This is a translation to English for reference purpose of JNCAP test method which is originally prescribed in Japanese language.
Please be sure to refer to the Japanese test method if you need to be precisely correct.

FRONTAL COLLISION SAFETY PERFORMANCE TEST PROCEDURE

Created: April 1, 1995
Revised: May 2, 2024
March 20, 2018
March 24, 2017

1. Effective Dates

This test procedure shall come into effect on April 1, 1995. However, the regulations revised on May 2, 2024 shall come into effect as from May 2, 2024.

2. Scope of Application

This test procedure applies exclusively to the “full wrap frontal collision safety performance” of passenger vehicles with 9 occupants or less and commercial vehicles with a gross vehicle mass of 2.8 tons or less conducted by the National Agency for Automotive Safety and Victims’ Aid (hereinafter referred to as “NASVA”) in the new car assessment program information supply project. However, if the seat belt in the rear test seat is a Class I seat belt or is not equipped, the rear test seat shall not be evaluated.

3. Definition of Terms

The terminology within this test method is defined as follows.

(1) **"Barrier"**: The wall surface with which the test automobiles will collide.

(2) **"Dummy"**: The anatomical models of adult women that ride in the test vehicle. In this test this refers to the Hybrid III Dummy Female 5th Percentile (CFR (United States Code of Federal Regulations) Title 49, Part 572, subpart O) respectively.

(3) **"HIC (Head Injury Criterion) "**: An index showing the degree of injury to the dummy’s head.

(4) **"Chest resultant acceleration"**: The resultant acceleration that occurs in the chest of a dummy at the time of impact.

(5) **"Femur load"**: The load placed upon the portions of the dummy corresponding to the right and left femurs in the axial direction of the femurs at the time of impact.

(6) **"NIC (Neck Injury Criterion) "**: Criterion for neck injuries

(7) **"ThCC (Thorax Compression Criterion) "**: Criterion for thorax compression

(8) **"Designed hip point"**: The standard point determined regarding each seat according to protocol stipulated in an attached document (Attachment 2).

(9) **"Hip point"**: A dummy's hip point in a test automobile as specified by the automobile manufacturer.

(10) **"Ilium load"**: The load placed upon the portions of a dummy corresponding with the right and left iliac pelvic region

(11) **"Slippage of lap belt from the pelvic region"**: A phenomenon in which a lap belt slips from the pelvic region of a dummy and is no longer able to provide proper pelvic restraint.

4. Test Environment

4.1 Condition of Test Vehicles

4.1.1 Provision of Data from Vehicles Manufacturers

The vehicle manufacturer shall provide NASVA with the following data necessary for preparing the test vehicle:

(1) Appendix 1

(2) Points to be specially checked during the preparations for the test. (Points to be checked for test preparations specific to the model concerned or, certain models including the model concerned.)

4.1.2 Mass of Test Vehicle

(1) The mass of the test vehicle shall be adjusted between 100% and 101% of the mass of the test vehicle when brought in*, including the mass of the measuring instruments (40 kg), with no dummy placed in the driver seat or rear seat (the front-most parallel seat behind the driver 's seat) adjacent to the side of the vehicle and on the same side as the front passenger seat (seat adjacent to the side of the vehicle among front seats parallel to the driver's seat), called the rear test seat hereafter.

However, this shall not apply to cases where the mass of the test vehicle cannot be adjusted in this range even after removing parts which will not affect the test results. In the case of a vehicle equipped with a spare tire and tools, etc., the test may be conducted with these installed in the test vehicle.

* Mass when stored: After the testing laboratory has received the test vehicle, its fuel tank shall be emptied, with all fluids aside from capacity, (to the maximum specified range and weights of a mass corresponding to 100% of the fuel tank capacity,(see Appendix 1, paragraph 3) (gasoline automobiles: fuel tank capacity x 0.745g/ml, diesel automobiles: fuel tank capacity x 0.840g/ml) before mass is measured. This mass shall be regarded as the mass at vehicle delivery. The automobile manufacturer may specify the location where the weights are loaded, with the premise that the position of the weights be equivalent to the upper side of

the fuel tank location. These conditions are outlined in Appendix 1-3.

(2) In regard to parts among installed components that have no influence on test results, the parts in question may be removed.

[Examples of components that will not affect the test results]

Rear bumper, rear windshield, trunk door, muffler, lighting units, and other items installed to the rear where the driver seat shoulder harness is affixed.

4.1.3 Vehicle Posture

The test vehicle with the dummies placed in the driver seat and the rear test seat shall have an inclination of ±3° relative to the vehicle manufacturer and importer specified values on the horizontal plane in the fore-and-aft direction and an inclination of ±1° relative to the horizontal plane in the lateral direction.

4.1.4 Test Vehicle Fluids

(1) Oil and similar fluids may be removed.

(2) Battery liquid must be removed (excluding instances where there is no concern of battery liquid leaking during collisions such as when the battery is located in the rear trunk). This does not apply when there is an offer from a manufacturer because there is a possibility that it affects the action of restraint devices. In such a case, the automobile manufacturer, etc. shall indicate this in Appendix 1.

(3) The fuel tank must be filled with colored water equivalent to the fuel mass when the fuel tank is filled to over 90% capacity.

4.1.5 Seat Adjustment

4.1.5.1 Driver Seat

The driver's seat shall be set to a position stipulated within (1) and (5) below. Details on each adjusting device, including compound type adjusting devices, shall be indicated in a separate document.

(1) In cases where the driver seat can be adjusted in a front-back direction using seat rails, the seat shall be adjusted to the midpoint in the front-back direction. However, when the design standard position is not specified, it is made as close as possible to the further intermediate position between the front most position and the intermediate position (within 25% from the front most position of the adjustable range). If it is not possible to adjust to the intermediate position further between the foremost position and the intermediate position, it is adjusted to an adjustable position that is rearward of this position and closest thereto. Also, the distance between the lower leg of the dummy and the instrument panel must be adjusted to a position where it can be secured by at least 30 mm.

(2) In cases where the driver seat can be adjusted in the up-down direction (excluding those instances where the angle of the seat floor, seat surface, and seat back all change simultaneously), the seat shall be adjusted to the design standard position.

(3) In cases where the seat back angle of the driver's seat can be adjusted, the seat shall be adjusted to the standard angle as designed. Furthermore, if the hip support portion of the seat back can be adjusted, this portion shall be adjusted to the lowest possible position.

(4) In cases where the headrest of the driver seat can be adjusted in the up-down direction, the headrest shall be locked in at the lowest possible position in the up-down direction.

(5) In cases where the driver seat has adjustment devices other than those mentioned in (1) to (4), such devices shall be adjusted to the standard position or standard angle as designed.

4.1.5.2 Rear Test Seats

(1) If the rear test seats are adjustable in the fore-and-aft direction by the seat rail, the seats shall be adjusted to the design standard position. However, if the knees of the dummy on the rear test seat contact the seatback of the front seat, the seatback of the front seat shall be moved forward using the fore-and-aft adjusting mechanism and shall be re-adjusted to the proper position where the knees of the dummy do not contact the seatback of the front seat. The range of adjustment is shown below. In this case, other adjusting mechanisms shall not be used. If the front seat is moved forward using the fore-and-aft adjustment mechanism, this position shall be recorded on the record sheet.

① Manual operation: The first rearward notch position where the knees do not contact the seatback of the front seat.

② Electric operation: Keep the distance between the knees of the dummy and the seat back of the front seat to within 5mm.

(2) If the rear test seat is adjustable in the vertical direction, the seat shall be adjusted to the design standard position.

(3) If the seatback angle of the rear test seat is adjustable, it shall be adjusted to the design standard angle. If the seatback also has an adjustable lumbar support, this device shall be adjusted to the rearmost position.

(4) If the rear test seat has an adjustable head restraint system in the up-and-down direction, the middle point of the head restraint itself shall be adjusted to the same height as the center of gravity of the dummy head. If the middle point of the head restraint cannot be adjusted to the same height as the center of gravity of the dummy head, it shall be adjusted to the nearest position below the center of gravity of the dummy head.

(5) If the rear test seat has adjustment mechanisms other than the devices mentioned in (1) through (4), these devices shall be adjusted to the design standard position or angle.

4.1.5.3 Seats other than the Driver and Rear Test Seats

Seats other than the driver seat and rear test seats (referred to hereafter as “front seats”) shall be adjusted to the standard position and angle as designed.

4.1.6 Adjustment of the Steering System

(1) If the steering system can be adjusted in the vertical direction, it shall be adjusted to the geometric center of the adjustment range. However, if the steering system cannot be adjusted to the center, it shall be adjusted to the nearest adjustable position below the center.

(2) If the steering system can be adjusted in the fore-and-aft direction, it shall be adjusted to the geometric center of the adjustment range. If the steering system cannot be adjusted to the center, it shall be adjusted to the nearest adjustable position rearward from the center.

4.1.7 Adjustment of Anchorage for the Seat Belt Shoulder Webbing

If the position of the anchorage for the seat belt shoulder webbing can be adjusted, it shall be adjusted to the design standard position.

4.1.8 Other Vehicle Conditions

4.1.8.1 Ignition

The engine of the test vehicle shall be in the stalled state. However, the ignition switch shall be in the ON position.

If the test vehicle is equipped with electrically controlled restraint devices such as air bags or seat belts with a pre-tensioner, the proper function of the devices shall be confirmed by warning lamps, etc. when the ignition switch is turned to the on position. Furthermore, the test institute will consult with the vehicle manufacturer, and the electric power supply to the motor may be disconnected if the test vehicle has a mechanism such that this action does not influence the abovementioned devices.

4.1.8.2 Side Windows and Doors

The side windows of the test vehicle (excluding the windows rearward from the rear test seat) shall be opened if it is possible.

The doors shall be closed securely but shall not be locked.

Additionally, if the test vehicle is equipped with a vehicle-speed-sensitive or vehicle-speed- and engine-speed-sensitive door locking system and when it’s arming and disarming methods are described in the owner’s manual and the driver can operate it easily without using a tool, etc., the system shall be in the disarmed state

4.1.8.3 Roof

If the roof is removable, the roof shall be installed.

If the roof is a sunroof, the sunroof shall be closed.

If the vehicle is a convertible, the top shall be closed.

4.1.8.4 Drive Axle, Transmission, and Parking Brake

If the drive axle can be selected, the standard drive axle shall be selected.

The transmission shall be neutral.

The parking brake shall be released.

4.1.8.5 Tires

The air pressure of the tires shall meet the requirements of the specification sheet.

4.1.8.6 Others

(1) Installation of Stroboscope, etc.

The test vehicle shall be equipped with a stroboscope, etc. for identifying the moment of collision in photographs taken using a high-speed photography device. However, this provision shall not apply to cases where the stroboscope, etc. is installed in ground facilities within the visual field of the high-speed photography device.

(2) Remodeling the Test Vehicle

The structure and devices of the test vehicle forward from the rear test seat shall not be remodeled. However, such prohibitions do not apply to remodeling necessary for towing the test vehicle, installation of the stroboscope used to identify the moment of collision, installation of the on-board camera used to photograph the movement of the rear test seat dummy, and attachment of instruments for measuring the speed of the test vehicle, insofar as the test results are not affected.

When remodeling is necessary for towing the test vehicle, the hook, lower suspension arms, stabilizers, tension rods, front cross member, and floor cross member may be remodeled.

(3) Attaching Target Marks

In order to grasp the state of deformation in the test, marks (hereafter referred to as "target marks") shall be attached to the test vehicle at points that are not deformed during the test.

When attaching the target marks, the positions of each target mark and intervals between the target marks shall be recorded in the data sheet (dimensions shall be recorded using the key holes and the side sill of the vehicle as a reference).

(4) Coloring of Compartment Interior Trim

The interior trim of the compartment shall be colored using colors other than liquid chalk colors, etc. applied to the dummy so that the position at which the dummy collides with the interior trim can be easily identified.

(5) Adjusting Vehicle Height

The test vehicle shall be in the normal running attitude prescribed in Paragraph 4.1.3. If the vehicle has a mechanism for adjusting the height depending on the vehicle speed, the height of the vehicle shall be adjusted to the height specified by the vehicle manufacturer when traveling at 50km/h.

(6) Collision position confirmation line

The front portion of the test automobile must have line drawn on the portion indicating the central plane of the vehicle in order to confirm collision position with the center of the barrier.

4.1.9 Dummies and Seat Belts

4.1.9.1 Dummy Placement

The dummies shall be placed in the test vehicle under the conditions prescribed in Paragraphs 4.1.5 through 4.1.7 according to Attachment 1-1 for the driver dummy and Attachment 1-2 for the rear test seat dummy. The positions of the seats may be adjusted or parts such as the steering wheel, etc. may be removed, as required, in order to position the dummy in accordance with the provision. After the dummy has been placed in the specified position properly, the positions of the seats shall be returned to the condition prescribed in Paragraphs 4.1.5 through 4.1.7 and the removed parts shall be reinstalled in the original positions.

The seat positions that may be adjusted as prescribed in the above proviso are the seat position in the vertical direction, seatback angle, and lumbar support position of the seatback, installation angle of the lower seat, position of the head restraint in the vertical direction and in the fore-and-aft direction, and axial direction and angle of the steering column. The parts that may be removed are the covers of the devices for adjusting the positions and angles of the seats (seat positions in the vertical direction, angle of the seatback, lumbar support position of the seatback, and installation angle of the lower seat), head restraints, steering wheel, doors, tops of convertible vehicles, and removable roof.

4.1.9.2 Fastening of the Seatbelt

Once the dummies have been loaded into the driver seat and the rear test seats of the test vehicle, the seatbelt must be fastened in such a way that its position around the dummies is the standard position as designed. On such occasions any slackness of the seatbelt must be sufficiently removed. Confirm that the center of the harness passes between the breasts in a natural position like that assumed for normal use. If the belt will not fit there, reset it to the design standard position and confirm with a witness.

4.1.9.3 Dummy Temperature Requirements

The dummies shall be left in a room at a temperature of 20–23°C for at least four hours just before conducting the test to stabilize the temperature. Furthermore, operations such as placement of the dummies may be carried out during this time. If there are justifiable reasons such as for preparing for conducting the test, the dummy may be removed from the room maintained at the above temperature for a maximum cumulative duration of 10 minutes. If the dummies are placed in the test vehicle, the

temperature measuring point shall be at the height of the shoulders of the dummies placed in the driver's seat and the rear test seat. In other cases, the temperature measuring point shall be at a height equivalent to that of the shoulders of the dummies.

4.1.9.4 Coloring of Dummies

To evaluate the secondary collision of the driver dummy head and the rear test seat dummy head with the knees of the dummies and the contact of the rear test seat dummy with the front seatback, paint such as liquid chalk shall be applied to the face and head of the dummies. This paint may also be applied to other parts of the dummy than the head and knees as well as interior components of the test vehicle such as the instrument panel or steering wheel. (The steering angle should be more than 32°)

Areas not covered in the information above cannot be applied. The rear test dummy's head shall be colored as shown in Figure 1.

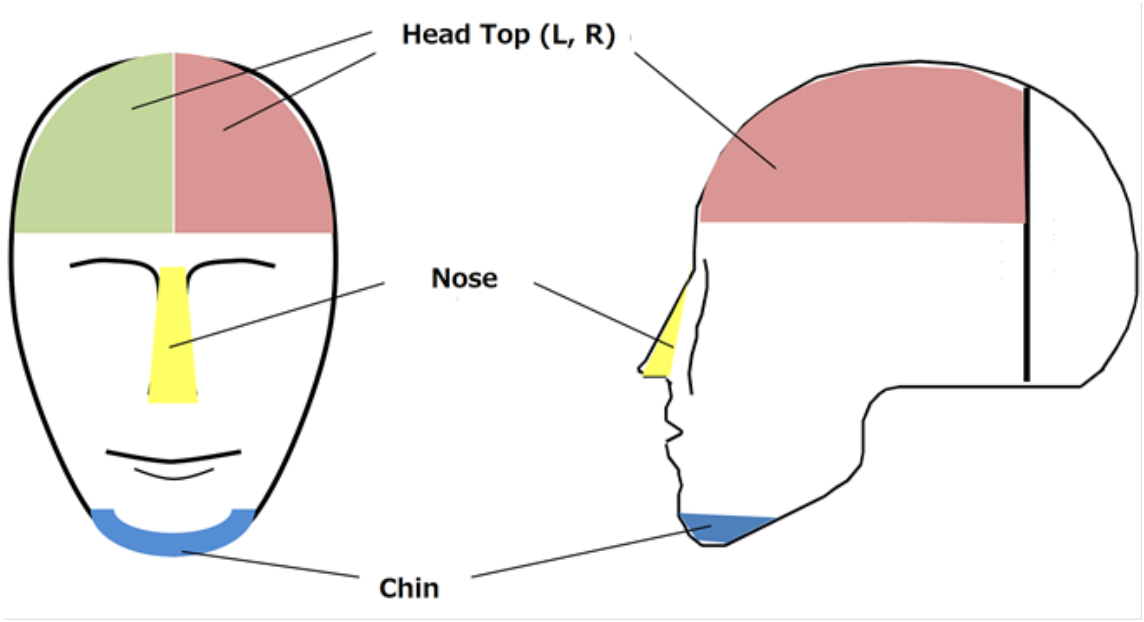


Figure2: Sample Rear Test Dummy Coloring

4.1.10 Installation of Electric Measuring Instruments

4.1.10.1 Installation of Accelerometers

Accelerometers shall be installed at the following points in the test vehicle to measure acceleration during the collision. However, if it is difficult to install accelerometers at the specified position, the test institute may change the installation position at its discretion.

(1) Tunnel: 3-axes (fore-and-aft direction, lateral direction, and vertical direction)

(2) Inside of side sill to the left of the vehicle: Single-axis (fore-and-aft direction)

(3) Inside of side sill to the right of the vehicle: Single-axis (fore-and-aft direction)

The positions of the accelerometers shall be recorded in Appendix 3.

4.1.10.2 Installation of seatbelt load indicator

A load indicator for the shoulder belt shall be installed near the shoulder area of the dummy in the driver's seat and rear test seat belt to measure the load during a collision. The position of the load indicator shall be specified by the automobile manufacturer. To maintain the natural mounting position of the load indicator on the shoulder belt, the load indicator may be supported from above using drafting tape or other means. The mounting position shall be specified in Appendix 1.

4.1.10.3 Installation of Measuring Instruments

(1) The measuring instruments shall be firmly secured to the inside of the test vehicle at locations where they are not affected by deformation caused by the collision test. However, if the instruments cannot be installed in the vehicle due to lack of space, they shall be installed in the space outside of the vehicle in the locations recommended by the vehicle manufacturer.

(2) The wiring connecting a transducer (apparatus which transforms a physical amount to be measured into electrical signals) and the measuring instruments secured in the test vehicle shall have an adequate margin so that the movement of the dummy is not affected in the collision test.

4.1.11 Installing the Onboard Camera

An onboard camera meeting the following requirements shall be installed in the test vehicle and shall take photographs of the movement of the rear test seat dummy during the crash.

(1) The main part of the onboard camera and the battery shall be firmly secured to the floor close to the front passenger seat or the trunk compartment of the test vehicle recommended by the vehicle manufacturer. However, if the mentioned areas do not have enough space, the vehicle manufacturer shall provide a proper fixing method and supply the attachments.

(2) The micro camera head separated from the main body shall be firmly secured to the roof aft of the driver seat.

(3) The wire connecting to the micro camera head from its main body shall have sufficient length so as not to affect the movement of the dummy during the collision.

(4) If necessary, an onboard lighting device shall be installed.

4.2 Test Facilities

4.2.1 The Barrier

The barrier is to be made of reinforced concrete possessed of sufficient structure and mass to withstand the collision of the test automobile, with its front side being at least 1.5m tall and 3m wide, and perpendicular to the runway.

A plywood board of a thickness of 20±2mm shall be affixed to the front of the barrier during a collision test.

An iron plate may be placed in between the barrier and the plywood to protect the barrier.

4.2.2 The Runway

The runway must be an even, level, and dry road surface.

4.2.3 Towing Unit

The towing unit must be capable of bringing the coast traveling speed of an automobile with a mass of up to 2.8 tons to 50.0±1km/h to collide perpendicularly with the front surface of the barrier.

4.2.4 Lighting System

The lighting system must be capable of producing the amount of light needed for high-speed photography and must not cause halation.

4.2.5 High-Speed Photography Device

The photographing speed of the high-speed photography device shall be set at 500 frames/second or more. Additionally, the time interval between reference time signals (timing pulse) shall be 10ms or less.

The camera may be equipped with polarizing filters to reduce unnecessary light.

4.2.6 Speed Measuring Device

The speed measuring device shall be capable of measuring the time required for the test vehicle to pass through the speed measuring zone in units of 0.1ms or less.

Furthermore, when converting the time into the speed (km/h) of the test vehicle, the speed-measuring device shall indicate the speed to the first decimal place.

The speed-measuring device shall be installed so as to be able to measure the speed of the test vehicle when it is traveling within 2m from the collision point.

4.2.7 Temperature and Humidity Measuring Device

The temperature and humidity of the dummy before conducting the test prescribed in Paragraph 4.1.9.3 and the temperature and humidity at the time of dummy verification shall be recorded at intervals of one minute or less using an automatic recorder. The minimum graduations of the thermometer shall be 0.1°C, and the minimum graduations of the hygrometer (relative hygrometer) shall be 1%.

4.2.8 Electrical Measuring Device

The measuring device shall comply with the requirements of ISO 6487:2002 *[1] under the condition in which all the devices between the constituent devices and the output devices (including a computer for analysis) are connected (the measuring device under this condition is referred to as “measurement channel”).

(1) The measurement channel shall measure acceleration, load, moment, and displacement according to the following channel classes.

*[1] ISO 6487:2000 is considered as the same requirement

①For collision tests, the channel classes are as follows:

(a) Head acceleration shall be 1,000

(b) Neck load shall be 1,000.

(c) Neck momentum shall be 600.

(d) Chest acceleration shall be 180.

(e) Chest displacement shall be 600.

(f) Hip acceleration shall be 1000.

(g) Femoral load shall be 600.

(h) Ilium load shall be 180.

(i) Ilium moment shall be 1,000.

(j) Side sill acceleration shall be 60.

(k) Tunnel acceleration shall be 60.

