score shall be 6 points. Points shall be reduced by each item when the test results of the "display area" that is separately prescribed in the review monitor test procedure fall under the items in the table below.

| Test | Viewed Object Position | Item to Deduct | Deduction |
|---|---|---|---|
| Proximity Vision | A | Display area requirements not fulfilled (judged: x) | －1 pt. |
| | B | Display area requirements not fulfilled ( judged: x) | －1 pt. |
| | C | Display area requirements not fulfilled ( judged: x) | －1 pt. |
| Near Side | D | Display area requirements not fulfilled ( judged: x) | －1 pt. |
| | E | Display area requirements not fulfilled ( judged: x) | －1 pt. |
| Far Side | F, G, H | Either one of F through G does not meet display area requirements | －1 pt. |

Based on the test results of "display size" in the rearview monitor test procedure, the remaining score after the deduction is multiplied by the following coefficients.

- For viewing sizes of F through H, all viewing angles are 5' or more (judged: Yes): 1.0
- At least one viewing angles is less than 3' (judged: No): 0.0
- Regarding display size of F through H, other than the above: 0.5

**Evaluation score = (score after points are deducted from the display area judgement) × (coefficient by the display size judgment)**

**Article 12: High-Performance Headlights**

From the results of the "Installed Device" and "Operation Speed" in the separately prescribed High-Performance High-beam Headlights Installation Confirmation Procedures, the highest score of (1) through (7) below shall be the evaluation score of the device.

| # | Installed Device | Operation Speed | Score |
|---|---|---|---|
| (1) | Auto. Antiglare Headlight | Entire Speed Range Over 41km/h | 5.0 |
| (2) | Auto. Antiglare Headlight | Entire Speed Range Over 51km/h | 2.4 |
| (3) | Auto. Antiglare Headlight | Entire Speed Range Over 61km/h | 0.7 |

| | | | |
|---|---|---|---|
| (4) | Auto. Switch Headlight | Entire Speed Range Over 41km/h | 1.4 |
| (5) | Auto. Switch Headlight | Entire Speed Range Over 51km/h | 0.6 |
| (6) | Auto. Switch Headlight | Entire Speed Range Over 61km/h | 0.2 |
| (7) | (Either Type) | (Other than the above) | 0.0 |

**Article 13: Acceleration Control Device Upon Wrong Pedal Operation**

From the results of the separately prescribed Test Procedure for Acceleration Control Device Upon Wrong Pedal Operation , the evaluation score shall be the sum of (1) Evaluation Score for Moving Forward and (2) Evaluation Score for Moving in Reverse below.

(1) Evaluation Score for Moving Forward

Points of the chart below shall be granted, depending on the results of the "Test Run Starting Position" and the "Speed Change Rate" of the Fon test results.

(2) Evaluation Score for Moving in Reverse

Points of the chart below shall be granted, depending on the results of the "Test Run Starting Position" and the "Speed Change Rate" of the Ron test results.

| Evaluation Score | | Speed Change Rate | | |
|---|---|---|---|---|
| | | 1.0 or more | 0.1 or more and less than 1.0 | Less than 0.1 |
| Test Run Starting Position | 1.0m | 1.0 | 0.6 | 0.0 |
| | 0.9m | 0.9 | 0.5 | 0.0 |
| | 0.8m | 0.8 | 0.4 | 0.0 |

**Article 14: Preventative Safety Performance Evaluation Procedure**

The overall safety performance evaluation of preventative safety devices shall be the sum of scores for the AEBS (car to car) and the AEBS (car to pedestrian), LDWS, etc, Rearview Monitor, High-Performance Headlights and Acceleration Control Device upon Wrong Pedal Operation, and shall be evaluated by three levels according to the criteria specified below.

| Total Score | Type |
|---|---|
| Above 86 pts. | Preventative Safety Evaluation ASV+++ |
| Between 46 and 86 pts., and carried out AEBS (car to pedestrian) | Preventative Safety Evaluation ASV++ |
| Between 12 and 46 pts. | Preventative Safety Evaluation ASV+ |

