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.

Autonomous Emergency Braking System [on-coming car to car: turning right in intersection] performance test method

Created: May 2, 2024

1. Effective Dates:

This test method shall come into effect on May 2, 2024.

2. Scope of Application, etc.

This test method applies to Autonomous Emergency Braking System [car-to-car] for vehicles with a seating capacity of less than 10 passengers used exclusively for passenger use and vehicles with a gross vehicle weight of 2.8 tons or less used for freight transportation, which are equipped with Autonomous Emergency Braking System [on-coming car to car: turning right in intersection], as part of the New Car, etc. Assessment Information Provision Project provided by the National Agency for Automotive Safety & Victims' Aid (hereafter referred to as "NASVA").

3. Definition of Terms

Throughout this test procedure, the following terms are used:

(1) **"AEBS (Autonomous Emergency Braking System)"** refers to a device that automatically operates the brakes to avoid collision with an oncoming straight vehicle or reduce the collision speed.

(2) **"FCWS (Forward Collision Warning System)"** refers to the warning system that using auditory and visual information, haptic information to alert the driver of a potential collision with an oncoming straight vehicle.

(3) **"AEBS Activation Point"** refers to the time when the deceleration by AEBS first crossed 0.3m/s^2.

(4) **"FCWS Activation Point"** refers to the time when the warning using audio information by FCWS started.

(5) **"Test target"** means a test device that simulates an oncoming straight vehicle as shown in Appendix A.

(6) **"Target running line"** means the target course where the right side of the vehicle target (the side where test vehicle approaches) passes.

(7) **"Reference runway"** means the target course through which the front axle center of the test vehicle passes.

(8) **"Interference area"** means the section to the right (far side) of the target running line as seen from the test vehicle.

(9) **"Collision"** refers to a situation in which the tip center of the test vehicle enters the interference area. However, this excludes cases where the distance between the tip of center of the test vehicle and the rear end of the test target was at least 1/2 of the overall width of the test vehicle at the time of the collision.

(10) **"TTC (Time To Collision)"** means the time remaining before collision when the test vehicle maintain

their current speed.

(11) **"Crash speed"** means the travel speed at the moment of collision.

(12) **"Initial velocity"** means the driving speed of the test vehicle at the time of AEBS activation for AEBS tests and at the time of FCWS activation for FCWS tests.

(13) **"Velocity reduction"** means the initial velocity minus the impact velocity.

(14) **"Rate of velocity reduction"** means the amount of velocity reduction divided by the initial velocity.

(15) **"Lateral error"** means the distance from each of the front axis center of the test vehicle and the right front edge of the vehicle target to reference runway and target running line.

(16) **"Set cross point"** means the intersection of the two that is set for each of test vehicle and vehicle target.

(17) **"Set cross spot"** means the location where the test vehicle and the vehicle target intersect when both are maintained at the test speed.

(18) **"Target arrival error"** means the distance forth and back from the set cross point to the set cross spot of the vehicle target at 4.0 seconds after the start of measurement (when TTC reaches 4.0 seconds), divided by the set target speed and converted to time.

(19) **"Pedal stroke"** means the amount of stroke of the brake pedal of the test vehicle.

(20) **"Accelerator operating volume"** means the amount of operation of the accelerator pedal of the test vehicle.

(21) **"Mass at vehicle delivery"** refers to the condition of the test vehicle loaded with the fuel, lubricants, coolants and the like in the engine and the fueling system, and equipped with onboard tools, a spare tire and standard accessories.

(22) **"Brake temperature before braking"** refers to the higher of the average temperature of the left wheel or the right wheel of each axle when the temperature of the brake lining or pad of each wheel is measured, pursuant to the procedures of JIS D 0210, immediately before the start of each run for braking with the vehicle in fixed position.

(23) **"Brake temperature check unit"** refers to a device to check the brake temperature before braking of the test vehicle by thermocouple measurement.