(l) Seat belt load shall be 60.

② For dummy verification, channel classes shall be as follows in addition to the provisions of ① above.

(a) Neck pendulum acceleration shall be 180.

(b) Displacement of the neck rotation detector shall be 60.

(c) Acceleration of the chest impactor shall be 60.

(d) Acceleration of the knee impactor shall be 600.

(2) If analog values are to be converted to digital values on measurement channels, the number of samples per second shall be over 8,000, and in collision tests, be of at least 8 times more than the channel class specified in ② for dummy inspections.

(3) The HIC shall be calculated with the sampling time (time intervals of data sampling conducted according to the abovementioned provision) set to the minimum time interval. The range of this calculation shall be between the collision and 200ms after the collision.

(4) Deletion (filtering) of the high-frequency components in accordance with the channel classes shall be performed before calculating the head resultant acceleration, chest resultant acceleration, HIC, etc.

4.2.9 Accelerometer, Load Meter, Moment Meter and Dummy

4.2.9.1 Accelerometers, Load Meters, and Moment Meter Used in the Test

The measurement ranges of the accelerometers, load meters and moment meter used in the collision test shall be as follows:

(1) The measurement range of the accelerometer to be installed in the head of the dummy shall be -1,960m/s2 (-200 G) to +1,960m/s2 (+200 G).

(2) The measurement range of the load meter to be installed in the neck of the dummy shall be -890daN (-907kgf) to +890daN (+907kgf).

(3) The measurement range of the moment meter to be installed in the neck of the

dummy shall be -285Nm (-29kgfm) to +285Nm (+29kgfm).

(4) The measurement range of the accelerometer to be installed in the chest of the dummy shall be -980m/s2 (-100G) to +980m/s2 (+100G).

(5) The measurement range of the load meter to be installed in the ilium of the dummy shall be -890daN (-907kgf) to +890daN (+907kgf).

(6) The measurement range of the load meter to be installed in the knee of the dummy shall be 0 to 1,960daN (2,000kgf).

(7) The measurement range of the accelerometer to be installed in the side sill shall be -1,960m/s2(-200G) to +1,960m/s2 (+200G).

(8) The measurement range of the accelerometer to be installed in the tunnel shall be -1,960m/s2 (-200G) to +1,960m/s2 (+200G).

4.2.9.2 The Dummies

(1) The dummy in the driver's seat and the rear test seat shall be a Hybrid III 5 percentile adult female dummy prescribed in CFR Title 49, Part 572, subpart O.

(2) The characteristics of each part of the driver seat dummy shall conform to Attachment 3.

(3) Neck shields should be attached to the necks of dummies. The feet of dummies should be size 7 1/2E shoes with the weight being measured at 0.41±0.09kg. Dummies can wear cotton short-sleeved shirts (or cotton sleeveless shirts) along with short pants.

(4) The limb joints of the dummy shall be adjusted so as to be able to support the weight of the limbs extended horizontally.

(5) In order to confirm the movement of the dummy during the collision test, the target marks shall be attached to the dummy's head at points where the movement of the dummy can be photographed using the camera during the test. Figure 2 shows a reference example.

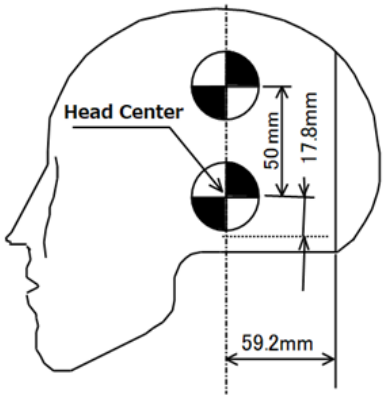


Figure 2 Example of attachment of target mark on the dummy's head

4.2.9.3 Recording of Electrical Measurement Results onto Recording Medium

The recording of acceleration and load measurement results on to a recording

medium should be at above channel class 1,000.

4.2.10 Three-dimensional Measurement Devices

The accuracy of three-dimensional measurement devices used to measure the vehicular dimensions of the test automobile and measure the seated position of dummies along with the affixed position of seatbelts shall be under 0.5mm/m.

5. Test Method

The test automobile will travel at a speed of 55.0±1km/h and made to collide perpendicularly with the front of the barrier.

The draw speed of the equipment pulling the test automobile should be under 4.9 m/s^2{0.5G}, and the space between the center plane of the vehicle and the center plane of the barrier at the time of collision should be under 300mm.

6. Recording and Measuring Items

6.1 Recording Prior to Test

6.1.1 Check and Recording of Received Vehicle for Test

After receiving a vehicle for the test, the test institute shall check the following items and record the results in Appendix 3. At the same time, the test institute must make sure that the received vehicle complies with the vehicle specifications provided by NASVA.

(1) Name
(2) Model
(3) Classification
(4) Frame number
(5) Drive system
(6) Steering system type (wheel and steering column, existence of an adjustment system)
(7) Seatbelt, winder, and fastener type (driver and rear test seat)
(8) Existence of airbags (driver and rear test seat)
(9) Type of seat (driver and rear test seat, presence or absence of adjustment mechanism)
(10) Existence of vehicle speed sensitive door locks
(11) Existence of crash sensitive door unlocking system
(12) Existence of precrash safety system
(13) Existence of a sunroof
(14) Existence of footrests

6.1.2 Recording of Dummy Inspection Results

(1) The test institute shall record the verification results for the dummy.
(2) The dummy shall be re-verified after conducting the test three times. However, if

the injury criterion reaches or exceeds the acceptable limit (example: HIC_{15} 700), the part of the dummy concerned shall be re-verified. If a component of the dummy is damaged, the component concerned shall be replaced by a verified component.

6.1.3 Recording the Verification Results for seat shoulder belt load meter

(1) The results of the seat shoulder belt load meter verification conducted prior to the test shall be recorded. However, they may be replaced by the performance results of the manufacturer.

(2) The verification method shall be performed in accordance with the quasi-static calibration procedure for belt force transducers described in ISO/TS17242:2014 or equivalent. (See Technical Bulletin TB016 (Quasi-static Calibration Procedure of Seatbelt Loadcells Version 1.0 June 2014) in EuroNCAP

6.1.4 Recording of Measuring Instrument Calibration Results

(1) The calibration results of the measuring instruments (each measurement channel including transducer) conducted before the test shall be recorded. The valid period for the measuring instrument calibration shall be one year. The measuring instruments may be used during that period.

However, if any abnormalities, etc. are found in the measuring instruments, the measuring instruments shall be re-calibrated at that time.

(2) To determine whether the injury criteria are calculated correctly, verifications shall be made using a calibration signal generation device (waveform generator).

6.1.5 Recording of Pre-test Vehicular Dimension Measurement Results

Of the pre-test position of body components indicated below, cabin interior No 8, 9 and door vicinity No 7 are to be measured and recorded using a three-dimensional measuring device. In such cases, locations that will not be deformed by collision shall be selected for the standard measured vehicular dimension positions. Measurement of other locations may be entrusted to the manufacturer.

(1) Points of measurement inside the cabin (examples)

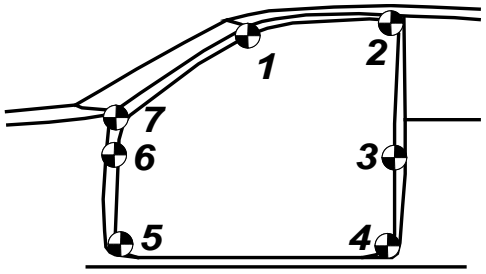
Note) The lateral direction positions of locations No 4 to 7 are positions where the side of the driver seat is symmetrical on both sides of the vehicle, driver and passenger, to the center position of the brake pedal.

Position No.	Measuring Point	Position No.	Measuring
1	Instrument panel - right end	8	Steering column tip
		9	Brake pedal
2	Instrument panel - center	10	Footrest
3	Instrument panel – left end	11	Driver seat side toe board A
		12	Passenger seat side toe board B
4	Driver seat side toe board		
5	Passenger seat side toe	13	Driver seat side floor A

6 7	board Driver seat side floor Passenger seat side floor	14	Passenger seat side floor B

(2) Measuring points around the doors (examples)

Position No	Measuring Point
1	A pillar upper end
2	B pillar upper end
3	Striker bolt
4	B pillar lower end
5	A pillar lower end
6	A pillar center
7	A pillar joint



6.1.6 Recording of Dummy Seated Position Measurement Results

The seating position of the dummy placed in the vehicle according to the Paragraph 4.1.9.1 and the routing position of the seat belt fastened according to the Paragraph 4.1.9.2 shall be measured and recorded according to the section 15-1 of Appendix 1. Furthermore, photographs are to be taken of the fastened position of the seatbelts.

6.1.7 Recording of the Final Pre-test State of Vehicles

The following items are to be confirmed and recorded once preparation of a test automobile is completed according to Section 4.

(1) Mass of the test automobile

(2) Names and masse of parts removed, and mass after adjustment

(3) Attitude of the test automobile (front-back and left-right direction inclinations)

(4) Adjusted seat positions (driver seat and rear test seat)

(5) Adjusted position of the steering system

(6) Adjusted position of seatbelt fastening systems

(7) Position of accelerometers attached to the vehicle body

(8) Position of target marks affixed to the vehicle body

(9) Standard position of vehicular dimensions

6.1.8 Recording of Dummy Temperature

(1) The temperature of a dummy at the time soaking begins, ends, and during soaking is to be recorded.

(2) The accumulated time when temperature requirements stipulated in Section 4.1.9.3 could not be maintained are to be recorded.

6.2 Records during testing

6.2.1 Recording of collision speed and collision position variance

The speed of the test automobile just before it collides with the barrier is to be measured and recorded. Furthermore, the divergence between the central plane of the vehicle and the central plane of the barrier at the time of collision are to be measured and recorded.

Just before collision is said to be the state when the test automobile is traveling by momentum within 2m in front of the barrier.

6.2.2 Recording of Electric Measurement Results from Dummy Parts, Vehicle Body Parts, and the Barrier.

The electrical measurement results of the accelerometers, load indicators, displacement gages, and moment sensors attached to the dummy parts, vehicle body parts, and the barrier listed below are to be recorded from 20ms preceding collision to 200ms following collision.

(1) Driver seat dummy head front-back direction acceleration

(2) Driver seat dummy head left-right direction acceleration

(3) Driver seat dummy head up-down direction acceleration

(4) Driver seat dummy neck front-back direction load

(5) Driver seat dummy neck left-right direction load

(6) Driver seat dummy neck up-down direction load

(7) Driver seat dummy moment on neck around front-back axis

(8) Driver seat dummy moment on neck around left-right axis

(9) Driver seat dummy moment on neck around up-down axis

(10) Driver seat dummy chest front-back direction acceleration

(11) Driver seat dummy chest left-right direction acceleration

(12) Driver seat dummy chest up-down direction acceleration

(13) Driver seat dummy chest displacement

(14) Driver seat dummy right femur load

(15) Driver seat dummy left femur load

(16) Driver seat dummy right ilium front-back direction load

(17) Driver seat dummy moment on right ilium around left-right axis

(18) Driver seat dummy left ilium front-back direction load
(19) Driver seat dummy moment on left ilium around left-right axis
(20) Acceleration of the lumbar of the driver seat dummy in the fore-aft direction
(21) Acceleration of the lumbar of the driver seat dummy in the lateral direction
(22) Acceleration of the lumbar of the driver seat dummy in the vertical direction
(23) Acceleration of the head of the rear test seat dummy in the fore-aft direction
(24) Acceleration of the head of the rear test seat dummy in the lateral direction
(25) Acceleration of the head of the rear test seat dummy in the vertical direction
(26) Rear test seat dummy neck front-back direction load
(27) Rear test seat dummy neck left-right direction load
(28) Rear test seat dummy neck up-down direction load
(29) Rear test seat dummy moment on neck around front-back axis
(30) Rear test seat dummy moment on neck around left-right axis
(31) Rear test seat dummy moment on neck around up-down axis
(32) Rear test seat dummy chest front-back direction acceleration
(33) Rear test seat dummy chest left-right direction acceleration
(34) Rear test seat dummy chest up-down direction acceleration
(35) Rear test seat dummy chest displacement
(36) Rear test seat dummy right femur load
(37) Rear test seat dummy left femur load
(38) Rear test seat dummy right ilium front-back direction load
(39) Rear test seat dummy moment on right ilium around left-right axis
(40) Rear test seat dummy left ilium front-back direction load
(41) Rear test seat dummy moment on left ilium around left-right axis
(42) Acceleration of the lumber of the rear test seat dummy in the fore-aft direction
(43) Acceleration of the lumbar of the rear test seat dummy in the lateral direction
(44) Acceleration of the lumbar of the rear test seat dummy in the vertical direction
(45) Acceleration of the right-side sill in the fore-and-aft direction
(46) Acceleration of the left side sill in the fore-and-aft direction
(47) Acceleration of the tunnel in the fore-and-aft direction
(48) Acceleration of the tunnel in the lateral direction
(49) Acceleration of the tunnel in the vertical direction
(50) Seat belt load for driver seat
(51) Seat belt load for rear test seat

6.2.3 Recording of Damage Values

Dummy damage values are to be calculated and recorded using the methods indicated below from the waveforms required in Section 6.2.2.

6.2.3.1 Recording of Damage Values for driver seat dummy

(1) Head damage value (HIC : Head Injury Criterion)

The maximum value of the value calculated according to the following formula using resultant dummy head acceleration is needed.

In this case,

aR is the resultant acceleration of the head's front-back, left-right, and up-down direction acceleration (aX aY aZ) (unit: m/s)

$$a_R = \sqrt{a_X{}^2 + a_Y{}^2 + a_Z{}^2}$$

t_1 and t_2 are the discretionary times during collision (unit: s)

$$| t_2 - t_1 | \leqq 0.015\text{s}$$

(2) NIC : Neck Injury Criterion

- NIC is determined by the compressive force in the axial direction where the neck and the head of the dummy are connected, tension in the axial direction, fore-and-aft shear strength, and the period of time (ms) for which these forces continue.
- The bending moment criterion for the neck is determined by the bending moment (Nm) around the horizontal axis where the neck and the head of the dummy are connected.
- The maximum value of the neck flexion bending moment (Nm).

(3) Chest damage value

- The maximum value of rib compression and displacement in a dummy's chest (ThCC : Thorax Compression Criterion).

(4) Femur damage value

The maximum value of a dummy's right and left femoral compressive load.

(5) Ilium load (female 5 percentile dummies only)

As it pertains to the measured value of ilium load, in cases where collapses of over 1,000N within duration of 1ms are seen, it shall be deemed that the waist belt slipped from the pelvis. However, in cases where multiple changes in the ilium load become apparent, judgment shall be made based upon the load collapse following the final rise in load.

Furthermore, in cases where the ilium load is greater than the leanings above during rebound and decreases, the waist belt shall be deemed to have not slipped from the pelvis if the ilium load directly before the value decreases is under 2,400N. The time of rebound beginning shall be time where the relative velocity with the

vehicle is 0, with waist velocity calculated from the resultant acceleration of front-back direction and up-down direction waist acceleration.

6.2.3.2 Recording of injury criteria for the rear test seat dummy

(1) HIC: Head Injury Criterion

The HIC shall be calculated only in the case where the dummy head comes into a secondary collision with the front seat, B-pillar, etc. during forward motion of the dummy.

The maximum value among the values calculated by the following formula shall be determined using the head resultant acceleration of the dummy:

Where,

a_R represents resultant acceleration (m/s^2) of the head in the fore-and-aft direction, lateral direction, and vertical direction (a_X, a_Y, a_Z)

$$a_R = \sqrt{a_X^{\,2} + a_Y^{\,2} + a_Z^{\,2}}$$

t_1 and t_2 represent arbitrary points in time during the collision (unit: s) provided that $| t_2 - t_1 | \leqq 0.015s$

If the waveforms of the secondary collision of the head contain those from a collision with another part of the dummy itself, such as the head hitting the knee or the chin hitting the chest, this index shall be calculated by deleting such waveforms if they can be separated from the waveforms of the head hitting interior parts of the test vehicle. However, if all the confirmation items in ① below show that there is definitely no contact, or if the load confirmed in ② below does not exceed 500N, then it shall be judged that no secondary collision of the head occurred (figjure 3).

① Confirm that the secondary collision has taken place, either by adhesion of paint such as liquid chalk applied to the dummy head before the test on interior parts of the test vehicle, or by the images produced by high-speed photography with the onboard-camera.

② If a secondary collision has been confirmed according to the provision of ①, confirm that the calculated head contact force exceeded 500N by following the SAE J2052 calculation procedure.

③ The resultant acceleration shall be deleted as described below only when the secondary collision has been confirmed according to the provision of ① and the head contact load caused by the collision concerned has complied with the provision of ②.

(a) Based on an analysis of the high-speed film, identify the time span in which the dummy came into secondary collisions with its own body.

(b) Based on the head contact force data, if the force data shows that the force between the peak of the pulse produced by the dummy head contacting another body part of the dummy and the peak of the pulse produced by the head contacting interior parts of the test vehicle was less than 200N, the pulse produced by the head contacting another body part of the dummy shall be deleted from the calculation time span (figure 4).

(c) Based on the head contact force data, if the force data shows that the force between the peak of the pulse produced by the dummy head contacting another body part of the dummy and the peak of the pulse produced by the head contacting interior parts of the test vehicle was within 200–500N, the calculation time span of the head contact shall be one half of the time span where both pulses cross the points of 500N (figure 5).

(d) Based on the head contact force data, if the force data shows that the force between the peak of the pulse produced by the dummy head contacting another body part of the dummy and the peak of the pulse produced by the head contacting interior parts of test vehicle exceeded 500N, the time span shall include the entire head contact time during the crash (figure 6).

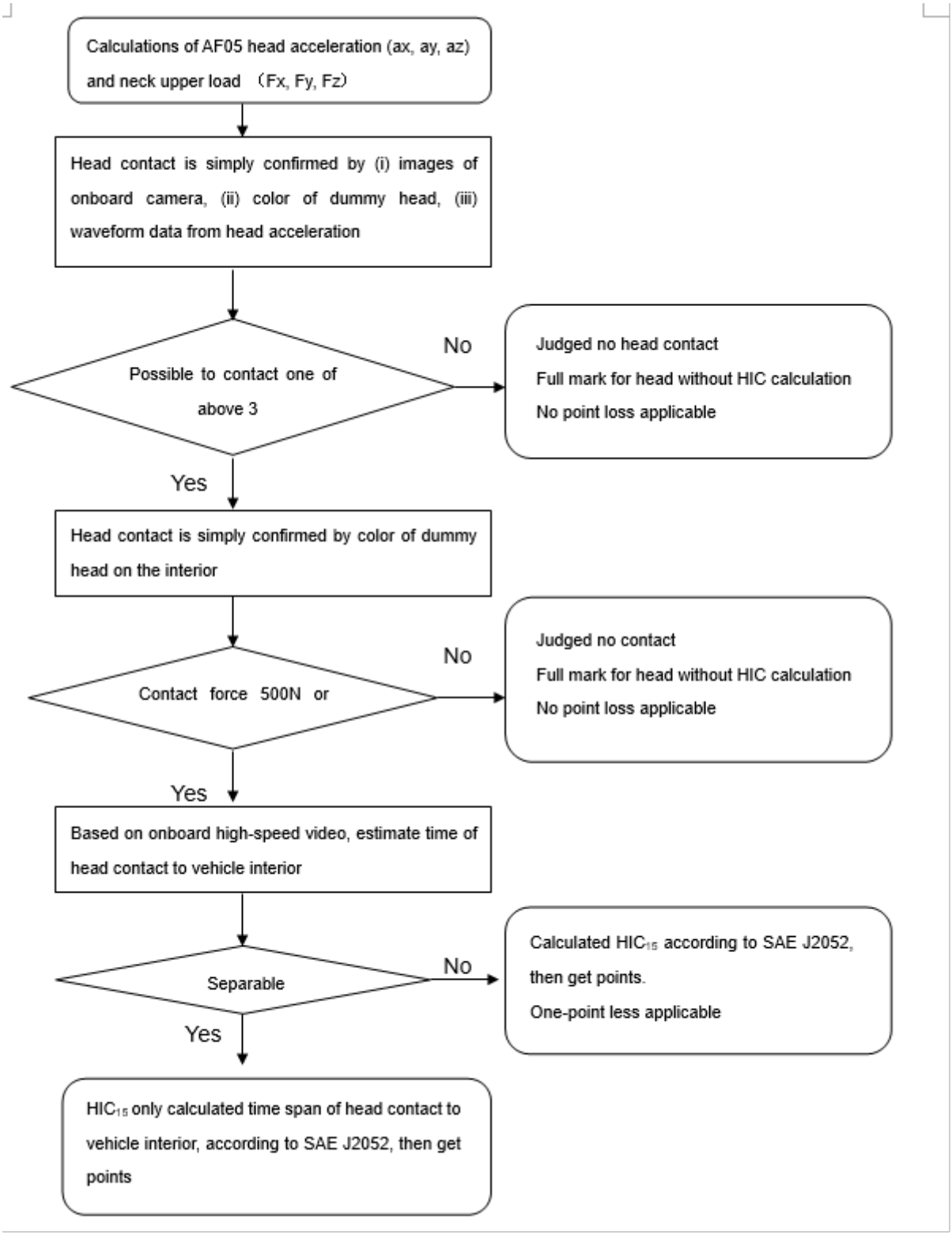


Figure 3: Secondary Head Collision Flowchart

Figure4

Figure 5

Figure 6: Contact Forces not Separable

(2) Neck Injury Criterion

① Confirm, by the method specified in Paragraph 6.2.3.2 (1), that the secondary collision has taken place.

② If a secondary collision has been confirmed according to the provision of ①, confirm that the calculated head contact force exceeded 500N by following the SAE J2052 calculation procedure.

③ If the secondary collision has been confirmed according to the provision of ① and the head contact force caused by the collision concerned has complied with

the provision of ②, the criterion for the neck shall be determined by the maximum values of the tensile strength in the axial direction, shear force in the fore-and-aft direction and flexion moment (tension side) where the neck and the head of the dummy are connected.

④ Other than the above cases, the criterion for the neck is determined by the maximum value of the tensile strength in the axial direction where the neck and the head of the dummy are connected.