## Chapter 4: Evaluation Procedure for Automatic Collision Notification

### Article 15: Automatic Collision Notification

The following indication for compliance shall be used based on the result of the Automatic Collision Notification Installation Confirmation Procedure. (Fig. 26 or 27)

[Fig. 26: Indication of Compliance (ACN)]


[Fig. 27: Indication of Compliance (AACN)]

## Chapter 5: Child Restraint System (CRS) Evaluation Procedure

**Article 16: The results from the CRS Assessment Test shall be evaluated by the following procedure.**

**Article 17: CRS Frontal Collision Safety Performance Test**

(1) Evaluation Classifications

| | |
|---|---|
| Excellent | When there are 4 ◎ marks, excluding cases where there is even 1 ×. |
| Good | When there are 3 ◎ marks and 1 ○ mark, excluding cases where there is even 1 ×. |
| Acceptable | When it does not fall under "Excellent," "Good," or "Not Recommended." |
| Not Recommended | If there is even 1 × mark. |

(2) Evaluation Items and Evaluation Procedure

<For Infants (Other than Beds)>

| Evaluation Items | Individual Evaluation Procedures | | Notes |
|---|---|---|---|
| Condition of damage to CRS anchorage part etc. after collision | No damage | ◎ | ・See Attachment 1 |
| | Light damage (cracks, etc.) | ○ | |
| | Original construction not maintained | × | |
| CRS backrest angle after collision | Angle ≤ 55° | ◎ | |
| | 55° < Angle ≤ 63° | ○ | |
| | 63° < Angle | × | |
| Movement position of the tip of the dummy's head immediately after collision | In the upper end surface of the seat back | ◎ | |
| | Moved within 73mm from the seat back upper end surface | ○ | |
| | Moved by more than 73mm from the upper end surface of the seat back | × | |
| Chest resultant acceleration measured on the dummy at the time of collision | 490m/s$^2$ (50G) ≥ Chest resultant acceleration | ◎ | ・3msG |
| | 490m/s$^2$ (50G) < Chest resultant acceleration | ○ | |
| Other | Seatbelt unbuckled itself | × | |
| | CRS flew out of the seatbelt | × | |

**<For Infants (Beds)>**

| Evaluation Items | Individual Evaluation Procedures | | Notes |
|---|---|---|---|
| Condition of CRS anchorage part etc. after collision | No damage | ◎ | ・See Attachment 1 (same as backward-facing) |
| | Light damage (cracks, etc.) | ○ | |
| | Original construction not maintained | × | |
| Restraint condition (overhang of head from bed, inclination of bed bottom surface) | The bed bottom surface tilts towards the rear of the vehicle (No head protrusion) | ◎ | ・See Attachment 2 |
| | The bottom surface of the bed does not tilt (No head protrusion) | ○ | |
| | The bottom of the bed tilts forward, or there's head protrusion | × | |
| Amount of dummy head movement at the time of collision | Movement ≤ 575mm | ◎ | |
| | 575mm < Movement ≤ 650mm | ○ | |
| | 650mm < Movement | × | |
| Chest resultant acceleration measured on the dummy at the time of collision | $490m/s^2$ (50G) ≥ Chest resultant acceleration | ◎ | ・3msG |
| | $490m/s^2$ (50G) < Chest resultant acceleration | ○ | |
| Other | Seatbelt unbuckled itself | × | |
| | CRS flew out of the seatbelt | × | |