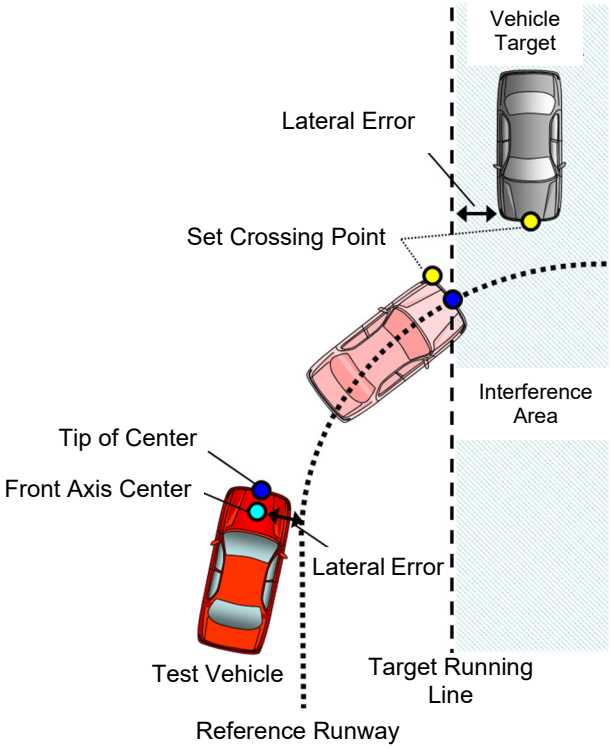


Figure 1: Definition of each term

4. Test conditions

4.1 Provision of data from vehicle manufactures, etc.

Vehicle manufacturers, etc shall provide NASVA with the following data required for test preparation (Attached Table 1).

4.2 Test vehicle's condition

The test vehicle shall be in the following status.

(1) Loading condition: With one driver in the vehicle, the mass of the test vehicle including measuring equipment, etc., shall be the delivered mass + 200 kg (within ±1%). The load distribution between the front and rear axles shall be equal (within ±5%) to the load distribution (%) of the delivered mass.

If the aforementioned requirements are not met, the component may be removed or installed without affecting performance. Parts to increase weight shall be securely attached.

(2) Tires: Tires shall be installed on the test vehicle at the time of purchase. Tire break-in runs shall also be used for the break-in runs defined in Section 5.1. In addition, the tire pressure shall be adjusted on a level surface before driving (at room temperature) to the value for normal driving described in the specifications, etc.

(3) Braking system: Discs, drums and friction materials installed on the test vehicle at the time of purchase shall be used in the manner specified in Section 5.1. The braking system shall be duly adjusted and shall not be affected by abnormal thermal history or water damage.

(4) Drive axle: For vehicles with selectable drive shafts, the drive shaft normally used shall be selected.

(5) AEBS and FCWS settings: If the driver can set the activation start timing of AEBS or FCWS, it shall be the median value within a configurable range. If there is (an even number of possible settings) with no median value, the value closest to the median value is set on the side where the activation start timing is later.

(6) Protection devices: In vehicles equipped with occupant protection devices and pedestrian protection devices, such devices shall be left inoperative.

4.3 Test track

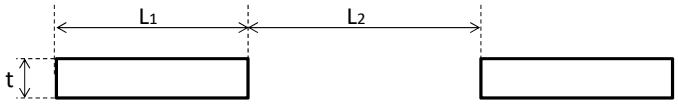
The test track shall meet the following requirements:

(1) White dashed lane markers meeting ① through ③ in good condition may be installed in the center of the test runway, except within intersections during the test, if declared in advance by the vehicle manufacturer, etc. However, it shall not be allowed to change the installation during the course of the test.

① Marker Length (L_1)：5.00m

② Space Between Markers (L_2)：5.00m

③ Marker Width：0.15m



(2) The test track shall be flat, clean paved road surface without any leaves, dirt or the like, and dry.

(3) The test track shall have a friction coefficient of about 0.9 (when the test tire is ASTM E1136) or 1.0 (when the test tire is ASTM F2493) under dry conditions. The measurement procedure shall comply with ASTM E1337.

(4) There shall be no other obstacles within 3 m on either side of the reference runway at the time of the test and within 30 m in front of the test end point. In addition, there shall be no road paints or markings at the points where deceleration due to AEBS activation or braking after FCWS is expected.

4.4 Weather conditions

The test shall be executed in the following weather conditions.

(1) At the time of test, air temperature is within the range of -5°C to 40°C.