(3) Chest Injury Criterion

The maximum value of the compression side displacement applied to the ribs of the dummy (ThCC: Thorax Compression Criterion).

(4) Femur Injury Criterion

The maximum value of the load applied to the right and left femurs of the dummy.

(5) Ilium Load

If the measured ilium load shows a drop of more than 1,000N within 1ms, this phenomenon is defined as the occurrence of the lap belt slipping from the proper position. However, if multiple changes in the ilium load were confirmed, it shall be judged by the force drop just after the final rising load. The images of the onboard camera shall be used for confirmation.

Additionally, if the ilium load is reduced by more than 1,000N within 1ms during the rebound phase, and the iliac load just before the reduction was less than 2,400N, then it is considered that the lap belt did not come off the pelvis. The starting time of rebound shall be defined as the moment the hip moving speed, calculated from the composite hip accelerations in the fore-and-aft direction and in the upward-and-downward direction, relative to the vehicle speed, becomes 0.

6.2.4 High-Speed Photography

The movements of the test vehicle and the dummy shown in Diagram 7 shall be photographed during the collision using a high-speed video camera. Strobe lights, etc. for identifying the moment of collision shall be included in each camera angle.

If multiple onboard cameras cannot be installed, a single onboard camera may be installed in a position that can observe the movement of the rear dummy upon mutual consultation between NASVA and the vehicle manufacturer.

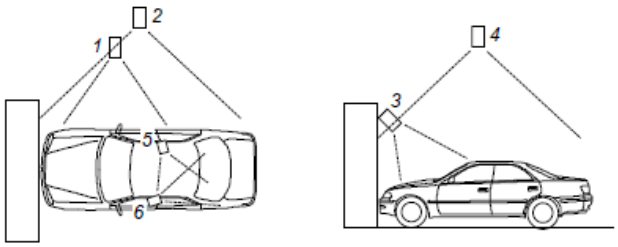
Camera No.	Camera Angle	
1 2 3 4 5,6	Movement of dummy in driver's seat and collapse of vehicle Movement and collapse of vehicle (right side) Movement of dummy in front seat Movement of vehicle and collision position Movement of dummy in rear test seat (onboard)	

Figure 7: High-Speed Camera Covering Range

6.3 Post-test Records

6.3.1 Photographing of the state of the vehicle immediately following testing

Photographs of distinctive portions are to be taken immediately following a test and after confirming the ability of the side doors to open in section 6.3.2.

6.3.2 Confirmation and Recording of the Ability of Side Doors to Open

The ability of side doors to open is to be confirmed for all test automobiles. At such times, whether or not a door opened with any of the methods indicated below is to be recorded. In cases where the door latch could not be undone as in (1), an attempt to undo the door latch shall be made with the inner handle, and if the latch can be undone, the ability of the door to open from (1) shall be confirmed once more, with record made that the latch was undone with the inner handle. In the event that the latch will not come undone even with the inner handle, proceed to the next step and continue confirming the ability of the door to open.

latch was undone with the inner handle. In the event that the latch will not come undone even with the inner handle, proceed to the next step and continue confirming the ability of the door to open.

ill not come undone even with the inner handle, proceed to the next step and continue confirming the ability of the door to open.

(1) Door was able to be opened with one hand.

(2) Door was able to be opened with both hands.

(3) Door was able to be opened with tools.

6.3.3 Confirmation and Recording of Removability of Dummy

The removability of each dummy from the test vehicle shall be confirmed and recorded using any of the methods given below.

Provided, however, that, considering that it is difficult to remove the rear test seat dummy from a two-door vehicle without operating the front seat, a case where the dummy was removed without any trouble other than operating the front seat without using tools shall be deemed as falling under case (1) and a remark "The normal operation of the front seat added to accommodate the two-door structure" shall be added.

(1) No tool was used. No adjustment mechanism for the seat and the steering system, etc. was operated.

(2) No tool was used. An adjustment mechanism for the seat or the steering system, etc. was operated.

(3) Tools were used.

Furthermore, when operating the adjustment mechanism for the steering system, marks shall be made indicating the conditions before the operation. The adjustment mechanism shall then be returned to the original position before measuring the vehicle dimensions after the test as prescribed in Paragraph 6.3.4.

6.3.4 Measurement and Recording of Post-test Vehicle Dimensions

Post-test vehicle dimensions are to be measured and recorded in the following manner.

(1) Post-test vehicle dimensions are to be measured and recorded with the three-dimensional measuring device from the same position that pre-test vehicle dimension measurements were made according to section 6.1.4. Furthermore, differences in pre- and post-test measured values are to be calculated and recorded.

(2) In instances where the steering system possesses a shear capsule structure and the steering column became separated from its mounting due movement of the structure during collision, measurements are to be made and recorded after the column has been returned to its mounting as close to properly as possible.

are to be made and recorded after the column has been returned to its mounting as close to properly as possible.

(3) Brake pedals are to be measured and recorded without any load applied. However, in the event a brake pedal is designed so as to come completely free of its mount during collision and comes free of its mount during collision, it is to be recorded that “the pedal came loose during testing and there is no longer any significant resistance to its movement remaining”. In such cases, measurements of the brake pedal in an unburdened state are to be conducted and recorded just to be sure. Furthermore, in instances where a brake pedal is designed to detach or fall away from its mount during collision and detaches or falls away from its mount during collision, no measurements will be conducted, and it will be noted that “the pedal detached or fell away from its mount during testing”.

6.3.5 Recording of Fuel Leakage Measurement Results

After collision, each part will be checked for the existence of fuel that has been discharged outside the vehicle or is dripping from it, with the results recorded.

6.3.6 Calibration and Recording of Accelerometers

After collision, accelerometers used during testing are to be calibrated, and the results are to be recorded.

6.3.7 Recording of Rear test seatbelt Coming Off from the Normal Position of the Rear test seat Dummy

After the test, confirm the movement of the dummy using images of the onboard camera, and then record whether the seatbelt came off from the normal position or not.

6.4 Handling of Measurement Values

Measurement values are to be handled in the following manner.

(1) Measurements of speed (km/h) are to up 1 decimal place, with the next place rounded up.

(2) Measurements of distance (mm) are to be to the integer position, with the next place rounded up.

(3) Measurements of acceleration (m/s) are to be to 2 decimal places, with the next place rounded up.

(4) Measurements of load (kN) are to be to 2 decimal places, with the next place rounded up.

(5) Measurements of moment (Nm) are to be to 2 decimal places, with the next place rounded up.

(6) Measurements of chest displacement are to be to 2 decimal places, with the next place rounded up.

(7) Calculation of HIC is to be to 1 decimal place, with the next place rounded up.

Procedure for driver's seat dummy

The dummy shall be mounted on the test vehicle as follows.

1. Seating Position

(1) The center between the right and left of the dummy shall be aligned with the center of the designed seating position.

(2) The upper torso of the dummy shall be in contact with the seatback and the hip point shall be adjusted as close as possible to the location of the design hip point after adjusting the seat location. The center between the right and left of the dummy shall be aligned with the center of the designed seating position.

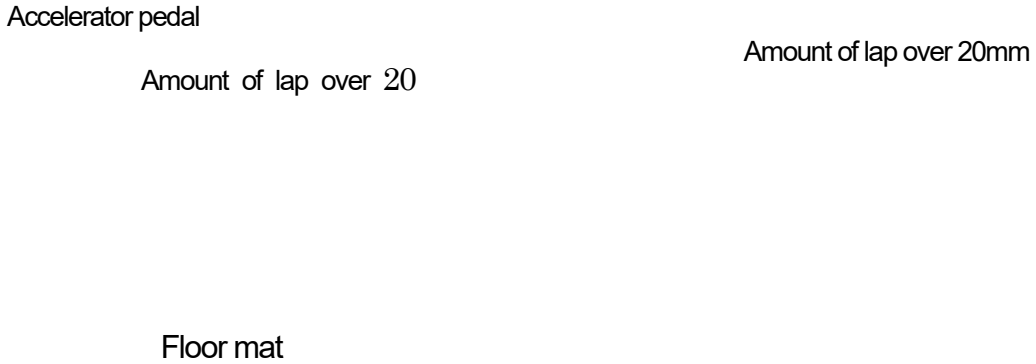
2. Position of the Feet

(1) The distance between both knees shall be adjusted as specified in Figure1, but this measurement does not define the final position.

Figure 1

(2) The right foot shall rest on the undepressed accelerator pedal, and the heel placed on the floor pan. The amount of lap between the right foot and the accelerator pedal should be secured by at least 20 mm. However, if the amount of lap cannot be secured, adjust the seat slide in the forward/backward direction to secure the amount of lap with the accelerator pedal. If the amount of lap with the accelerator pedal still cannot be secured by 20 mm or more, the amount of lap with the accelerator pedal shall be secured by adjusting the position of the dummy forward, etc., after consultation between the mechanism and the car manufacturer, etc.

Figure2 How to place on the accelerator pedal



(3) In cases where the plane formed by the femur and tibia of the right leg is not perpendicular, move and adjust the knee until it is as close to perpendicular as possible.

(4) The left foot is to be set upon the floor with the heel as close as possible to the point where the toe board and floor pan intersect, with the foot set upon the toe board. In cases where the foot does not reach the toe board, the foot is to be set at a right angle to the tibia and placed upon the floor as close as possible to the toe board. In cases where there is a footrest, the foot is to be placed upon the footrest.

Figure 3 - If the foot reaches the toe board

Figure 4 - If the foot does not reach the toe board

Figure 5 - If there is a footrest

(5) The plane created by the right and left femur and tibia should be adjusted so that they are vertical, respectively. In cases where the plane formed by the femur and tibia of the left leg is not perpendicular, move and adjust the knee until it is as close to perpendicular as possible. In cases where the foot interferes with the brake pedal or clutch pedal, the left foot is rotated

as little as needed to center it with the tibia. If the foot is still in the way even after this, the femur may be rotated so that there is as little interference as possible.

3. Initial position of arms and hands

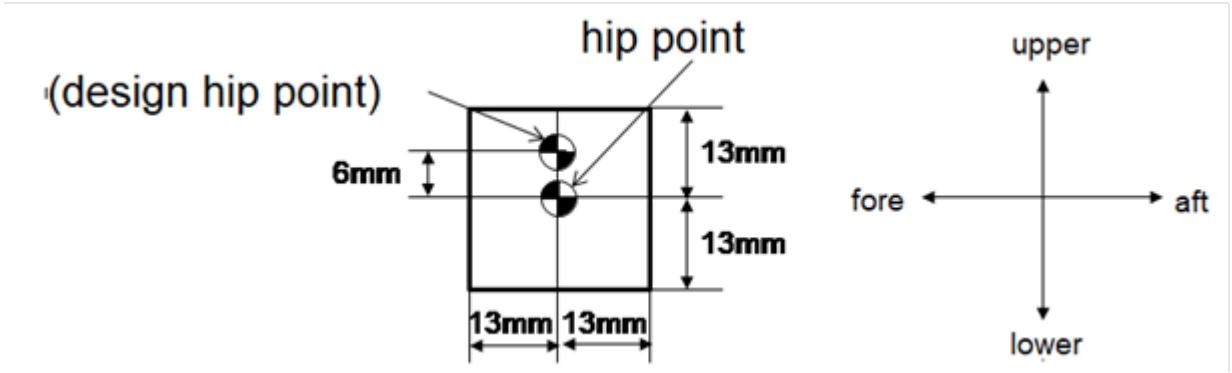
(1) Upper arms are to be placed against the seat back, so that they also touch the upper body.

(2) The lower arms and hands are to be placed along the outside of the femurs.

4. Setting the Position of the Upper Body

(1) The dummy's hip point on the external side of the vehicle is to match a position that is left as-is in terms of the front-back direction, from the designed hip point after seat position has been adjusted and under 6mm in terms of the up-down direction. When doing so, it is fine if the hip point is within the range of diagram 6. However, in cases where this condition cannot be met, the hip point is to be made as close to this range as possible.

Figure 6



(2) Set the pelvis angle to a range of 20.0°±2.5°. (Diagram 7)

(3) Set head angle to a range of ±0.5° horizontally. If when doing so the head angle cannot be set within the appropriate range, the position of the dummy's upper body is to be readjusted within the ranges stipulated in (1) and (2), in the order of hip point then pelvis. In cases where, even after these readjustments, the head angle cannot be set within the range stipulated in this section, the neck bracket is to be moved to get the head angle within the appropriate range.

(4) If the pelvic angle fails to be brought within the range given in (2), even after adjusting the position of the dummy upper torso according to the provisions of (1) through (3), the pelvic angle may be adjusted within the range of ±2.5° of the torso angle. However, if the head angle is now beyond the range given in (3) because of the aforesaid adjustments, move the neck bracket so that the neck angle becomes as close to the horizontal position as possible.

5. Positioning the Hands and Arms

(1) Place the thumbs on the rim of the steering wheel, and the palms, as far apart as possible, on any line passing through the center of the steering wheel, with the backs directed to the outside of the motor vehicle, and with the armpits closed.

(2) Fix the thumbs on the steering wheel with drafting tape about 12mm wide

.

6. Reset the positions of the legs

If the legs come out of position when setting the position of the upper body, legs should be returned to the position set according to the stipulations of section 2.

ATTACHMENT 1-2

HOW TO LOAD THE REAR TEST SEAT DUMMY

Dummies shall be loaded into the rear test seat of test automobiles following the steps below.

1. Seat position

(1) Match the dummy's left, right, and center with the designed seat center.

(2) Place the dummy's torso against the seat back and match the hip point as closely as possible with the designed hip point after adjusting seat position.

2. Setting leg positions

(1) First match both knees to the initial interval in the diagram. However, these dimensions do not prescribe the final position of the knees.

Figure 1

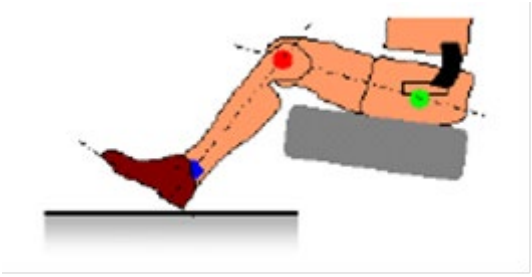
(2) Adjust the right and left femur and tibia so the planes formed by each of them are perpendicular to each other.

(3) Place the femurs in a state in contact with the surface of the rear seat cushion, in a position with the leg as for as possible from front end of the seat cushion. (See figure 2)

Figure 2

(4) Place the foot and the tibia at a right angle, then lower the leg until the foot reaches the floor without changing the angle of the femur (See figure 3).

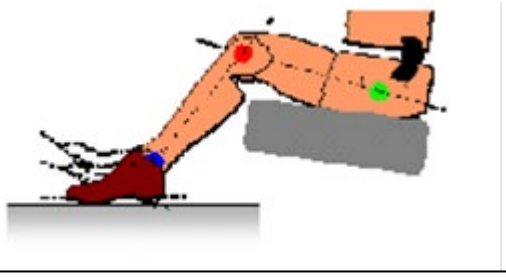
Figure 3



Without changing the femur angle and keeping the feet and tibias at right angles, lower the lower legs until the feet touch the floor.

(5) Rotate the foot with the heel touching the floor so that the toes touch the floor as much as possible. (See figure 4)

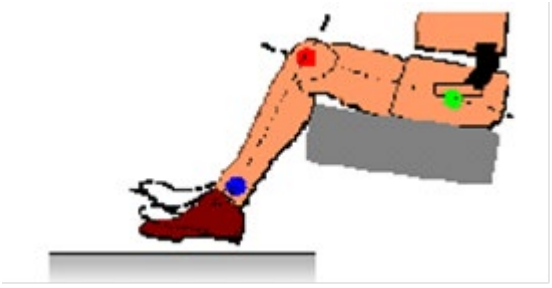
Figure 4



Without changing the position of the heel, turn the toes toward the floor as much as possible.

(6) In cases where the foot does not touch the floor, either place the calf in contact with the front end of the seat cushion or lower the foot until the back of the foot comes into contact with the interior upholstery and the foot is as level as possible with the floor (See figure 5).

Figure 5



Place the calves in contact with the seat cushion front when the feet are not in contact with the floor, then position the feet as parallel to the floor as possible.

(7) Place the feet in contact with the front seat installation parts or hump of the floor; move the direction of the toes to inward or outward as little as possible and try not to interfere with these parts while maintaining the distance between both knees.

(8) If the feet or legs contact the front seat which is adjusted to the specified position, or the hump of the vehicle body, lift up the femur and legs and move them rearward, and make the femur contact the rear test seat cushion as much as possible (see figure 6).

Figure 6

If the feet or legs contact the front seat which is adjusted to the specified position, or the hump of the vehicle body, lift up the femur and legs and move them rearward, and make the femur contact the rear seat cushion as much as possible.

3. Initial position of arms and hands

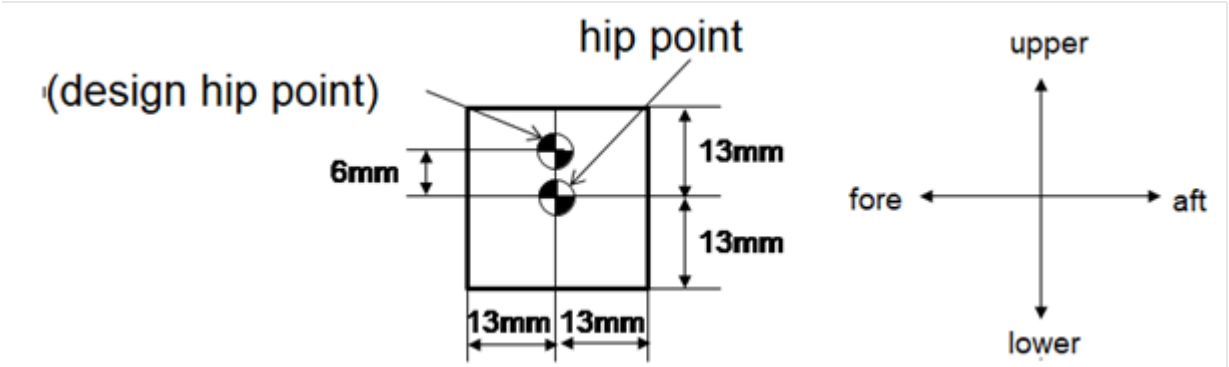
(1) Upper arms are to be placed against the seat back, so that they also touch the upper body.

(2) The lower arms and hands are to be placed along the outside of the femurs.

4. Setting the position of the upper body

(1) The dummy's hip point on the external side of the vehicle is to match a position that is left as-is in terms of the front-back direction, from the designed hip point after seat position has been adjusted and under 6mm in terms of the up-down direction. When doing so, it is fine if the hip point is within the range of figure 7. However, in cases where this condition cannot be met, the hip point is to be made as close to this range as possible.

Figure 7



(2) Set the pelvis angle to a range of 20.0°±2.5°.

(3) Set the head angle within the range of ±0.5° of the horizontal. If the head angle cannot be set within this range, readjust the upper torso of the dummy in the sequence of the hip point and the pelvic angle. This readjustment shall be carried out within the range given in (1) and (2). If this readjustment still fails to bring the head angle within the range specified in this paragraph, move the neck bracket to bring the head angle within the specified range.

(4) In cases where the position of a dummy's upper body has been adjusted as stipulated in (1) to (3) and the pelvis angle is not within the range stipulated in (2), the dummy's upper body posture may be moved forward or backward within a range of ±2.5° to adjust the pelvis angle. In cases where, as a result of these adjustments, the head angle no longer falls within the range stipulated in (3), the neck bracket is to be moved to adjust the head angle so that it is as close to level as possible.

5. Set arm and hand positions

(1) Place the upper arms in contact with the seatback as much as possible and in contact with the torso of the dummy.

(2) The lower arms and hands shall be in contact with the upper legs, and the little fingers shall be positioned so as to slightly touch the seat cushion.

(3) If the hands and arms are in contact with the vehicle trim or other parts after performing procedures (1) and (2), the arm may be placed on the armrest of the trim side to avoid such contact.

6. Reset the position of the legs

In cases where the legs moved out of position while setting the position of the upper body, return the legs to the position stipulated in section 2.

MEASUREMENT PROCEDURE FOR DESIGNED HIP POINT AND ACTUAL TORSO ANGLE IN SEATED POSITION IN THE AUTOMOBILE

1. Purpose

The process stipulated in this enclosure is for measuring the designed hip point position (referred to hereafter as “hip point”) and actual torso angle in the seated position of one or more automobiles.

2. Definitions

2.1 “Three-dimensional mannequin” refers to the device used to measure the hip point and actual torso angle. This device will be described in an appendix. The length of the femurs and lower legs were adjusted to 401 mm and 414 mm each.

2.2 “Hip point” refers to the rotation center of a three-dimensional mannequin’s torso and femurs when attached to an automobile based on section 3. The position of the hip point between the hip point side buttons found on both sides of the three-dimensional mannequin. After it has been set once using the process stipulated in section 3, the positional relationship of the hip point and seat cushion structure is to be viewed as fixed, with the hip point moving along with seat when it is adjusted.

2.3 “Torso line” refers to the center line when the three-dimensional mannequin’s probe is placed in the rearmost position.

2.4 “Actual torso angle” refers to the angle between the torso line and the perpendicular line passing through the hip point measured using the three-dimensional mannequin’s back angle protractor.

2.5 “Occupant center plane” refers to the center plane of the three-dimensional mannequins placed in the designated seated positions. This is depicted by the hip point coordinates on the Y-axis. When referring to individual seats, the center plane of the seat will be the same as the occupant center plane. When referring to other seats, use the occupant center plane determined by the automobile manufacturer.

2.6 “Three-dimensional coordinate system” refers to the system stipulated in appendix 2.

2.7 “Reference point marks” refers to the physical points on the vehicle (holes, surfaces, marks, or notches) determined by the automobile manufacturer.

2.8 “Vehicle measurement posture” refers to an automobile’s position as determined by the coordinates of the reference point marks in the three-dimensional coordinate system.

3. Measurement procedure for the hip point and actual torso angle

3.1 The test automobile is, at the automobile manufacturer’s discretion, to be kept at a

temperature of 20±10°C, with the seat material confirmed to have reached room temperature. If no one has ever sat in a seat that is to be examined, a person or device weighing 70 to 80 kg is to be sat upon the seat for 1 minute 2 times to make the cushion and bag flexible. Do not place any weight upon the entire seat assembly for at least 30 minutes before attaching the three-dimensional mannequin.