**<For Infants>**

| Evaluation Items | Individual Evaluation Procedures | | Notes |
|---|---|---|---|
| Condition of damage to CRS anchorage part, etc. after collision | No damage | ◎ | ・See Attachment 1 |
| | Light damage (cracking, etc.) | ○ | |
| | Original construction not maintained | × | |
| Amount of dummy head movement at the time of collision | Movement ≤ 525mm | ◎ | |
| | 525mm < Movement ≤ 600mm | ○ | |
| | 600mm < Movement | × | |
| Head resultant acceleration measured on the dummy at the time of collision | $637m/s^2$ (65G) ≥ Head resultant acceleration | ◎ | ・3msG |
| | $637m/s^2$ (65G) < Head resultant acceleration | ○ | |
| Chest resultant acceleration measured on the dummy at the time of collision | $588m/s^2$ (60G) ≥ Chest resultant acceleration | ◎ | ・3msG |
| | $588m/s^2$ (60G) < Chest resultant acceleration | ○ | |
| Chest deflection | If the chest deflection from pressure to the dummy's chest surpasses 40mm, a comment shall be made as of the evaluation announcement. | | |
| Abdominal pressure measured on the dummy at the time of collision | 115kPa < Abdominal pressure | × | |
| Other | Seatbelt unbuckled itself | × | ・For "Harmfulness of restraint condition" and "Dummy dropped out of the seat," refer to Attachment 2 |
| | CRS flew out of the seatbelt | × | |
| | Harmfulness of restraint condition | × | |
| | Dummy dropped out of the seat | × | |

**Article 18: CRS Usability Test**

**1. Evaluation Procedure**

1 point shall be granted every time a test item is met, and the maximum achievable score for each test shall be 5.

However, for the items 2-1 through 2-3 and 4 on ease of installation out of the test items of Attachment 1 of the Test Procedure, and the item 2 on the product labeling, the item 3 on CRS mechanisms, and the items 3-1, 3-2 and 5 out of the test items of Attachment 2 of the Test Procedure, when the test results column is "no function", 1 point is granted to each test item.

**3. Evaluation Results**

In addition to the test report, testing institutes must fill in the appendix corresponding to the type of CRS that was tested on the evaluation results and submit it to NASVA.

**(ATTACHMENT 1)**

# HOW TO JUDGE THE EVALUATION ITEMS ON "ANCHORAGE PART, ETC. DAMAGE CONDITION" OF CRS FRONTAL COLLISION SAFETY PERFORMANCE TEST EVALUATION PROCEDURE

1. Implementation Procedure

Judgment shall be made visually, by touching, etc., after the test. (CRS shall be disassembled as needed.)

2. Evaluation Procedure

As a concept of the evaluation procedure, basically referring to the reference values of safety standards: "◎" shall be granted when the reference values are met, "×" shall be given when an obvious safety problem was confirmed, and "○" shall be provided in other cases.

As a concept of judging damage conditions, "×" shall be given when falling under the following items:

(1) When multiple collisions are assumed and protection against the risk of a frontal collision is not provided (e.g. when installation or restraint is extremely loose)

(2) When there is a possibility of direct injury of the restrained child

Actual cases are considered to vary widely and there is a need to wait until more experiences are gained from future tests before providing details of judgment method; however, the following are the judgment cases that are assumed at present.

**<Definition of Terms>**

- "**CRS Anchorage Part"** refers to ISO-FIX attachments, holes of a CRS through which a test seat's seatbelt passes, fasteners (including cases of accessories) of a CRS for fastening the test seat's seatbelt and the like.
- **"CRS Parts with Strength Retention Functions"** refers to the reclining mechanism, the rotation mechanism, harnesses, harness through-holes, the harness mechanism and buckles, top tethers, support legs etc.
- **CRS "damage"** refers to visible "cracking", "peeling", "rupture", "deformation (excluding support legs that remain contact with the vehicle floor surface)", "fraying" and "disengagement of a button, etc." of a CRS that can be visually checked, and does not include the cases of resin bleaching and others specified in section (4).
- **"Test Seat's Seatbelt Damage"** refers to "holes", "ripping," and "cutoff" of the test seat's seatbelt that can be visually checked.

**<Judgment Cases>**

(1) Cases of granting "◎"

No breakage or damage

(2) Cases of granting "○"

When falling under either of the following. (There is breakage or damage, but it does not fall under "×".)

(i) Breakage of the CRS anchorage part with the CRS mounting by the ISO-FIX attachment or the test seat's seatbelt retained.

(ii) Damage to the test seat's seatbelt with the seatbelt ripped.

(iii) Damage to the CRS parts with strength retention functions that do not fall under the description of (v) through (viii) of section (3) below.