(2) At the time of test, average wind speed is 5 m/s or less.

(3) Visibility during testing shall be 1km or more.

(4) A declaration by a vehicle manufacturer might allow the following tests under sunlight conditions to be avoided.

① When illumination during testing is 2000 lx or less.

② When there is a strong shadow near the reference runway other than the shadow of the test vehicle and the test target.

③ Direct sunlight shines on the test vehicle from the front or the rear.

④ Temperature at time of testing below 5°C.

4.5 Measurement items

The measurement items in the test shall be as follows, and the sampling frequency shall be 100 Hz or higher. For yaw rate and front/rear acceleration, high-frequency components shall be removed at a cutoff frequency of 10 Hz.

(1) AEBS activation time

(2) FCWS activation time

(3) Collision time

(4) Test vehicle and test target positions

(5) Test vehicle and test target speeds

(6) Yaw rate of test vehicle

(7) Front/rear acceleration of test vehicle

(8) Steering angle speed of test vehicle

(9) Pedal stroke

(10) Accelerator operation amount

(11) Brake temperature before braking

4.6 Measuring equipment

The following measuring instruments used in the test shall be able to smoothly handle the measurement data of the measurement items specified in Section 4.5. In addition, the position of the test vehicle shall be verified prior to the test, and the accuracy of other measuring instruments shall be confirmed by the results of calibration by the manufacturer of the measuring instruments, etc.

(1) Test vehicle position measuring device: The accuracy of the test vehicle position for each test shall be within ±0.03 m.

(2) Test vehicle speed measuring device: The accuracy of the test vehicle speed for each test shall be within ±0.1 km/h.

(3) Yaw rate measuring device: Yaw rate accuracy for each test shall be within ±0.1°/s.

(4) Longitudinal acceleration measurement device: Accuracy of longitudinal acceleration for each test shall be within ±0.1m/s2.

(5) Steering wheel velocity measurement device: Accuracy of steering wheel velocity for each test shall be within ±1°/s.

(6) Brake pedal stroke measurement device: Accuracy of brake pedal stroke for each test shall be within ±1mm.

(7) Accelerator operation measurement device: Accuracy of accelerator stroke for each test shall be within ±1%.

(8) Brake temperature check unit: Accuracy of temperature of each test shall be within ±3%.

(9) Test target position measurement device: Accuracy of test target position of each test shall be within ±0.03m.

(10) Test target speed measurement device: Accuracy of test target speed of each test shall be within ±0.1km/h.

5. Pre-test run

5.1 Break-in run

To break-in the disc, drum, and friction material of the brake system of the test vehicle, 200 operations shall be performed in which the vehicle is accelerated to 64 km/h and then stopped by operating the brakes to generate a deceleration of 3.7 m/s2 (except for other tests in which similar break-in runs were performed). The interval between the first brake operation and the next brake operation shall be the time required to reduce the brake temperature between 110°C and 132°C or the distance traveled to reach 1.6 km, whichever is earlier. After each stop, the vehicle shall accelerate to 64 km/h and maintain that speed until the next braking. (Break-in runs are equivalent to those specified in FMVSS105 S7.4.1.1.)

If requested by the vehicle manufacturer, etc., the vehicle may be driven on general roads (not highway), etc., for up to 100 km for initialization work of the sensor device. If the conditions necessary for initialization are met, the initialization process may be performed in conjunction with the break-in run described above.

5.2 Re-break-in, etc.

In the case of a braking system test that is the first for the test vehicle (the generic term for a test in which

a break-in is performed in accordance with Section 5.1), the vehicle shall undergo 35 re-break-in runs in accordance with Section 5.1 before starting the test. However, if more than 2 weeks have elapsed since the mortise run, the re-break-in run may be performed up to 50 times.

If this is the second or subsequent braking system test (the same applies if multiple days are required in the same test), the test may be re-run 35 times if more than one week has elapsed since the previous test date, and up to 50 times if more than two weeks have elapsed.

If re-brake conditioning test is not carried out on the day of test, warm up run should be carried out until the brake temperature exceed 100°C by the procedure of the Section 5.1.