3.2 Test automobiles are to be placed in the measured posture defined in section 2.8.

3.3 In cases where seats can be adjusted, seats are to be placed in the rearmost normal driver and passenger positions determined by the automobile manufacturer. When doing so, only front-back adjustments of the seat may be considered, excluding seat travel used for intents other than the normal driver and passenger position. In cases where there are other seat adjustment modes (vertical, angle, seat back, and so on), these are to be adjusted to the position determined by the automobile manufacturer later. In cases where there are suspension seats, set the vertical position to the normal driver and passenger positions determined by the automobile manufacturer and fix them firmly in place.

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ases where there are suspension seats, set the vertical position to the normal driver and passenger positions determined by the automobile manufacturer and fix them firmly in place.

3.4 The range of the seating position the three-dimensional mannequin comes into contact with is to be covered in muslin cotton of sufficient size and appropriate fabric (18.9threads/cm^2 and 0.228kg/m), knitted fabric possessing the same qualities, or non-woven fabric.

3.5 The seat back assembly of the three-dimensional mannequin is to be placed so that the occupant center plane aligns with the center plane of the three-dimensional mannequin. In cases where the position of the three-dimensional mannequin is too close to the outside, and the three-dimensional mannequin is prevented from being level by the end of the seat, the three-dimensional mannequin may be moved towards the inside from the occupant center plane.

3.6 The feet assemblies and lower leg assemblies are to be attached individually or using a T bar lower leg assembly. They are to be parallel to the line passing through the hip point side buttons, and must be at a right angle to the front-back direction vertical center plane of the seat.

3.7 The position of the three-dimensional mannequin’s feet and legs are to be adjusted as follows.

3.7.1 Feet are to be placed upon the floor, with the feet assemblies and leg assemblies both moved forward as necessary so that the feet are in a natural position between the control pedals. If possible, the distance between the three-dimensional mannequin’s center plane and left foot and the distance between its right foot are to be made the same. The level confirming the horizontal position of the three-dimensional mannequin is, as necessary, to be made level

by readjusting the seat pan or adjusting the leg and feet assemblies to the rear. The line passing through the hip point side buttons is to be kept at a right angle to the front-back direction vertical center plane of the seat.

eg and feet assemblies to the rear. The line passing through the hip point side buttons is to be kept at a right angle to the front-back direction vertical center plane of the seat.

d feet assemblies to the rear. The line passing through the hip point side buttons is to be kept at a right angle to the front-back direction vertical center plane of the seat.

3.7.2 In cases where the left and right legs cannot be kept parallel, and the left leg cannot be supported by a structure, the left leg is to be moved until it is supported. The focal point is to be level and vertical to the front-back direction vertical center plane of the seat and kept in this state.

3.8 Apply lower leg weights and femur weights to make the three-dimensional mannequin level.

3.9 Lean the back pan forward until it reaches forward stop, then separate the three-dimensional mannequin from the seat back using a T bar. Readjust the position of the three-dimensional mannequin using the method stipulated below.

3.9.1 Use the following procedure if the three-dimensional mannequin is to be moved to the rear. Slide the three-dimensional mannequin back until the weight on the forward part of the T bar is no longer needed (until the seat pan comes into contact with the seat back). Readjust the position of the lower legs as necessary.

3.9.2 Use the following procedure if the three-dimensional mannequin is not to be moved to the rear. Apply weight to the level rear of the T bar and slide the three-dimensional mannequin back until the seat pan comes into contact with the seat back (see Attachment 1 diagram 2).

3.10 Apply a load of 100±10N to the back pan assembly of the three-dimensional mannequin at the point of intersection between the T bar housing and the hip angle protractor. The direction in which the load is applied is to be along the line passing through the aforementioned point of intersection and a point directly above the femur bar housing (see Attachment diagram 2). Next, carefully return the back pan to the seat back. Take care to ensure that the three-dimensional mannequin does not move forward during the remaining portion of the procedure.

ng the remaining portion of the procedure.

e remaining portion of the procedure.

3.11 Attach buttocks weight to the left and right hip point pivots, and then alternately attach individual torso weights to the torso weight hanger. Keep the three-dimensional mannequin level.

3.12 Lean the back pan forward to release pressure on the seat back. Sway the three-dimensional mannequin by means of making an arc of 10° (5° to each side in the front-back direction of the vertical center plane) for three complete cycles, thus eliminating friction accumulated between the three-dimensional mannequin and the seat.

During swaying, the prescribed horizontal and vertical line states of the three-dimensional

mannequin's T bar may shift. Therefore, adequate weight must be applied in a direction during swaying to keep the T bar in place. Take care that when restraining the T bar and swaying the three-dimensional mannequin unexpected external weight is no applied in the vertical or front-back direction.

ng swaying to keep the T bar in place. Take care that when restraining the T bar and swaying the three-dimensional mannequin unexpected external weight is no applied in the vertical or front-back direction.

There is no need to restrain or keep the three-dimensional mannequin's feet in place at this stage. If the position of the feet change, leave them in that posture.

feet change, leave them in that posture.

Take great care in returning the back pan to the seat back, and check whether the 2 levels are in the zero position or not.

In cases where the feet moved during the act of swaying the three-dimensional mannequin, readjust their position in the following manner.

Lift each foot in alternation from the floor so that the feet will not move any further. Both feet should be able to rotate freely during this action, and no weight is to be applied forward or laterally. In cases where each foot will be returned to the position it was lowered into, the heel is to touch the structure designed for that purpose.

Confirm that the lateral level is in the zero position. If necessary, apply sufficient lateral weight to the top of the back pan to level the three-dimensional mannequin's seat pan on the seat.

in's seat pan on the seat.

3.13 Conduct the following procedure while keeping the T bar in place to ensure that the three-dimensional mannequin does not move forward on the seat cushion.

(a) Return the back pan to the seat back.

(b) Apply horizontal rear weight not greater than 25 N at the same height as the center of the torso weights to back angle bar, repeatedly applying and removing the weight in alternation until it can be confirmed with the hip angle protractor that a stable position has been reached after the weight has been removed. Take care that external weight is not applied to the three-dimensional mannequin is not applied from below or laterally. If levelling adjustments for the three-dimensional mannequin become necessary once again, rotate the back pan forward and, upon levelling it once more repeats the procedures of section 3.12.

e three-dimensional mannequin become necessary once again, rotate the back pan forward and, upon levelling it once more repeats the procedures of section 3.12.

sary once again, rotate the back pan forward and, upon levelling it once more repeats the procedures of section 3.12.

3.14 Conduct all measurements.

3.14.1 Measure the actual measured position of the hip point based on the three-dimension

coordinate system.

3.14.2 Place the probe in a completely rear position and read the actual torso angle on the three-dimensional mannequin's back angle protractor.

3.15 In cases where reimplementation of the attaching the three-dimensional mannequin is desired, no weight must be applied to the seat assembly for at 30 minutes before reimplementation. The three-dimensional mannequin must not be left applying weight to the seat assembly for a time longer than that needed to implement the test.

3.16 In cases where the driver seat and passenger seat are deemed to be the same (bench seats, seats with identical designs, and so on), only a single hip point and a single "actual torso angle" need to be measured. Place the three-dimensional mannequin described in Attachment 1 in the driver seat as a representative.

4. How to find the AF05 hip point

The front-back direction and up-down direction dimensions of the hip point of male 50^{th} percentile dummies shall be (X_{AM50}、Z_{AM50}), and the front-back direction and up-down direction dimensions of the hip point of female X percentile dummies shall be (X_{AF05}、Z_{AF05}). XSCL shall be defined as the hip point in male 50^{th} percentile dummies and the horizontal distance of the foremost point on the seat cushion (see diagram 1). Measure the hip point of female 5^{th} percentile dummies according to the following formula.

$$X_{AF05}=X_{AM50}+(93-0.323\times XSCL)$$

$$Z_{AF05}=Z_{AM50}$$

X is the vehicle's rear direction, and Z is the vehicle's upward direction.

ATTACHMENT 2 ANNEX 1 : THREE-DIMENSIONAL MANNEQUIN EXPLANATIONS[*note2]

1. Back and seat pans

The back pan and seat pan are composed of reinforced plastic and metal. They emulate the torso and femurs of the human body, and are connected mechanically by a hinge at the hip point. In order to measure the actual torso angle, a protractor is fixed in place with a probe attached by a hinge at the hip point. The adjustable femur bar attached to the seat pan determines the center line of the femurs, which in turn serves as the base line of the hip angle protractor.

2. Body and leg elements

While the lower legs are connected to the seat pan assembly by a knee joint T bar, this T bar is a lateral extension of the adjustable femur bar. A protractor has been built into the lower legs in order to measure knee angle. A scale has been attached to the shoe and feet assemblies in order to measure foot angle. 2 levels determine the vertical and horizontal position of the mannequin. A center of gravity corresponding to the body element weight has been attached to produce an equivalent load to a male of 76 kg in weight sitting in the seat. All of the joints of the three-dimensional mannequin must be checked to ensure that they can move freely without producing considerable friction.

Diagram 1 names of three-dimensional mannequin parts

[note2] For details on the construction of three-dimensional mannequins, refer to SAE, 400 Commonwealth Drive, Warrendale, Pennsylvania 15096 ,U.S.A.
This device suits ISO 6549-1999 standards and the terms denoted in SAE J826.

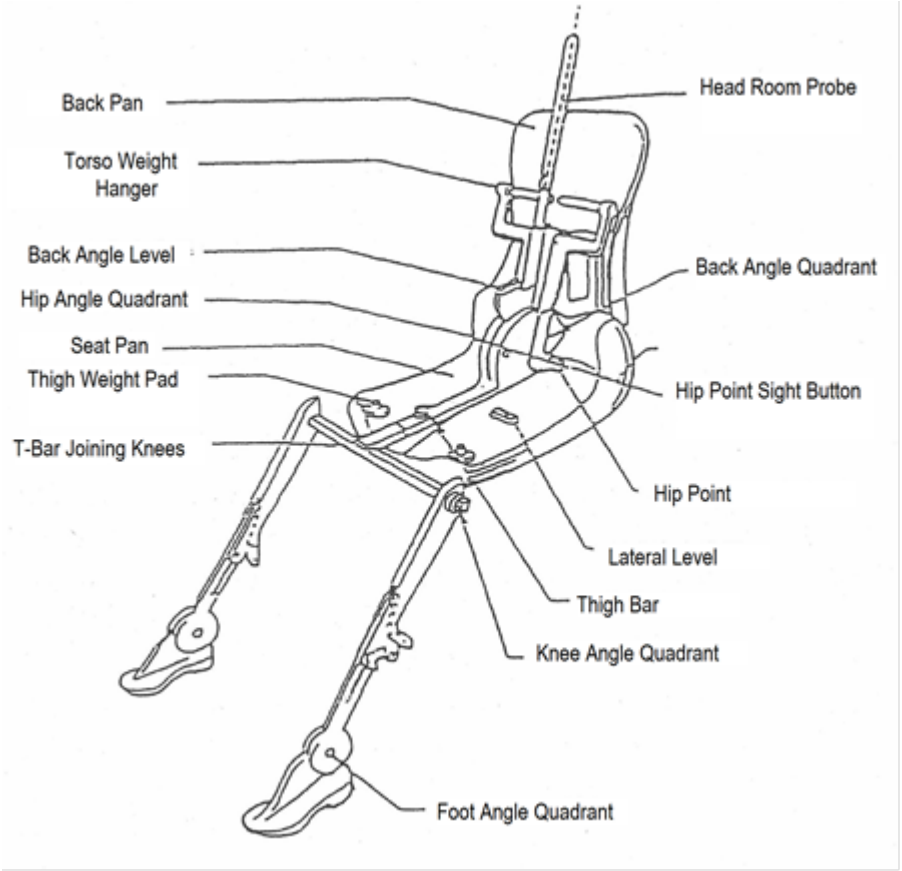
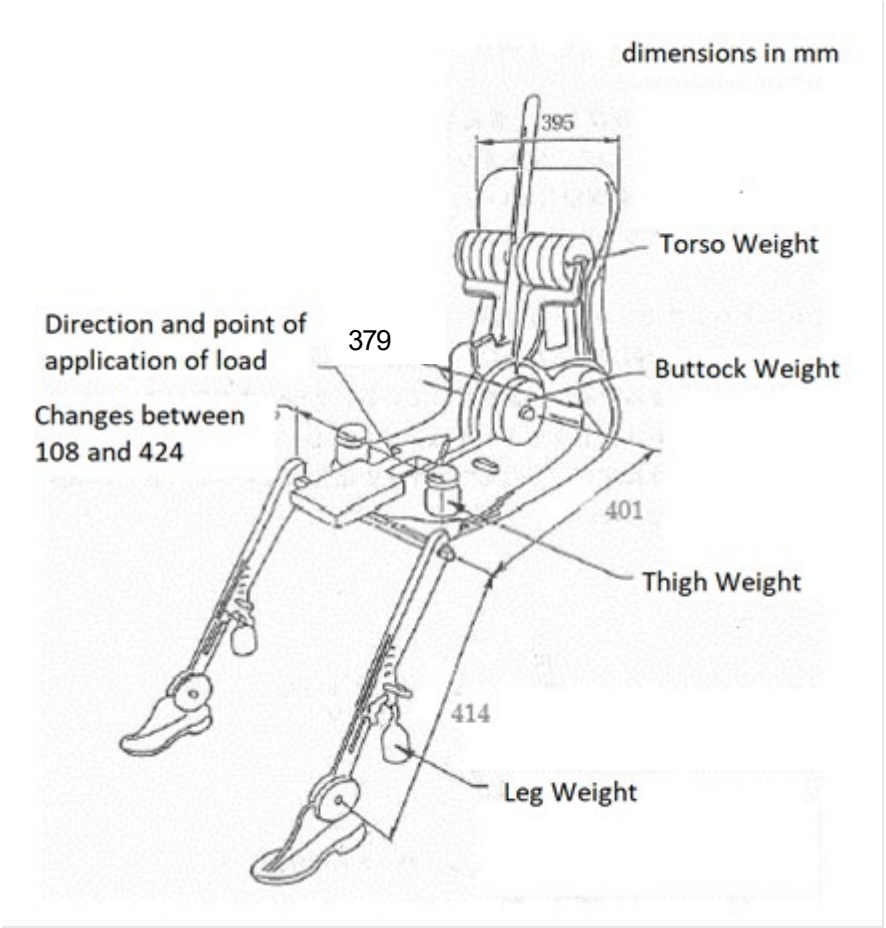


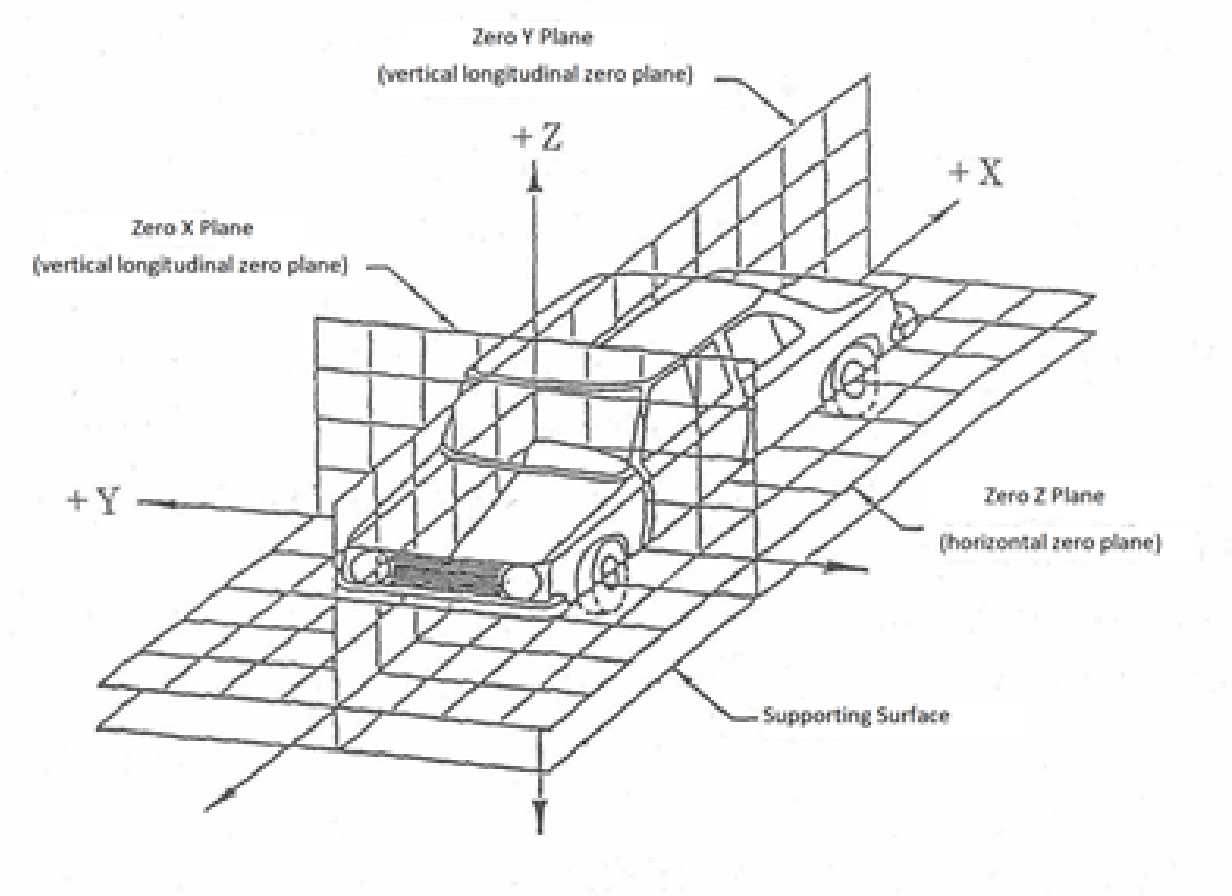
Diagram 2 Dimensions and weight distribution of 3-DH measurement elements



ATTACHMENT 2 – ANNEX 2 : THREE-DIMENSIONAL COORDINATE SYSTEM

1. The three-dimensional coordinate system is regulated by three orthogonal planes determined by the automobile manufacturer (see diagram).*Note3
2. Vehicle measurement posture is determined by placing the automobile on the installation surface in such a manner that the coordinates of the reference point marks match the values determined by the automobile manufacturer.
3. Hip point coordinates are determined based upon the reference point marks determined by the automobile manufacturer.

Diagram - Three-dimensional coordinate system



note3 This coordinate system complies with ISO standards 4130 and 1978.

HYBRID III DUMMY 50TH PERCENTILE INSPECTION METHOD

1. Inspection method and requirements

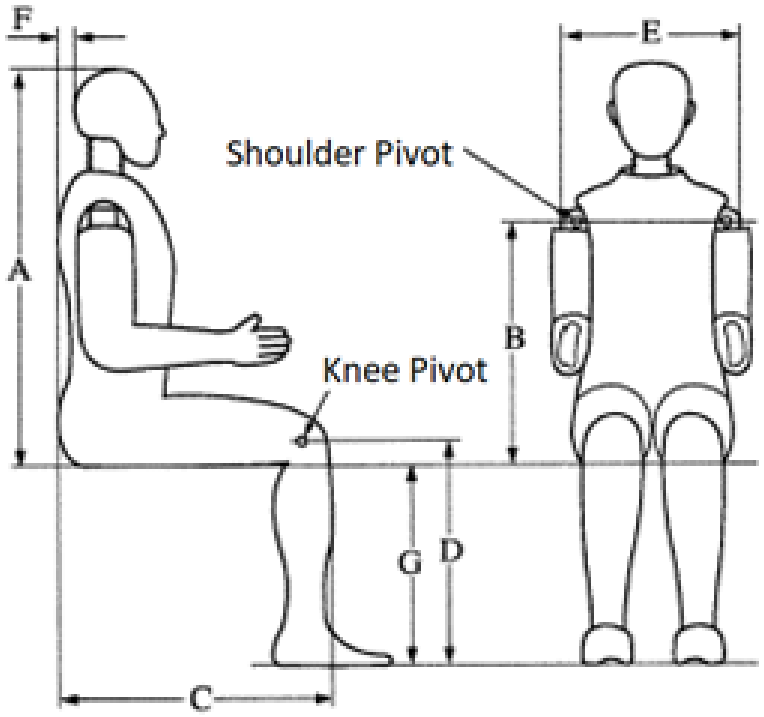
In cases where it is necessary to inspect the features of each part of a dummy in accordance with sections 1.2 to 1.6, the dummy may be dismantled and put together. Furthermore, the measurement of structural dimensions in section 1.1 are to be completed after all inspections of sections 1.2 to 1.6 have been completed and the dummy has been assembled back into its proper state. Tape may be used with the intent of maintaining the dummy's posture when measuring the dummy's dimensions and features.

dimensions and features.

1.1 Structural dimensions

The dimensions of each part when measuring dummy part dimensions are to be as indicated in diagram 1.

Diagram 1 - Hybrid III structural dimensions



A	774	~	800	mm
B	431	~	457	mm
C	520	~	546	mm
D	393	~	419	mm
E	350	~	366	mm
F	43	~	48	mm
G	355	~	376	mm

1.2 Head features

When conducting inspection tests following the procedure below, the maximum resultant acceleration value when the head is falling is to be between 2,205m/s^2 and 2,695m/s^2, and the maximum value of the waveform that occurs after the main waveform (referred to as the maximum waveform) on a resultant head acceleration/time curve is to be under 10% of the maximum value of the main waveform. Furthermore, the maximum value of the left-right

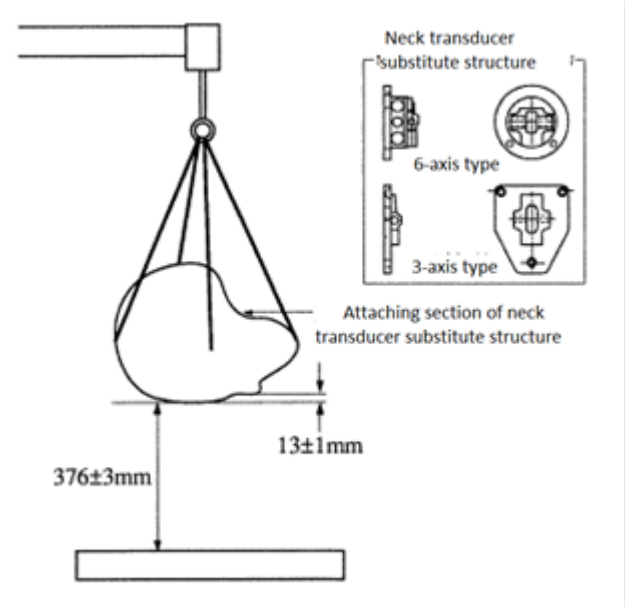
acceleration is to be under 147m/s^2.