(3) Cases of giving "×"

When falling under either of the following.

(i) Breakage of the CRS anchorage part of with the mounting of CRS by the ISO-FIX attachment coming off on one side or more, or the mounting of CRS by the test seat's seatbelt being extremely loose (those with the overlap portion of the test seatbelt released or the CRS released at the shoulder part of the test seat's seatbelt)

(ii) Breakage of the CRS anchorage part with rupture of the construction around the CRS through-holes through which the test seat's seatbelt passes.

(iii) Damage to the test seat's seatbelt with the seatbelt cut off.

(iv) Breakage of the CRS parts with strength retention functions with the construction of the whole product not retained.

(v) When the dummy cannot be removed easily, such as the force needed to release the buckle, shield, etc. exceeding 80N or the like.

(vi) Damage of buckles, shields, etc. with sharp protrusions that may cause direct injury to the restrained child.

(vii) Rupture of constructions around the harness through-holes.

(viii) Breakage of the harnesses and/or the harness mechanism with the dummy's restraint being extremely loose such as the harnesses coming off from both shoulders of the dummy.

(4) Cases of no breakage of CRS anchorage part or the parts with strength retention functions after the test

For a CRS equipped with a mechanism to absorb impact by breaking (hereinafter, referred to as the "impact-absorbing mechanism"), cases are not deemed breakage when meeting all of the following (i) through (iv):

(i) Technical descriptions on the operation of the impact-absorbing mechanism are submitted before testing.

(ii) In-house test data checking the operation of the shock absorbing mechanism are submitted before testing.

(iii) Photographs of the operation of the impact-absorbing mechanism after the in-house test submitted in (ii) above are available.

(iv) By comparing the CRS after testing with the documents submitted in (i) through (iii), proper operations of the impact-absorbing mechanism is confirmed.

**(ATTACHMENT 2)**

# HOW TO JUDGE THE EVALUATION ITEMS "OTHER" (HARMFULLNESS OF RESTRAINT CONDITION) OF CRS FRONTAL COLLISION SAFETY PERFORMANCE TEST EVALUATION METHOD

## 1. Implementation Procedure

(1) Judgment shall be made by observing dummy restraint conditions and dummy behavior during the collision test with high speed video. (Static restraint conditions shall be checked beforehand for use as reference for making judgment using the high-speed video.)

## 2. Evaluation Procedure

For judgment of harmfulness of restraint conditions, "×" shall be given when falling under the following items.

(1) When the harness puts pressure on vulnerable parts of the body like crotch or neck.

(2) When restraint is removed (when the restraint by harnesses on shoulders comes free, etc.)

Actual cases are considered to vary widely, and there is a need to wait until more experiences are gained from future tests before providing details of judgement method; however, the following are the judgment cases that are assumed at present.

**<Judgment Cases>**

(1) When it is shell-type and the dummy is restrained only by harnesses:

・Cases of giving "×"

(i) The harness is putting pressure on the dummy's neck.

(ii) Restraint on the pelvic bones is weak and the harness is putting pressure on the dummy's abdomen and/or crotch.

(iii) The dummy's shoulder comes free from restraint by harnesses.

(2) When it is a shell-type and the dummy is restrained by pads or shields:

・Cases of giving "×" grade

(i) The harness is putting pressure on the dummy's neck.

(ii) The dummy sinks down and pressure is put on crotch.

(iii) It is a type with shoulder harnesses and the dummy’s shoulder comes free from restraint by harnesses.

(3) When it is clothed-type

・Cases of giving "×"

(i) The harness, etc., is putting pressure on the dummy's neck.

(ii) Restraint on the pelvic bones is weak and the harness is putting pressure on the dummy's crotch.

(iii) The dummy's shoulder comes free from restraint by harnesses, etc.

(iv) The dummy moves forward and falls out of the seat. (The dummy's hips sliding off the seat.)

(4) When it is shell-type and the infant bed undersurface is angled

・Case of giving "×"

(i) The tilt of the bed undersurface is over a level plane.