(1) The inspected head is to be stored for over 4 hours in environment conditions maintained such that temperature is between 18.9°C and 25.6°C, and humidity is between 10% and 70%.

(2) Suspend the head so that the lowest point of the forehead is 13±1 mm lower than the lowest point of the dummy's nose with the head lifted from a height of 376 ± 3 mm as depicted in diagram 2. When it is dropped on an iron plate of at least 50 mm thickness with a surface roughness between 0.0002mm (ms) and 0.002mm (ms), measure the 3 axials (front-back, left-right, and up-down directions) acceleration and find the maximum resultant acceleration value. When doing so, attach a Neck Transducer substitute structure to place the head in a state as if it were actually attached.

(3) When inspecting the same head successively, an interval of at least 3 hours in the environmental conditions stipulated in (1) between tests.

Diagram 2 - Head feature tests



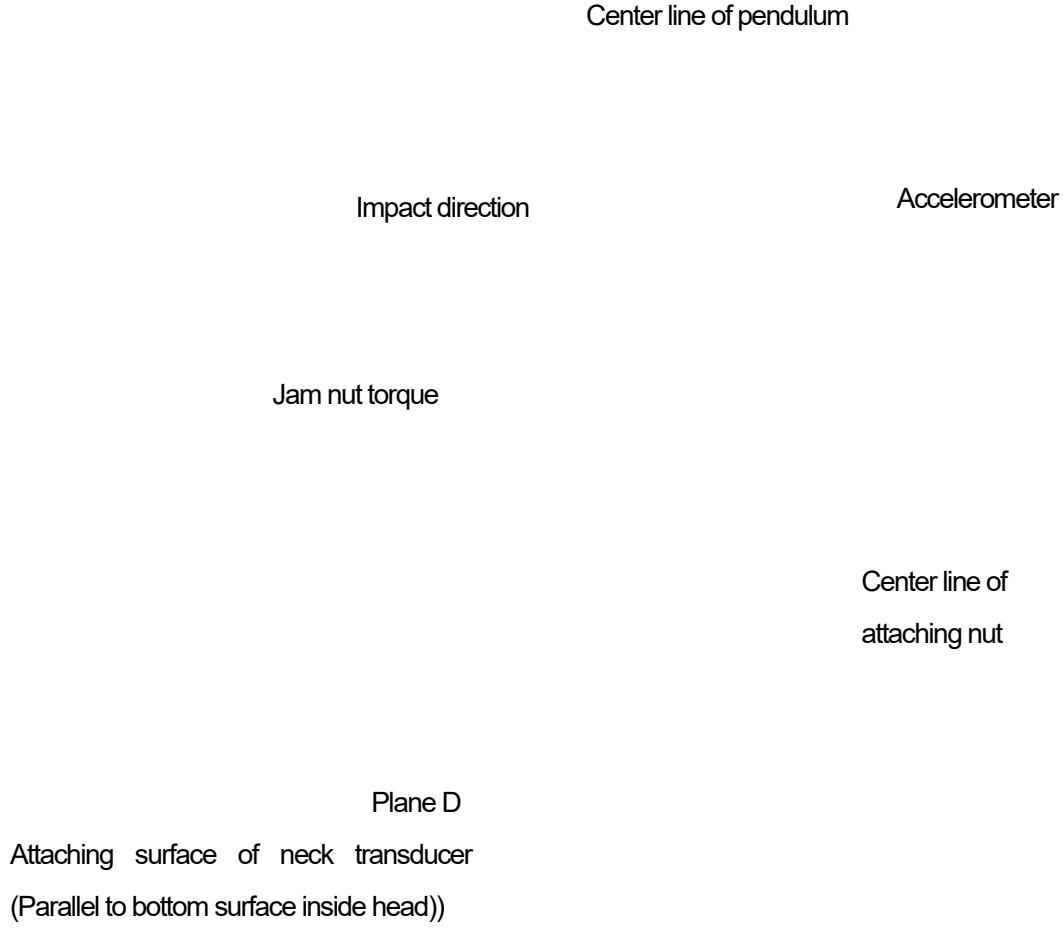
1.3 Neck Characteristics

When conducting the verification test as follows, the characteristics at the flexion side (the side where the neck is contracted) and the characteristics at the extension side (the side where the neck is extended) shall comply with the requirements given in the following table.

Characteristics at flexion side	① The moment measured by the neck measuring equipment shall reach a maximum of 69–83 N·m after the impact, and Plane D in Diagram 3 shall be within 77°–91° relative to the pendulum. ② The positive moment (the moment in the same direction as the rotation direction of the pendulum) shall decay for the first time to 10Nm between 80ms and 100ms after the impact.

Characteristics at extension side	① The moment measured by the neck measuring equipment shall reach a maximum of –65 to –53 N·m after the impact, and Plane D in Diagram 4 shall be within 99°–114° relative to the pendulum. ② The negative moment (the moment in the reverse direction of the rotating direction of the pendulum) shall decay for the first time to -10Nm between 94ms and 114ms after the impact.

Diagram 3. Neck Flexion Side Characteristics Test

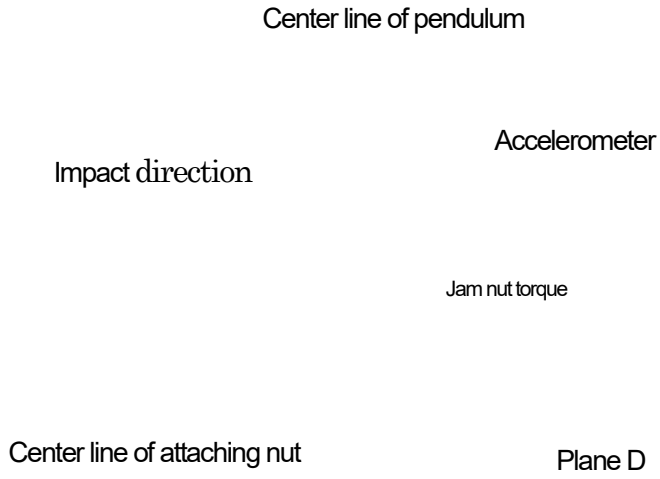


Sample rotation angle measurement methods

・Affix a displacement sensor to measure and calculate

・Film analysis using high-speed photography.

Diagram 4 - Neck expansion side features



(1) The inspected neck is to be stored for over X hours in environment conditions maintained such that temperature is between 20.6°C and 22.2°C, and humidity is between 10% and 70%.

(2) Before inspection, tighten the jam nuts of the neck cable with a torque between 1.2Nm and 1.6Nm.

(3) Attach the neck and head to the pendulum as indicated in diagram 5 with face facing the direction of collision (curve side inspection) and the opposite direction (expansion side inspection). When doing so, attach a bib simulator (see diagrams 3 and 4) to simulate an actual attached state, with plane D being perpendicular to the center line of the pendulum. However, a head for inspection purposes only with an inspection displacement sensor attached may be used for the head.

(4) The pendulum is to be swung to cause collision at speeds of between 6.89m/s and 7.13m/s for curve side inspections, and between 5.95m/s and 6.18m/s for expansion side inspections, with the rotation angle and moment at these times measured and calculated.

g to cause collision at speeds of between 6.89m/s and 7.13m/s for curve side inspections, and between 5.95m/s and 6.18m/s for expansion side inspections, with the rotation angle and moment at these times measured and calculated.

Neck moment is calculated according to the following formula.

$$M = M_y - 0.01778(m) \times F_x$$

In this case,

M is neck moment (unit: Nm)

M_y is the neck measurement instrument moment (unit: Nm)

F_x is the x axial force of the neck measurement instrument (unit: N)

(5) For verification at the flexion side, the deceleration of the pendulum occurring at

the time of impact shall be within the range specified in the right column of table A in accordance with the lapse time after the impact specified in the left column of table A. Furthermore, the curve indicating the relationship between the deceleration of the decaying pendulum and the lapse time shall first cross the 49 m/s2 level between 38ms and 46ms.

Diagram 5: Neck Characteristics Test

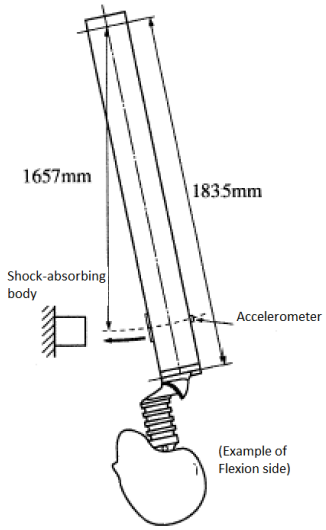


Table A

Time (ms)	Speed Range (m/s)
10	2.1～2.5
20	4.0～5.0
30	5.8～7.0

Table B

Time (ms)	Speed Range (m/s)
10	1.5～1.9
20	3.1～3.9
30	4.6～5.6

(6) When verification is conducted on the same neck, etc. consecutively, allow at least 30 minutes between successive tests, under the environmental conditions given in (1).

1.4 Chest Characteristics

The potentiometer for the chest shall be in accordance with SAEJ2517.

1.4.1 High-speed characteristics

When applying impact to the chest with an impact device according to the following procedures, the maximum value of the impulsive force occurring the impact element is to be between 390daN and 440daN, and the maximum displacement value of the sternum in relation to the vertebral column is to be between 50mm and 58mm. Furthermore, the displacement of the sternum relative to the spine of the dummy shall not exceed 460 daN of impact force generated on the impactor between 18 mm and 50 mm. Internal hysteresis during impact is to be within a range of 69% and 85%.

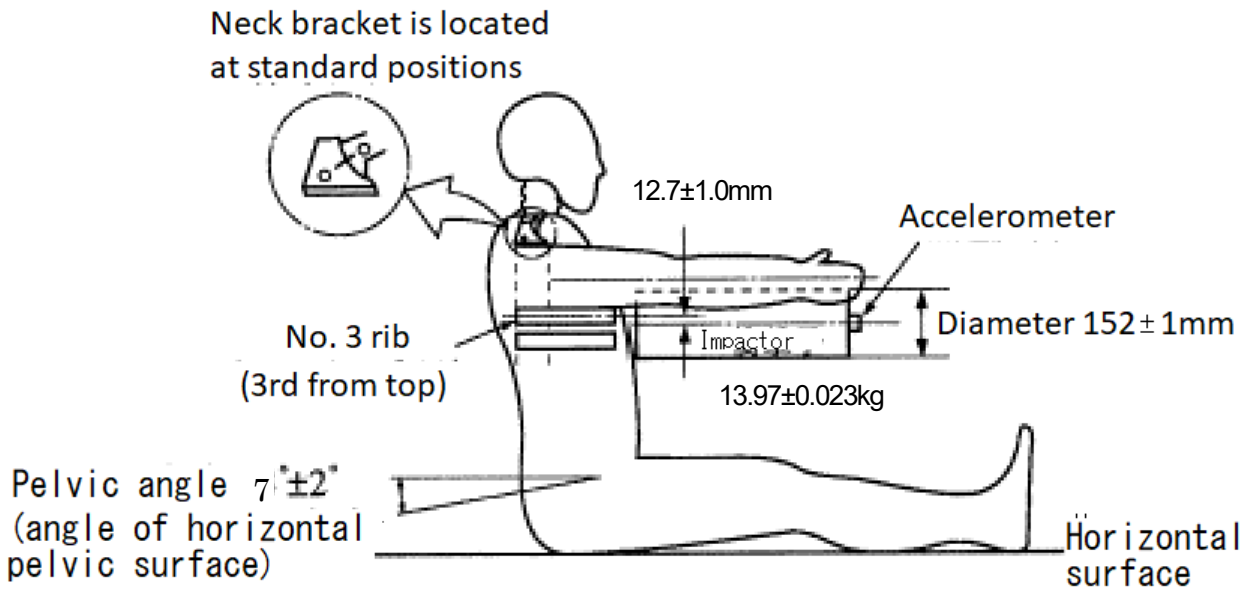
(1) The inspected chest is to be stored for at least 4hours in environmental conditions

maintained at a temperature between 20.6°C and 22.2°C, and humidity is between 10% and 70%.

(2) As indicated in the diagram 6, sit the dummy on a level surface without its back or elbows resting 70

against anything, and with the shoulder and elbow joints lightly tightened so that the upper arms thrust forward, with the pelvis angle adjusted between 13°± 2°. In this situation the dummy may be dressed in a shirt and pants as stipulated in 3.2.9.2(3).

Diagram 6: Chest Characteristics Test



(3) Adjust the positional relationship between the impact device and rib no. 3 in such a manner that the longitudinal direction center line extending from the impact device is 13.0±1.0mm lower than the horizontal center line of rib No. 3 on the dummy's center plane.

(4) Collide the impact device with the chest at a speed between 6.59m/s and 6.83m/s, with the deceleration that occurs at the rear end of the impact device at this time the displacement of the sternum in regards to the dummy's vertebral column (measured with a displacement gage attached inside the sternum), then measure and calculate the impulsive force occurring in the impact device (the product of the impact device's mass and deceleration), and the hysteresis (the comparison (A/B) of the area A between the load of the force displacement curve and the unloaded portion, and the area B below said curve's loaded portion (see diagram7)).

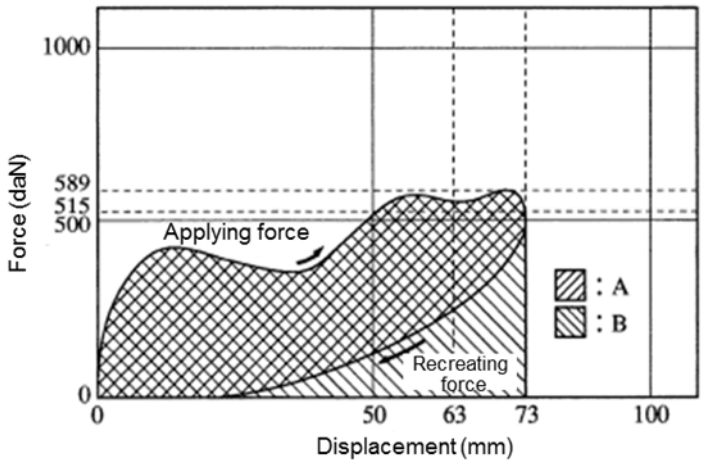
measured with a displacement gage attached inside the sternum), then measure and calculate the impulsive force occurring in the impact device (the product of the impact device's mass and deceleration), and the hysteresis (the comparison (A/B) of the area A between the load

of the force displacement curve and the unloaded portion, and the area B below said curve's loaded portion (see diagram7)).

e load of the force displacement curve and the unloaded portion, and the area B below said curve's loaded portion (see diagram7)).

(5) When inspecting the same chest successively, it must be left for an interval of at least 30 minutes in the environmental conditions stipulated in (1) between tests.

Diagram 7 -Chest feature inspection load/displacement curve



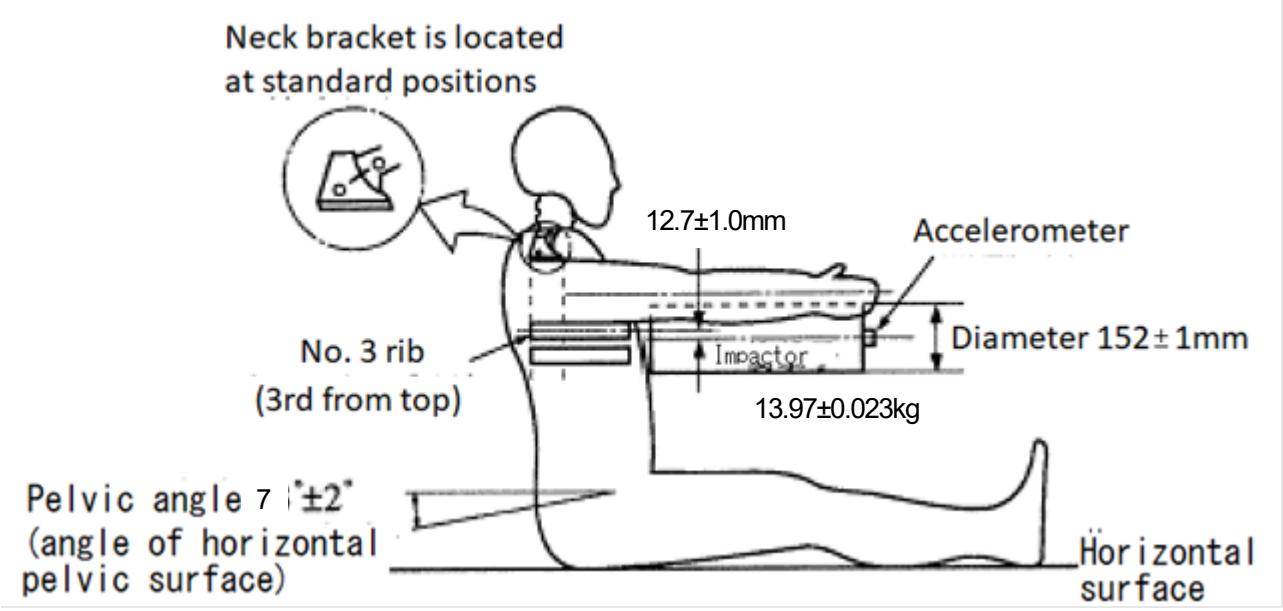
1.4.2 Low-Speed Characteristics

When an impact is applied to the dummy chest with an impactor as shown below, the impact force occurring at the impactor shall reach its maximum between 178daN and 207daN and the displacement of the dummy sternum relative to the spine shall be between 17.4mm and 21.8mm. The internal hysteresis at the moment of impact shall be 65% to 79%.

(1) Condition the chest to be verified in an environment with a temperature of 20.6 ºC –22.2ºC and relative humidity of 10%–70% for at least four hours.

(2) Seat the dummy on a flat surface, without a back support or armrest, as shown in Diagram 8. At this time, the joint of the shoulder and elbow shall be tightened securely so that the upper limbs may be extended forward. Adjust the pelvic angle to 7° ± 2°. The dummy may be clothed in a shirt and pants as provided in Paragraph 4.2.9.2 (3) of this Technical Standard.

Diagram 8: Chest Characteristics Test

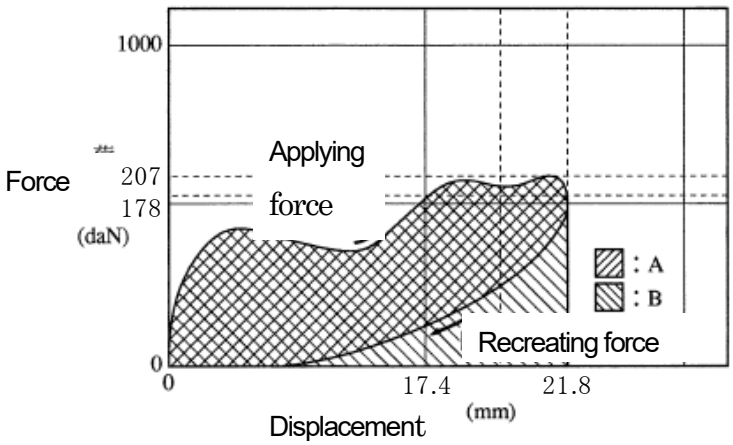


(3) Adjust the positional relationship between the impact device and rib no. 3 in such a manner that the longitudinal direction center line extending from the impact device is 12.7±1.0mm lower than the horizontal center line of rib No. 3 on the dummy's center plane.

(4) Collide the impact device with the chest at a speed between 2.95m/s and 3.05m/s, with the deceleration that occurs at the rear end of the impact device at this time the displacement of the sternum in regards to the dummy's vertebral column (measured with a displacement gage attached inside the sternum), then measure and calculate the impulsive force occurring in the impact device (the product of the impact device's mass and deceleration), and the hysteresis (the comparison (A/B) of the area A between the load of the force displacement curve and the unloaded portion, and the area B below said curve's loaded portion (see diagram 9)).

(5) When inspecting the same chest successively, it must be left for an interval of at least 30 minutes in the environmental conditions stipulated in (1) between tests.

Diagram 9 -Chest feature inspection load/displacement curve



1.5 Flexion Characteristics of the Lumbar Vertebrae

As shown in Diagram 10, when the lumbar vertebrae are rotated downward as follows, the upper torso pulling load shall be 320N –390N when the angle between the upper torso and the

legs becomes 44.5°–45.5°. Additionally, when the load is removed, the upper torso shall return to keep the angle within 8° from the original position.

(1) The dummy for verification shall be preconditioned in an environment with temperature of 18.9 ºC –25.6ºC and relative humidity of 10%–70% for at least four hours.

(2) The dummy shall be installed on the pedestal, and keeping the connecting surface of the pelvis and lumbar vertebra horizontal, the pelvis shall be fixed by using a pelvis-fixing jig. Additionally, the loading jig shall be installed at the vertebra.

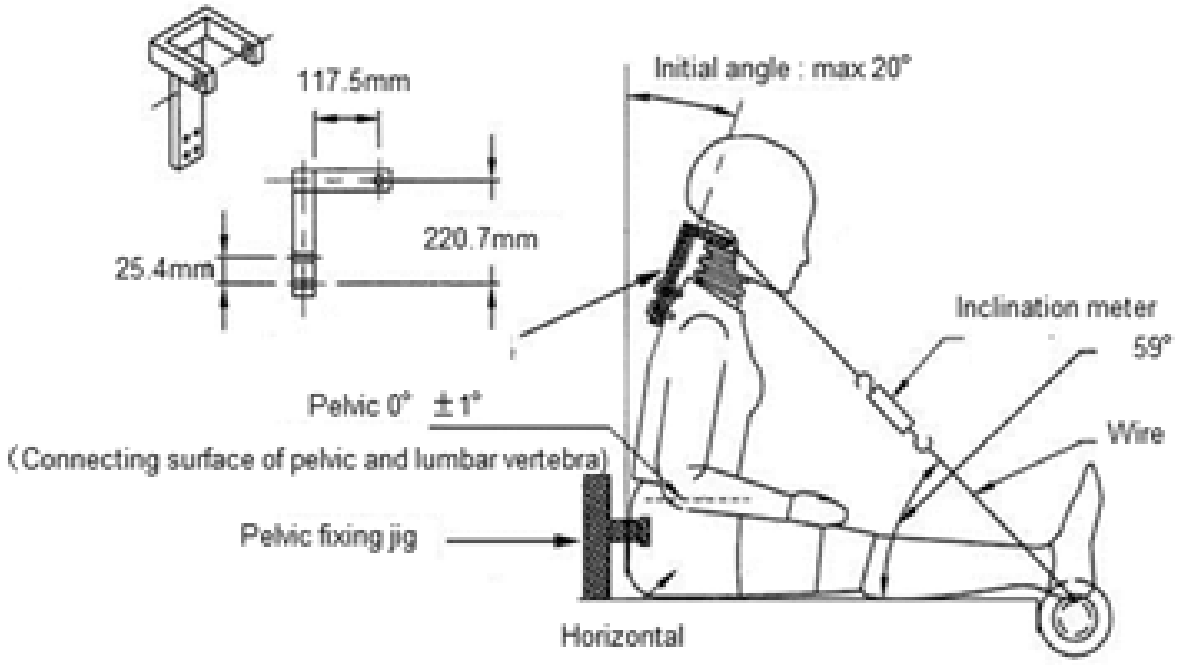
(3) Bend the dummy's upper torso forward at an angle of 30° from the vertical plane. Repeat this three times and then leave the dummy for 30 minutes before conducting the test. Meanwhile, support the dummy's torso by external means so that it is maintained in the vertical position.

(4) Remove the fixing jig from the dummy, keep this condition for 2 minutes, then measure the upper torso angle (initial angle). The measured angle (initial angle) shall be within 20°.

(5) Connect the wire and load meter to the loading jig, pull the upper torso down to 45 ± 0.5° at the speed of 0.5°/sec –1.5°/sec, then measure the load 10 minutes later.

(6) Quickly remove all loads from the load jig, then after 3 minutes, measure the change of upper torso angle from the initial angle.

Diagram 10 : Flexion Characteristic test for the Lumbar Vertebra



1.6 Leg Characteristics

Apply impact to each knee on the right and left side with the impactor as follows. The maximum impact force occurring at the impactor shall be 345daN –406daN. (The

impactor is a cylinder whose impact applying section has a diameter of 76 ± 1mm. To measure the impactor acceleration that occurs in the longitudinal centerline of the cylinder, the accelerometer shall be mounted on the impactor surface opposite the impactor surface in a way superposed onto the aforesaid line. The impactor mass shall be 2.99 ± 0.023kg including the accelerometer.) (See Diagram 9.)

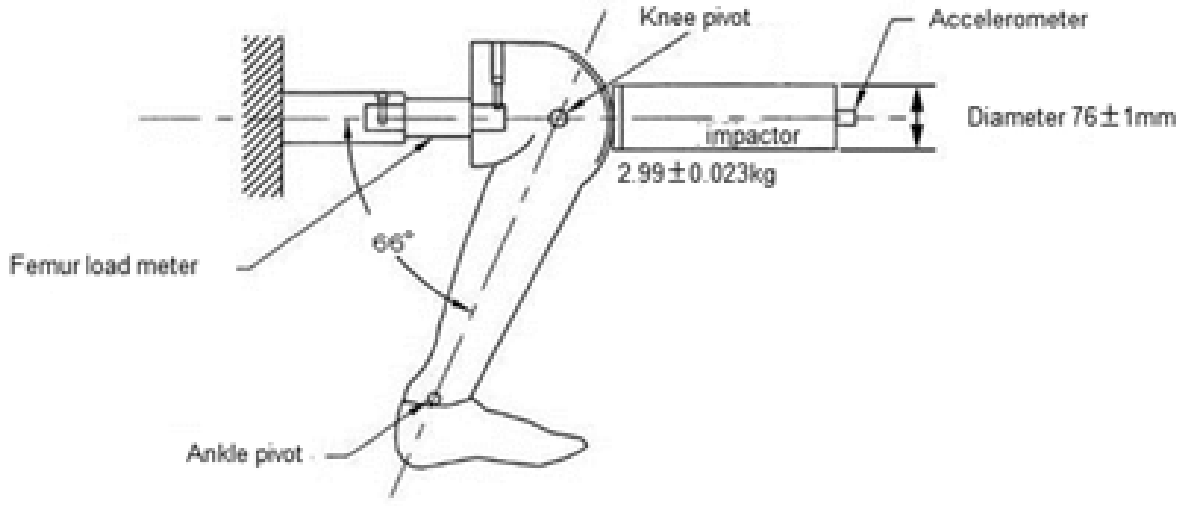
(1) Condition the leg to be verified in an environment with temperature of 18.9 ºC –25.6ºC and relative humidity of 10%–70% for at least four hours.

(2) Adjust the impactor position so that the height of the longitudinal centerline of the impactor is the same as the height of the centerline of the knee pivot bolt on the vertical plane that passes through the centerline of the upper leg at the time when the impactor comes in contact with the knee in a horizontal state.

(3) Impact the leg with the impactor at a speed of 2.07m/s –2.13m/s. Measure the deceleration occurring at the rear end of the impactor and calculate the impact force occurring at the impactor (the product of the impactor mass and the deceleration).

(4) When the verification is conducted on the same leg, etc. consecutively, allow at least 30 minutes between successive tests under the environmental conditions given in (1).

Diagram 11: Leg Characteristics Test



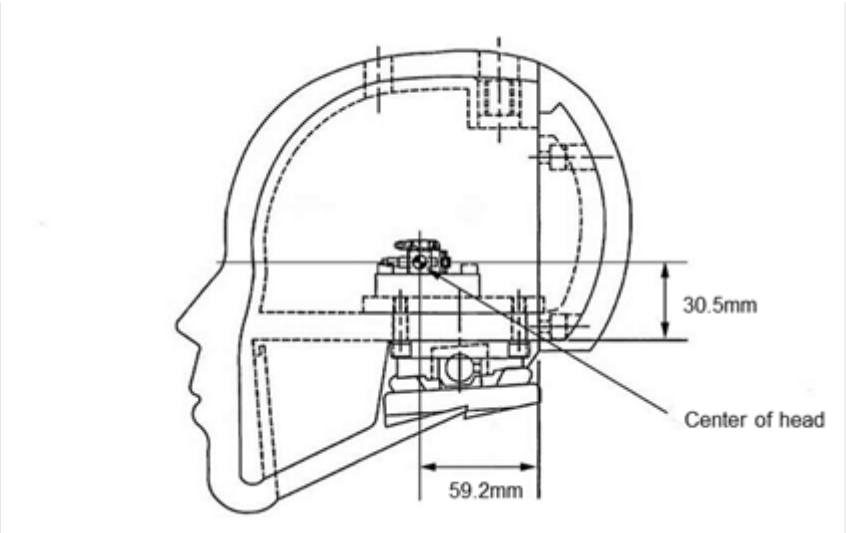
1.7 Measuring Equipment

(1) Center of Sensitivity of Head Accelerometer

The center of sensitivity of the head accelerometer shall be in the range specified in the table below with the head center as the zero-point. (The head center means the point that is on the dummy center plane, 30.5mm above the head inner bottom surface and 59.2mm forward from the vertical plane where the brainpan joins with the brain pan cover.) (See Diagram 12.)

	Range of head accelerometer center of sensitivity (mm)		
	Fore-aft direction	Lateral direction	Vertical direction
Fore-aft axis range	Backward within 33	±5	±5
Lateral axis range	±5	±33	±5
Vertical axis range	±5	±5	±8

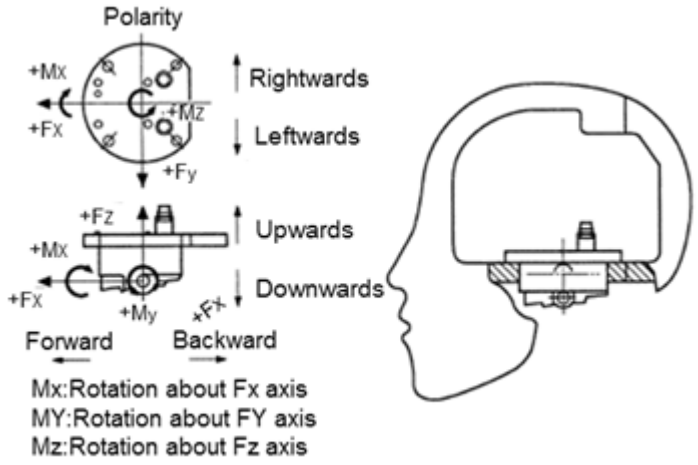
Diagram 12: Head Accelerometer Sensitivity Center



(2) Installation of Neck Load Meter

The neck load meter shall be installed as shown in Diagram 13.

Diagram 13: Installation of 6-axis Type Head Load Meter



(3) Center of Sensitivity of Chest Accelerometer

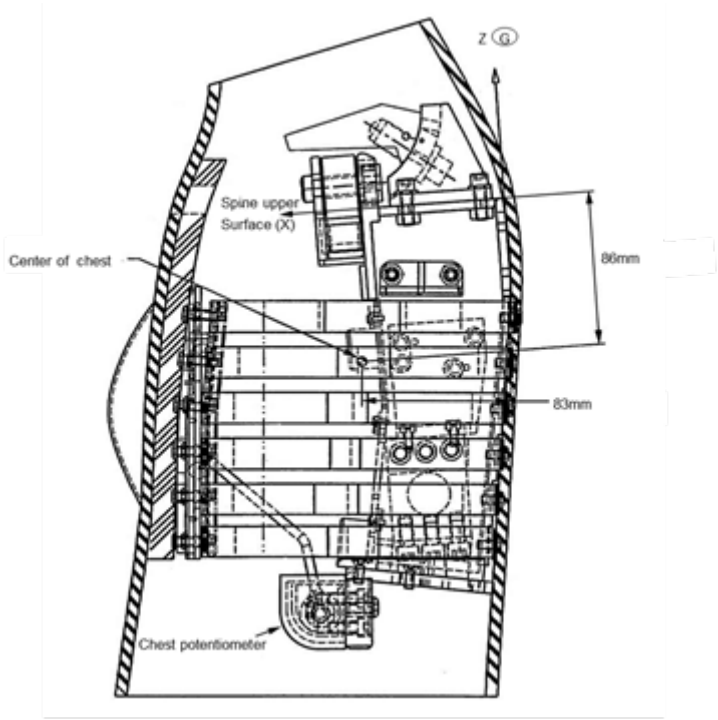
The center of sensitivity of the chest accelerometer shall be within the range specified in the table below from the chest center (which means the point on the dummy's center plane located 86mm below the spine upper face and 83mm forward of the rearmost thoracic plane). (See Diagram 14.)

	Range of chest accelerometer center of sensitivity (mm)		
	Fore-aft direction	Lateral direction	Vertical direction
Fore-aft axis range	Backward, within 40	±10	Downward, within 20
Lateral axis range	Backward, within± 50	±5	Downward, within 20
Vertical axis range	Backward, within 25	±10	Downward, within 45

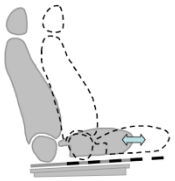
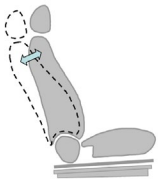
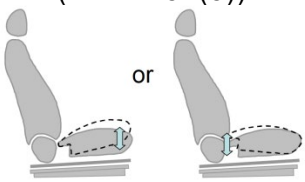
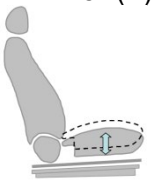
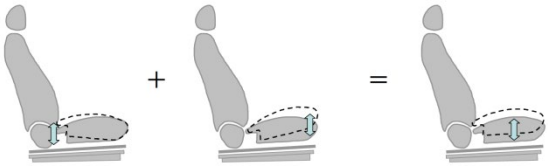
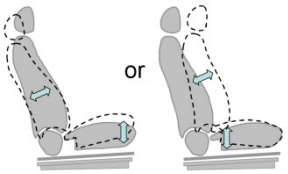
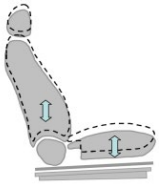
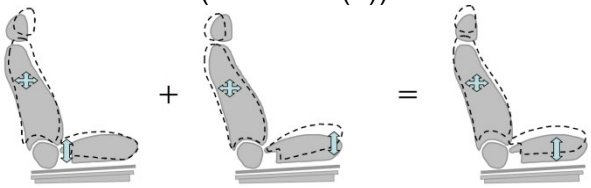
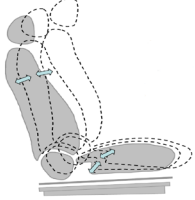
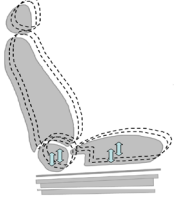
(4) Installation of Chest Potentiometer

A potentiometer shall be installed as shown in Diagram 14.

Diagram 14: Center of Chest and Installation of Chest Potentiometer


Z G
Spine upper
Surface (X)
Center of chest
86mm
83mm
Chest potentiometer

Adjusting Position of Test Seat Adjustment Mechanism

Fore-and-aft direction adjustment device (ref.4.1.5. (1))  Design standard position	Seat back angle adjustment device (ref.4.1.5. (3))  Design standard position
Seat cushion surface angle adjustment device (tilt or lifter) (ref.4.1.5. (5))  Design standard position	Seat cushion surface up-and-down adjustment device(lifter) (ref.4.1.5. (2))  Design standard position
Seat cushion surface angle up-and-down adjustment device(others) (ref.4.1.5. (5))  Design standard position	Seat lower-seat back angle adjustment device (ref.4.1.5. (5))  Design standard position
Seat lower-seat back up-and-down adjustment device(lifter) (ref.4.1.5. (2))  Design standard position	Seat lower (angle, up-and-down)-seat back angle adjustment device (ref.4.1.5. (5))  Design standard position
Fore-and-aft, up-and-down, angle all linked adjustment device (ref.4.1.5. (5))  Design standard position	Fore-and-aft, up-and-down all linked adjustment device (lifter) (ref.4.1.5. (2))  Design standard position

TEST RESULTS REPORT (SAMPLE)

Full Wrap Front End Collision

Test **No. NASVA 2024-*****

Test Vehicle Name : **NASVA　1234**

Test Date : **2024 / ** / ** (*)**

Test Location : **Japan Automobile Laboratory, Inc.**

1. Test Vehicle

Vehicle Name / Model : **NASVA　1234(DAA-ABCD)**

Test Vehicle Mass : **1000kg (F:600 / R:400)**

Frame Number : **ABCD-123456**

Occupant Crash Protection : **Driver Seat　seatbelt（w/ double pretensioner）＋airbag（Front・Side・Knee・Curtain）**

Rear Test Seat　seatbelt（w/ double pretensioner）＋airbag（Curtain）

2. Dummies

Driver seat : **Hybrid-Ⅲ　5F　No. DT01-1**

Rear Test Seat : **Hybrid-Ⅲ　5F　No. DT02-1**

3. Test Scores

① Collision Speed : **50.0km/h**

② Center Displacement : **Left-right 0mm ／ Up-down 0mm**

③ Injury Value :

		Driver Seat	Rear Test Seat
Head Injury Value (HIC15)		123.4	(123.4)
Head & Neck	Pull Load (kN)	1.23	1.23
	Shear Load (kN)	1.23	(1.23)

	Extension Moment (Nm)	-12.34	(-12.34)
Amount of Chest Displacement (mm)		-12.34	-12.34
Shoulder belt load (kN)		1.23	1.23
Waist Belt Displacement From Pelvis	Right	None	None
	Left	None	None
Femoral Load	Right (kN)	-1.23	-1.23
	Left (kN)	-1.23	-1.23

Note: If there is no secondary head collision, enter as ( )

④ Vehicle Body Deformation :

Steering Displacement (mm)	Backward Displacement	Forward 0
	Upward Displacement	Down 0
Brake Pedal Displacement (mm)	Backward Displacement	Forward 0
	Upward Displacement	Down 0

⑤ Dummy Constraint Condition During or After Testing :

- Driver Seat ..... Acceptable
- Rear Test Seat ..... Acceptable

⑥ Waveform Remove in Secondary Collision :

- Driver Seat ..... None
- Rear Test Seat ..... None

⑦ Fuel Leakage During or After Collision : None

⑧ Side Door Openability :

		Left Side	Right Side
Front Seat	Openability	Open Hand	Open Hand
	Door Lock	None	None

Rear test seat	Openability	Open Hand	Open Hand
	Door Lock	None	None

⑨ Ability to pull dummy out of vehicle :

・Driver Seat ..... Manpower

・Rear Test Seat .....Manpower

⑩ Secondary collision to rear dummy's head: None

Simple measurement results

① Suspected contact with the marks on the dummy : None

② Suspected contact with the onboard camera : None

③ Suspected contact from the head acceleration wave: None

If there is contact, enter the head contact load here: N

⑪ Sliding of the seatbelt off the dummy's pelvic region

・Right side: None

・Left side : None

If there is, enter the amount of displacement and the duration

Right side: Load displacement KN Duration ms ～ ms

Left side: Load displacement KN Duration ms ～ ms

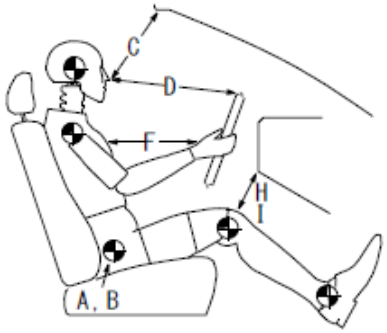
⑫ Slippage of shoulder belt on rear test seat dummy: (Yes・No)

Note

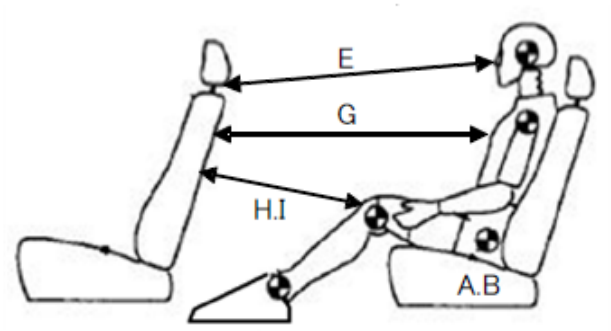
4. Dummy Seated Positions

(1) Point to Point Measurements Results

Driver Seat



Rear test Seat

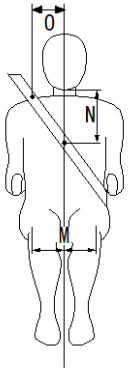


Units: mm

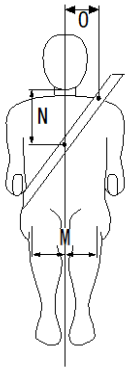
Measured Position		Driver Seat	Rear Test Seat
A Reference point ～ hip point front-back		123	123
B Reference point ～ hip point up-down		123	123
C Nose tip ～ windshield header		123	123
D Nose tip ～ steering wheel rim top center (horizontal with nose ～ seat back)		123	
E Top of nose ～ Front seatback, upper-center			123
F Chest ～ Steering horn pad (horizontal)		123	
G Chest ～ Front seatback (horizontal)			123
H Right knee ～ dashboard bottom （Shortest）	Right Knee ～ Front Seatback (Shortest)	123	123
I Left knee ～ dashboard bottom（Shortest）	Left Knee ～ Front Seatback (Shortest)	123	123
J Head angle		0°	0°
K Pelvis angle		20.0°	20.0°

Seatbelt Settings

Driver Seat



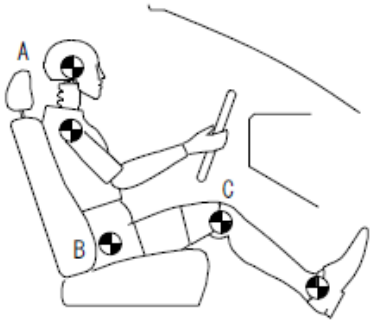
Rear Test Seat



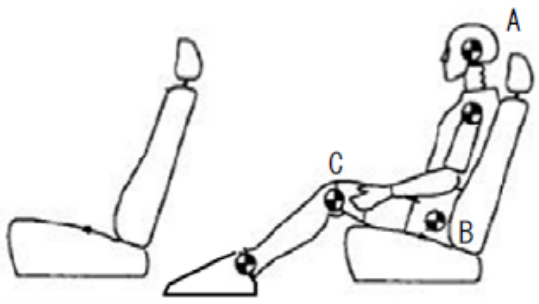
Measured Position	Driver Seat	Rear Test Seat
M Knee interval（dummy center ～ left, right）	123 / 123	123 / 123
N Dummy chin center ～ belt center（up-down on dummy center line）	123	123
O Dummy center ～ belt center（left-right at height of neck base）	12	12

(2) Three-dimensional Measurement Results

Driver Seat



Rear Test Seat



Reference Points（Example）: Driver Seat – Fr door checked bolt head（X;1234.5 Y;123.4 Z;123.4）

Rear Test Seat - Fr door checked bolt head（X;1234.5 Y;-123.4 Z;123.4）

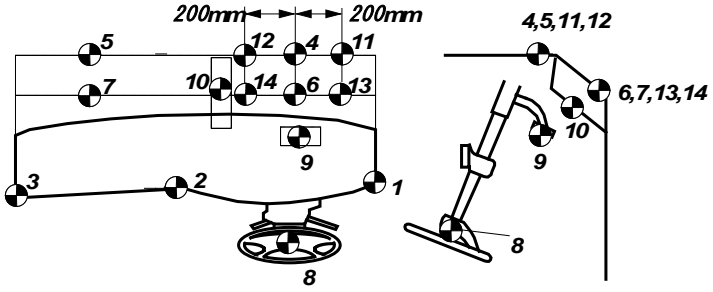
Unit :mm

Measured Part	Driver Seat			Rear Test Seat		
	X	Y	Z	X	Y	Z
A: Head（Outside）	1234	123	1234	1234	123	1234

B: Wasit （Outside）	1234	123	1234	1234	123	1234
C: Knee （Outside）	1234	123	1234	1234	123	1234

5. Vehicle Body Part Deformation Amounts

(1) Cabin Interior Part Deformation Amounts



1 : Instrument panel right end

2: Instrument panel center

3: Instrument panel left end

4: Driver seat toe board

5: Passenger seat toe board

6: Driver seat floor

7: Passenger seat floor

8: Steering shaft tip

9: Brake pedal

10: Footrest

11: Driver seat toe board A

12: Driver seat toe board B

13: Driver seat floor A

14: Driver seat floor B

Reference Points（Example）： door checked bolt head（X：1245.5Y：1234.5, Z：123.4）

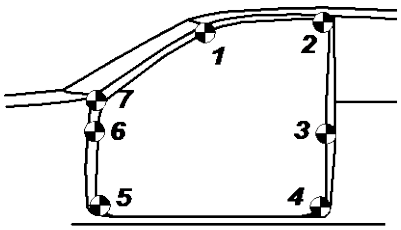
Unit：mm

Car interior

Part		Before test	After test	Deformation
1	X	-	-	-
	Y	-	-	-
	Z	-	-	-
2	X	-	-	-
	Y	-	-	-
	Z	-	-	-
3	X	-	-	-
	Y	-	-	-
	Z	-	-	-
4	X	-	-	-
	Y	-	-	-
	Z	-	-	-
5	X	-	-	-
	Y	-	-	-
	Z	-	-	-
6	X	-	-	-
	Y	-	-	-
	Z	-	-	-
7	X	-	-	-
	Y	-	-	-
	Z	-	-	-

Part		Before test	After test	Deformatio
8	X	1234	1234	0
	Y	123	123	0
	Z	1234	1234	0
9	X	1234	1234	0
	Y	123	123	0
	Z	1234	1234	0
10	X	-	-	-
	Y	-	-	-
	Z	-	-	-
11	X	-	-	-
	Y	-	-	-
	Z	-	-	-
12	X	-	-	-
	Y	-	-	-
	Z	-	-	-
13	X	-	-	-
	Y	-	-	-
	Z	-	-	-
14	X	-	-	-
	Y	-	-	-
	Z	-	-	-

(2) Door vicinity Deformation



1 : A pillar top
2 : B pillar top
3 : Striker bolt
4 : B pillar bottom
5 : A pillar bottom
6 : A pillar center
7 : A pillar fitting

Reference Points (Example) : Fr door checked bolt head (X : 1245.5, Y : 1234.5, Z : 123.4)

Unit : mm

Right door

Part	Before test	After test	Deformation

Left door

Part	Before test	After test	Deformation

Electrical Measurement Data

Dummy test results and sensor performance certification

Photo of the situation at the time of the test

Appendix 1: Test Vehicle Specification Data Sheet

[To be completed by vehicle manufacturer]

1. Adjusting Seats and Seatbelts

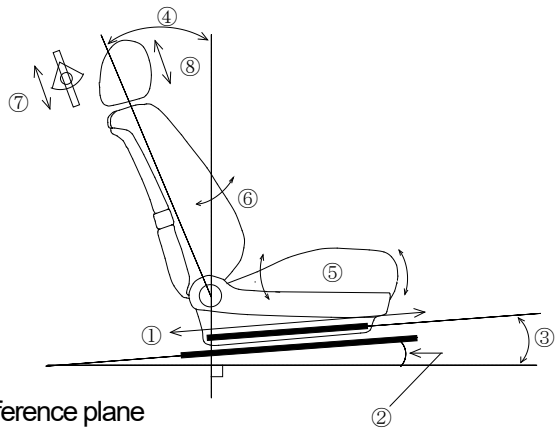
[Row 1]

			Driver Seat	Front Passenger Seat
①Adjustment of seat in fore-and-aft direction	Adjustment amount per stage		mm	mm
	Entire adjustment amount		mm	mm
	Mid. Position	From front edge	mm (stage)	mm (stage)
		From rear edge	mm (stage)	mm (stage)
② Adjustment of seat-slide-rail in attaching angle			°	°
③ Adjustment of seat lower and seatback at once	Design standard position			
	Attachment method			
④ Adjustment of seatback angle	Design standard angle		° (stage)	° (stage)
⑤ Adjustment of seat in vertical direction	Tilt	From the lowest position	mm	mm
	Lifter		mm	mm
	Other		mm	mm
⑥ Adjustment of lumbar support	From the release position			
⑦ Adjustment of anchorage for seatbelt shoulder webbing	Adjustment range		mm (stage)	mm (stage)
	Design standard position		[From top position] mm (stage)	[From top position] mm (stage)
⑧ Adjustment of head-rest height	Adjustment range		mm (stage)	mm (stage)
⑨Other adjustment mechanisms ( )	Design standard position			

[Rows 2, 3]

			2nd Row	3rd Row
① Adjustment of seat in fore-and-aft direction	Adjustment length per stage		mm	mm
	Total adjustment length		mm	mm
	Standard	From front edge	mm (stage)	mm (stage)
		From rear edge	mm (stage)	mm (stage)
④ Adjustment of seatback angle	Design standard angle		° (stage)	° (stage)
⑦ Adjustment of anchorage for seatbelt shoulder webbing	Adjustment range		mm(stage)	mm(stage)
	Design standard position		[From top position] mm (stage)	[From top position] mm (stage)
⑧ Adjustment of headrest height	Adjustment range		mm (stage)	mm (stage)
	Design standard position		[From top position] mm (stage)	[From top position] mm (stage)
⑨Other adjustment mechanisms ( )	Design standard position			

(Note) The number of stages for adjustment position shall start from the first locking position ("stage 0").



Vehicle horizontal reference plane

(Note) position of ⑨ other adjustable mechanism shall be shown on the above drawing.

2. Adjustment of Steering System

(1) Vertical direction: (present/absent)

Adjustment range: ____° ~ ____° (____ stage)

Vertical adjustment position: From highest position ____° (____ stage)

(2) Fore-aft direction

Adjustment range: ____ mm (____ stage)

Fore-aft adjustment position: From foremost position ____ mm (____ stage)

(Note) The number of stages for position adjustment in the vertical direction and the fore-and-aft direction shall start from the uppermost position and foremost position ("stage 0"), respectively.

(3) Distance between steering pad center and forward end of steering shaft: ____ mm

3. Fuel Tank Capacity: ____ L

When specification is needed of the vehicle's mounting position when its mass at vehicle delivery was recorded, diagram it below.

Diagrams or photographs may be used.

4. Vehicle Width: _____mm

5. Reference Points of Measurement of Vehicle Inclination (Enter the inclination of the unloaded vehicle with two dummies placed in their assigned positions.)

(1) Fore-aft Direction

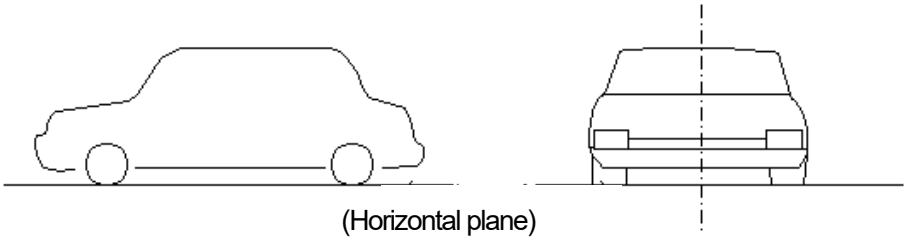
Reference Points (locations):_____(indicated below)

Angle to Horizontal Plane: □Forward Tilt □Backward Tilt_____°

(2) Lateral Direction (in relation to driving direction)

Reference Points (locations):_____(indicated below)

Angle to Horizontal Plane: □Leftward Tilt □Rightward Tilt_____°



6. Location and Method for Installing Vehicle Accelerometers

The details shall be entered using Appendix 2.

7. Removable Parts

8. Automatic Door-Locking Systems, etc.

Vehicle-speed-sensitive door-locking system: Available (sensitive type) / Not Available

Crash-sensitive door-unlocking system: Available / Not Available

9. Installation of Towing Hook

The towing hook shall be installed at the center of the test vehicle.

Diagrams or photographs may be used.

10. belt load indicator mounting position

Indicates the mounting position of the load indicator on the driver's and rear test seat belt (shoulder area).

Diagrams or photographs may be used.

11. Points of reference for vehicle measurement criteria

After the collision test has been carried out, locations from point 3 to point 5 that are unlikely to have been affected by vehicle body deformation are to be indicated.

Diagrams or photographs may be used.

12. Clamping Torque of Bolts

Driver side airbag module :_____ N

Driver seat anchor bolts :_____ N

Front passenger seat anchor bolts :_____ N

Other

:_____ N

:_____ N

:_____ N

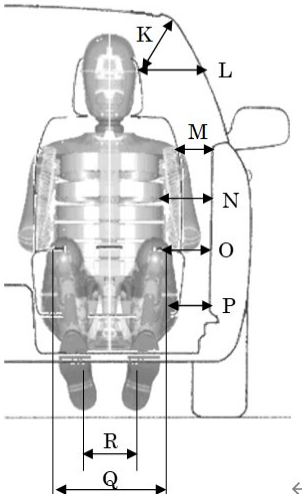
13. Battery liquid

To maintain functions such as operation of restraining device, only when battery liquid must not be eliminated, it is indicated below. (However, battery here indicates only one mounted at vehicle front (engine room)

Battery Fluid Required: Yes (circle)

14. Impact area of rear test seat side when side curtain airbags deploy

Diagrams or photographs may be used.



15.Other special notes

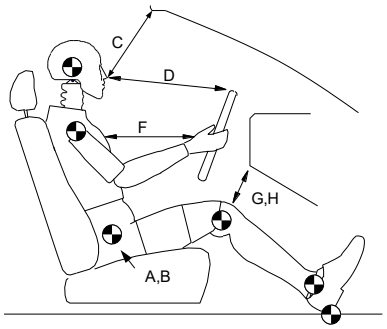
FRONTAL COLLISION SAFETY PERFORMANCE TEST

16. Dummy seating position measurement results record　　For entry by vehicle manufacturer

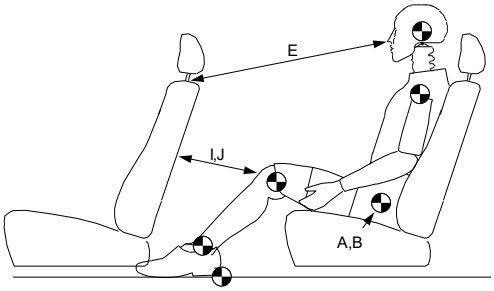
① Recording Sheet for Simple Measurements

Test vehicle name/model:	Test Date:
Frame Number:	Test Location:
Dummy Type:	Overseer:
Dummy Number:	Notes:

Driver's Seat

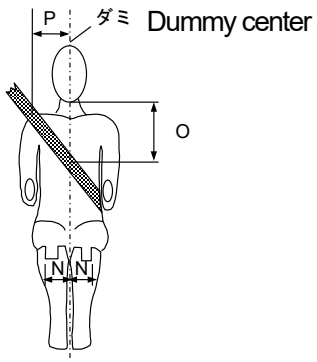


Rear Test Seat

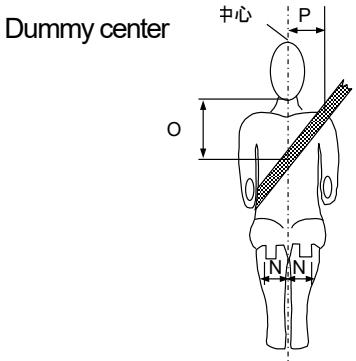


	Measurement Items	Driver's Seat	Rear Test Seat
A	Reference Point ( )～ Hip Point, fore-aft direction		
B	Reference Point ( )～ Hip Point, vertical direction		
C	Top of nose ～ Windshield Header		
D	Top of nose ～ Steering Wheel Rim, upper-center		
E	Top of nose ～ Front seatback, upper-center (horizontal with nose ～ seat back)		
F	Chest ~ Steering horn pad face (horizontal)		
G	Right Knee ～ Under the dashboard		
H	Left Knee ～ Under the dashboard		
I	Right Knee ～ Front seatback		
J	Left Knee ～ Front seatback		
K	Head Angle		
L	Pelvis Angle		
M			

Driver's Seat



Rear Test Seat



Measurement Items		Driver's Seat	Rear Test Seat
N	Knee Gap (dummy center～right, left)	R: L:	R: L:
	Reason why the dummy can't be loaded with a knee gap		
O	Dummy Lower Jaw～Belt Center (vertical line down the dummy's center)		
P	Dummy Center～Belt Center (lateral direction at height of root of neck)		
Q			

(Note) In A and B, enter the reference point of the car body in parentheses ( ) and measure the dimensions of the front/rear and vertical components. The reference points do not have to be the same.

② 3-D Measuring Device Recording Sheet

Test vehicle name/model: _____
Frame Number: _____
Dummy Type: _____
Dummy Number:

Test Date: _____
Test Location: _____
Overseer: _____
Notes: _____

Driver's seat

Rear Test Seat

Measurement Items (target value)		Driver's Seat			Rear Test Seat		
		X	Y	Z	X	Y	Z
A	Head Center						
B	Hip Point						
C	Knee Joint Center: Right Side (vehicle outer side)						
D	Knee Joint Center: Left Side (vehicle outer side)						
E	Heel center: Right side						
F	Heel center: Left side						
G	Head Angle						
H	Lower neck						
I	Pelvis Angle						
J	Neck Bracket Step						
J							

Hip Point Design Value

	Driver's Seat			Rear Test Seat		
	X	Y	Z	X	Y	Z
Design Hip Point (Y is the dummy center value)						

Hip Point (Y is the dummy center value)						
Vehicle Reference Points ( )						

Vehicle reference point

Diagrams or photographs may be used.

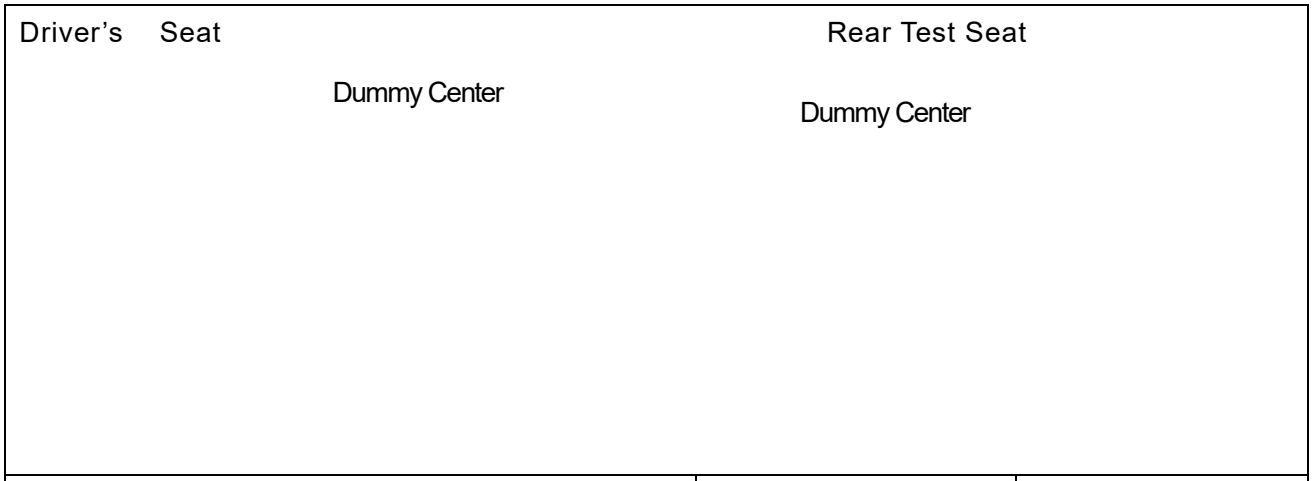
16－1. Dummy seating position measurement results record for entry by testing institute

Recording Sheet for Simple Measurements

Test vehicle name/model:	Test Date:
Frame Number:	Test Location:
Dummy Type:	Overseer:
Dummy Number:	Notes:

Driver's Seat Rear Test Seat

	Measurement Items	Driver's Seat	Rear Test Seat
A	Reference Point ( )～ Hip Point, fore-aft direction		
B	Reference Point ( )～ Hip Point, vertical direction		
C	Top of nose ～ Windshield Header		
D	Top of nose ～ Steering Wheel Rim, upper-center		
E	Top of nose ～ Steering Wheel Rim, upper-center (horizontal with nose ～ seat back)		
F	Chest ～ Steering, horn, pad surface (horizontal)		
G	Right Knee ～ Under the dashboard		
H	Left Knee ～ Under the dashboard		
I	Right Knee ～ Front seatback		
J	Left Knee ～ Front seatback		
J	Head Angle		
L	Pelvis Angle		
M			



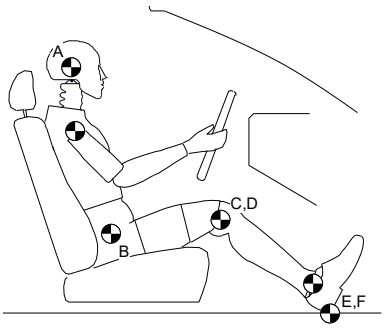
	Measurement Items	Driver Seat	Rear Test Seat
N	Knee Gap (dummy center～right, left)	R: L:	R: L:
O	Dummy Lower Jaw～Belt Center (vertical line down the dummy's center)		
P	Dummy Center～Belt Center (lateral direction at height of root of neck)		
Q			

(Note) In A and B, enter the reference point of the car body in parentheses ( ) and measure the dimensions of the front/rear and vertical components. The reference points do not have to be the same.

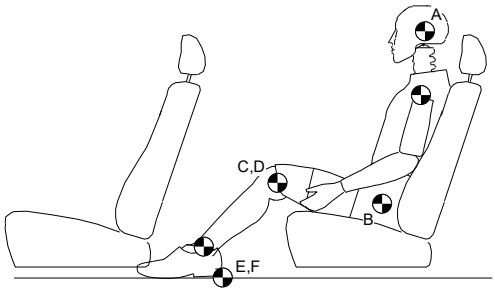
② 3-D Measuring Device Recording Sheet

Test vehicle name/model:	Test Date:
Frame Number:	Test Location:
Dummy Type:	Overseer:
Dummy Number:	Notes:

Driver's Seat



Rear Test Seat

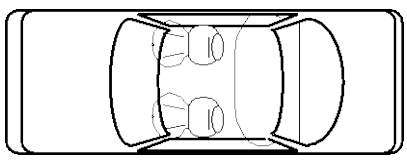


Measurement Items (target value)		Driver Seat			Rear Test Seat		
		X	Y	Z	X	Y	Z
A	Head Center						
B	Hip Point						
C	Knee Joint Center: Right Side (vehicle outer side)						
D	Knee Joint Center: Left Side (vehicle outer side)						
E	Heel center: Right side						
F	Heel center: Left side						
G	Head Angle						
H	Pelvis angle						
I	Neck bracket stage						
J							

16－2. Detached parts and loaded weight

Detached parts	
Loaded weight mass	

Loaded Weight locations

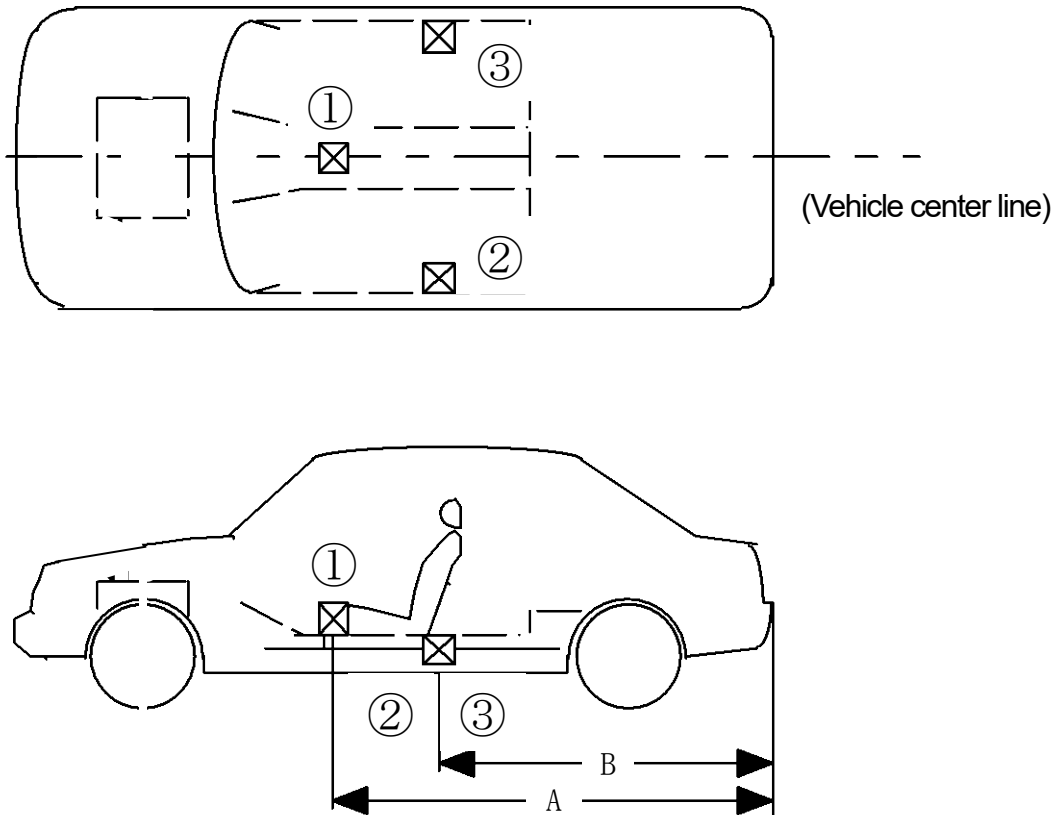


17. Results of Tests by Vehicle Manufacturer

The vehicle manufacturer shall provide the results of their tests in the format specified in Appendix 4.

Appendix 2: Position of Accelerometers in Test Vehicle

［To be filled in by test institute］



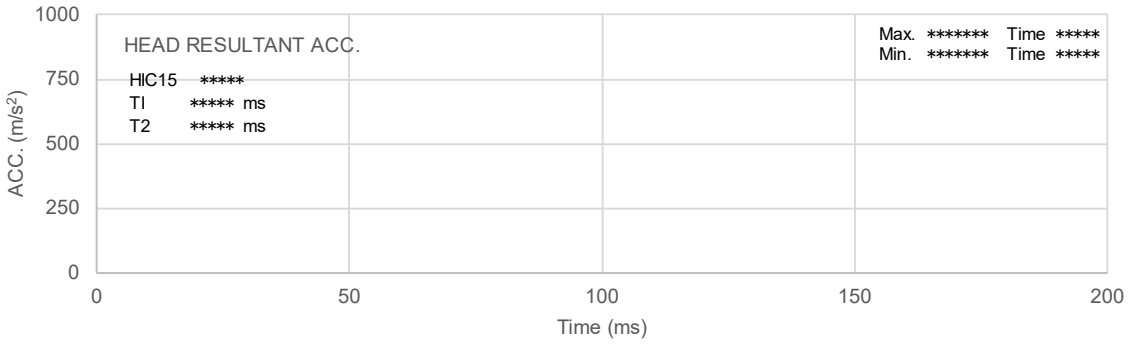
Measuring Points	Distance from reference measuring position of vehicle dimensions (mm)
① Tunnel	A:
② Left Side Sill	B:
③ Right Side Sill	B:

APPENDIX 3: TEST AUTOMOBILE DIMENSION DATASHEET

[For entry by the test laboratory]

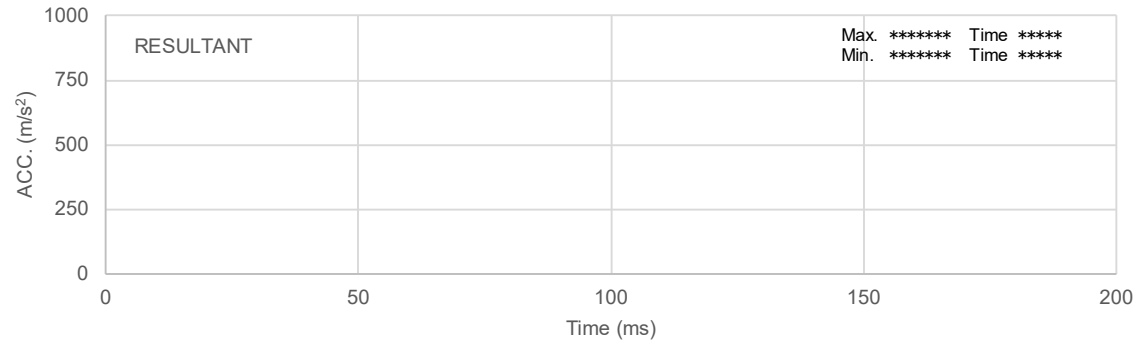
Model Name		
Model type		
Classification		
Frame number		
Drive type		
Steering system	Steering wheel type	
	Air bag	Absent / Present
	Adjustment in the vertical direction	Absent / Present (Electric / Manual)
	Adjustment in the fore-and-aft direction	Absent / Present (Electric / Manual)
Seat	Adjustment in the fore-and-aft direction	Absent / Present (Electric / Manual)
	Adjustment of seat back	Absent / Present (Electric / Manual)
	Adjustment of lumbar support	Absent / Present (Electric / Manual)
	Adjustment of height	Absent / Present (Electric / Manual)
Seat belt	Pre-tensioner	Absent / Present (Shoulder / Inside of waist)
	Adjustment of shoulder webbing	Absent / Present (Electric / Manual)
Others (Circle around items present)		Vehicle speed sensing door lock / Crash Sensitive door unlocking system / precrash safety system / Sunroof / Footrest

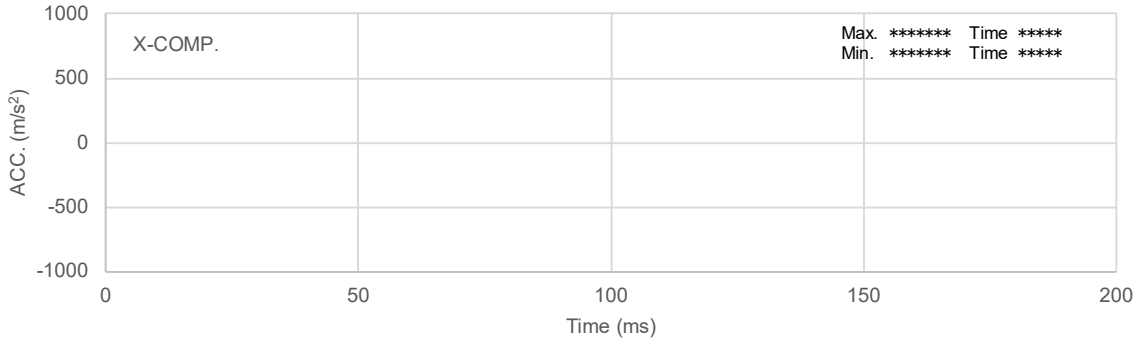
APPENDIX 4: RECORDED EXAMPLES OF ELECTRICAL MEASUREMENT RESULTS

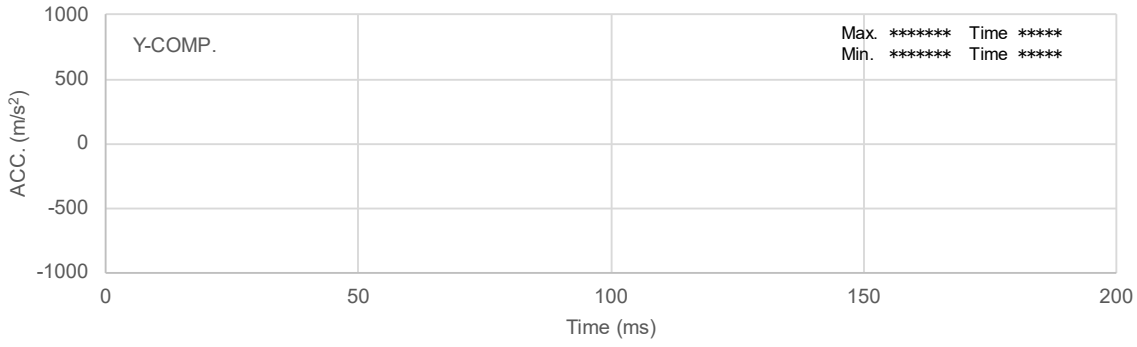


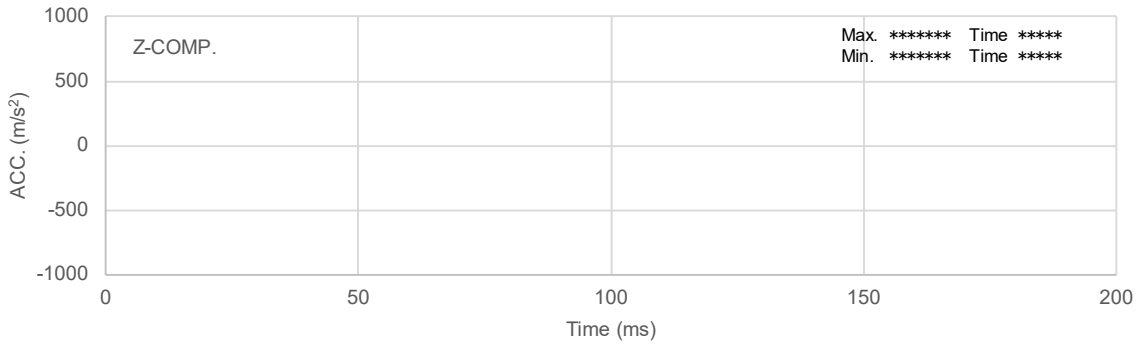
Driver Dummy HIC

No. NASVA****-*****



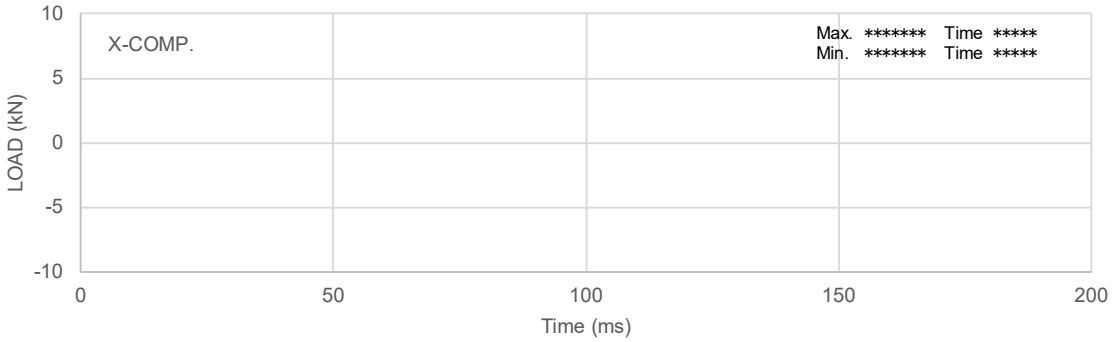


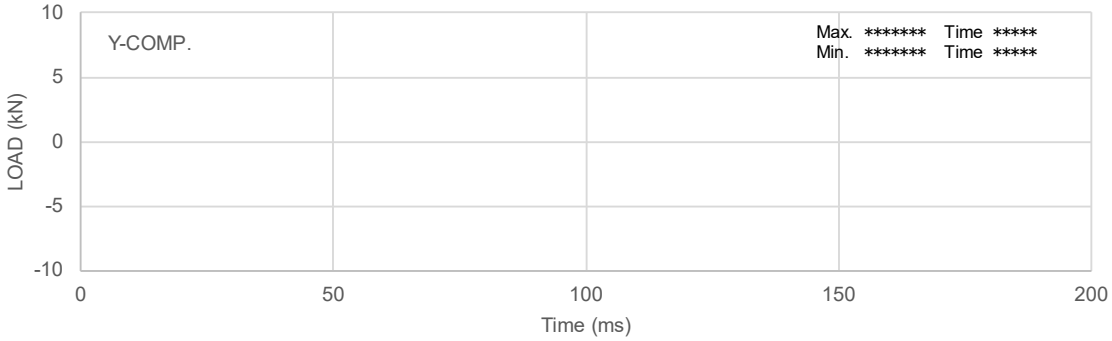


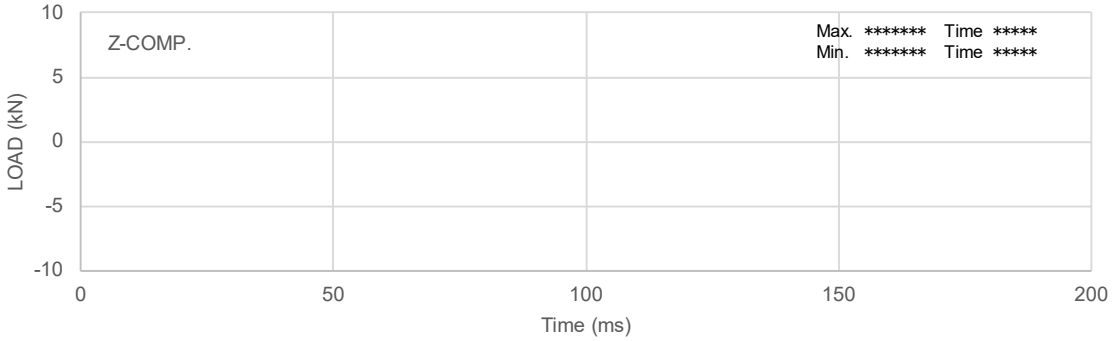


Driver Dummy Head Acc.

No. NASVA****-*****

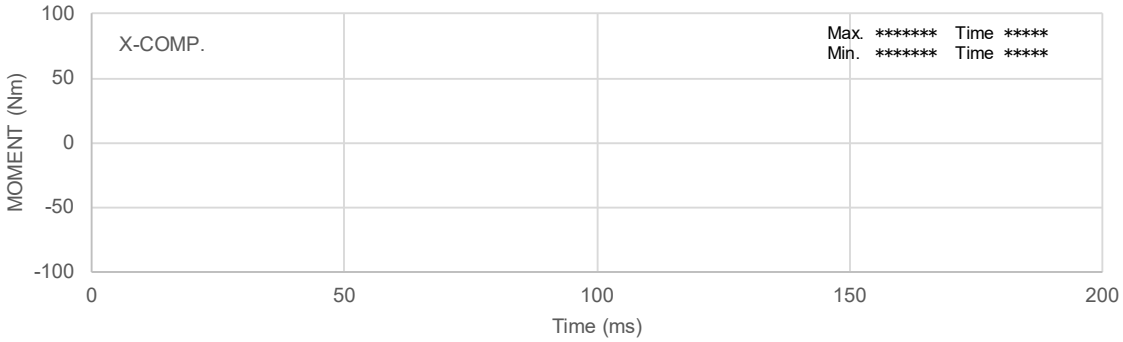


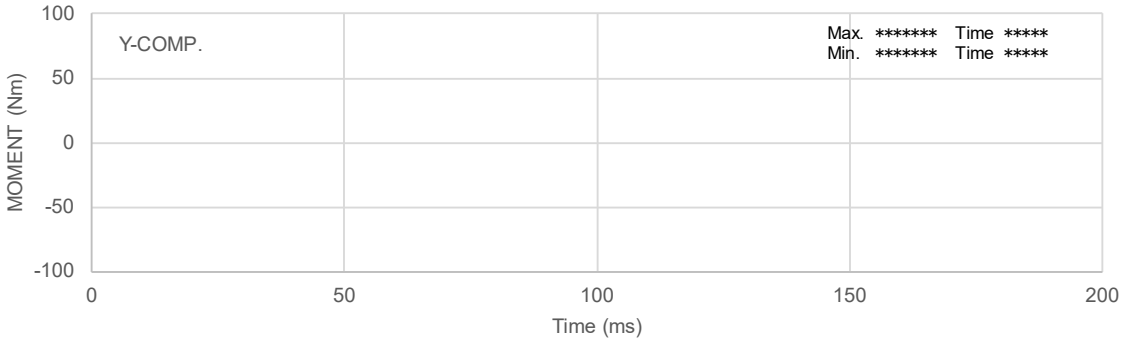


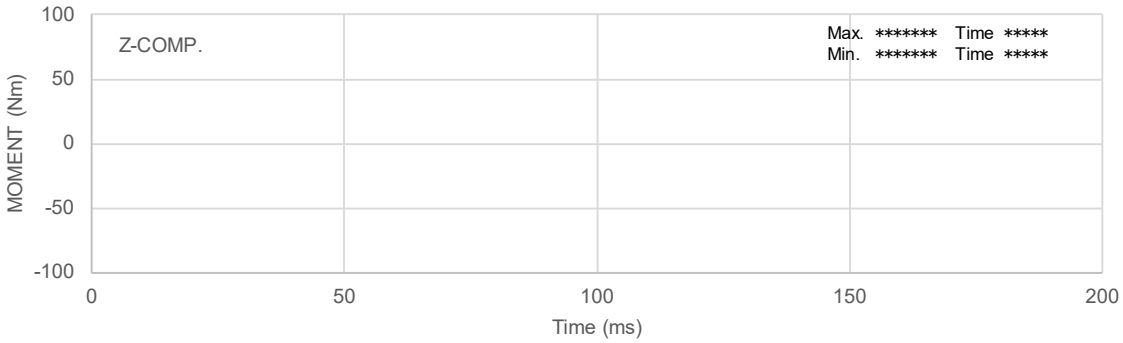


Driver Dummy Neck Force

No. NASVA****-*****

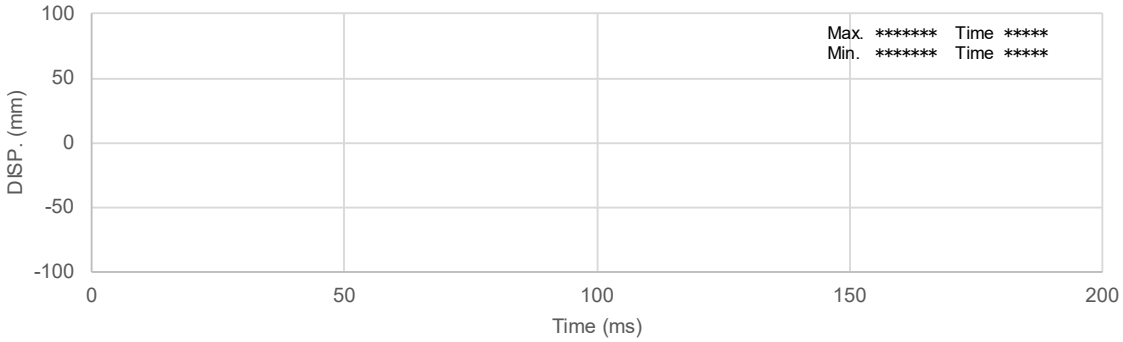






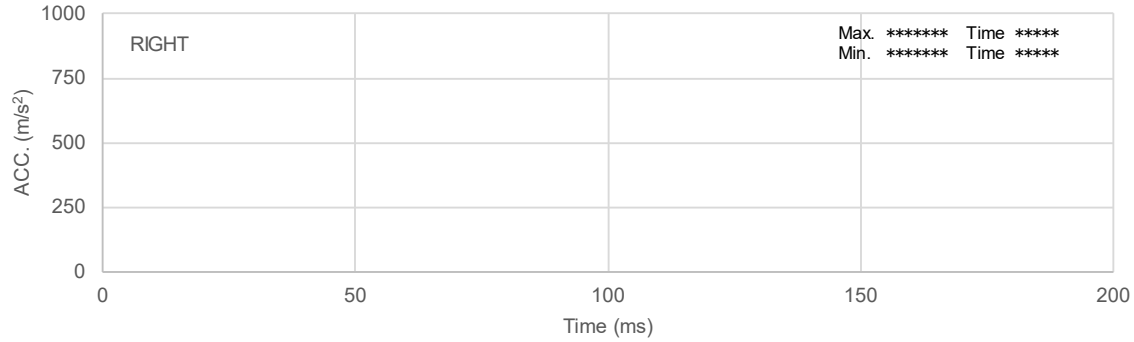
Driver Dummy Neck Moment

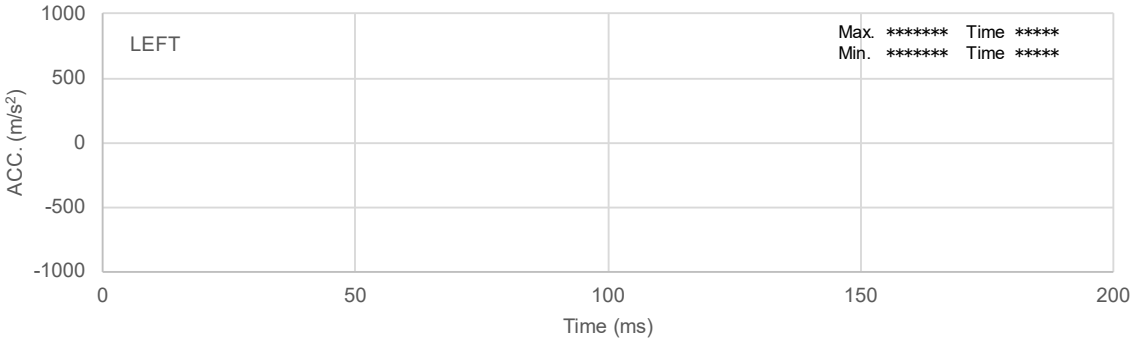
No. NASVA****-*****



Driver Dummy Chest Disp.

No. NASVA****-*****



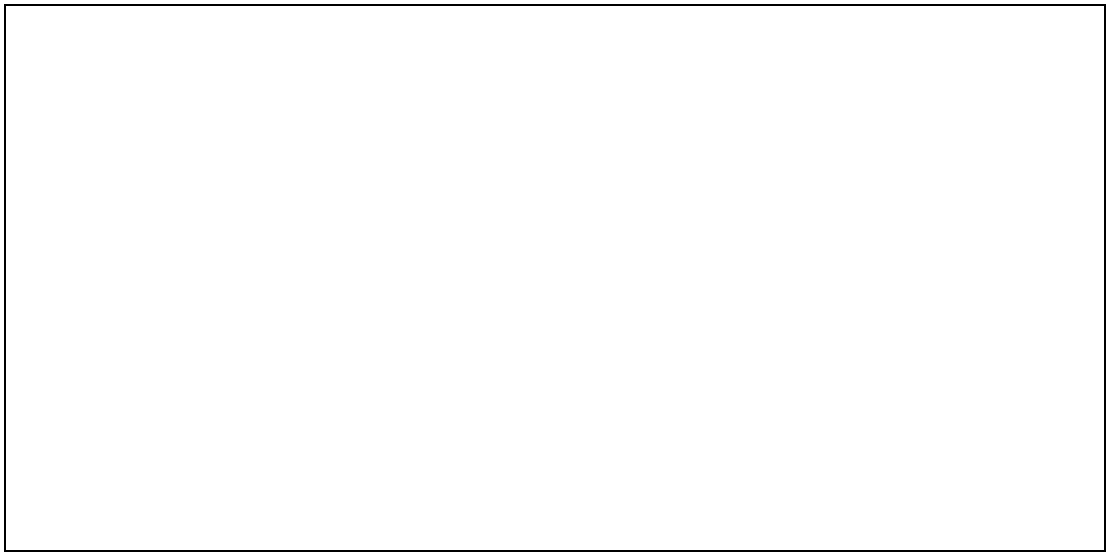


Vehicle Side Sill Acc.

No. NASVA****-*****

Appendix 5: Installation Location of Onboard Camera

The head of the onboard camera shall be installed on the roof aft of the driver's seat. If the vehicle manufacturer suggests a location for installation, they are required to provide the following drawing. If it is impossible to install on the roof, (due to a glass roof, convertible, etc.) the vehicle manufacturer shall specify a suitable location for the onboard camera and installation instructions.



Appendix 6: Installation Location of Main Body of Onboard Camera, Battery, etc.

If the vehicle manufacturer has recommended locations for installing the onboard cameras, batteries, lighting equipment, etc., specify them below in an illustration. If there is no space for installing any device in the compartment, specify alternative locations.