6. Test Method

6.1 Testing

(1) Test scenario: The test shall be conducted using a test scenario simulating car collision situation between a car turning right and an on-coming car for each of the AEBS evaluation test and the FCWS evaluation test (Diagram 2). The cross configuration between the test vehicle and the vehicle target shall be specified by the vehicle manufacturer, etc. from among the two types of cross point conditions shown in Diagram 3, and the cross-point conditions may not be changed after the test has started. When lane markers are installed, the reference runway shall be 1.75 m from the center of the lane markers, distance between the test vehicle before starting the right turn and the running axles of the vehicle target shall be 3.5 m and, and the reference runway for the test vehicle during the right turn shall be set using the turning parameters shown in Table 1. However, the location of cross point shall be set assuming that both the test vehicle and the vehicle target are rectangular (rectangular in plain view), and individual vehicle body shapes (shape of the front side edge of the vehicle) shall not be considered.

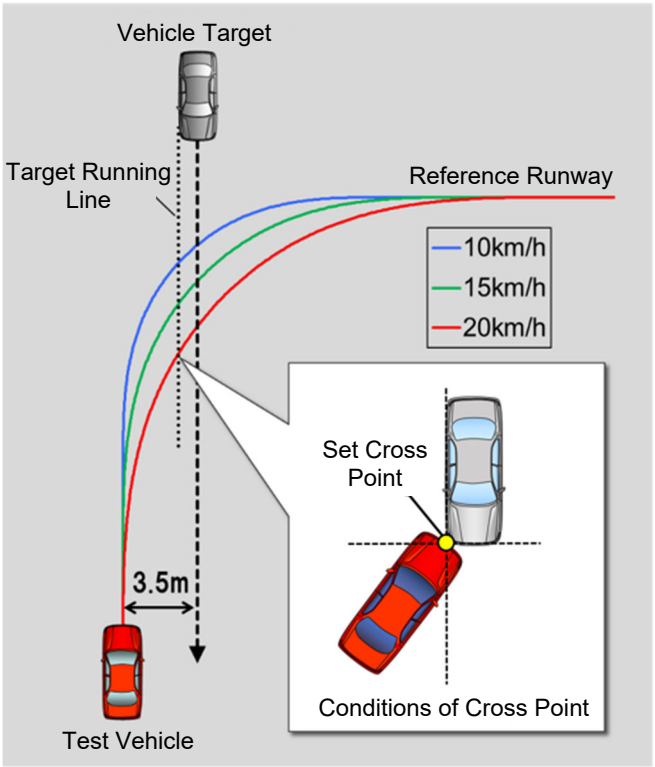
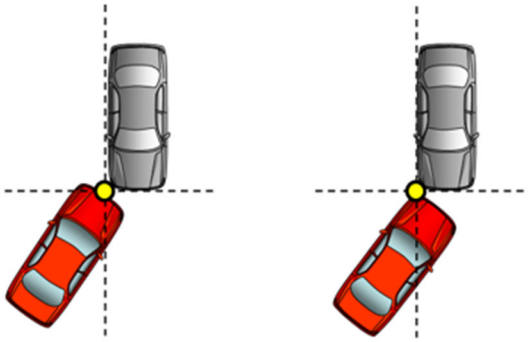


Figure 2: Test Scenario (Example)



① tip of center of test vehicle and front right end of vehicle target

② front left of test vehicle and front right end of vehicle target

Figure 3: Conditions of cross point

Table 1: Turning parameters of reference runway

Test vehicle speed	Clothoid start radius	Clothoid angle (Former)	Turning radius	Turning Angle	Clothoid Angle (Latter)	Clothoid end radius
10 km/h	1500 m	20.62 °	9.00 m	48.76 °	20.62 °	1500 m
15 km/h	1500 m	20.93 °	11.75 m	48.14 °	20.93 °	1500 m
20 km/h	1500 m	21.79 °	14.75 m	46.42 °	21.79 °	1500 m

(2) Test speed: The speed of the test vehicle and the vehicle target shall be within the ranges shown in Table2, and both the AEBS tests and FCWS tests shall be conducted for combinations of all speed conditions. The test will be performed by starting at the combination of the lowest speed conditions and the speed of the vehicle target is increased, followed by an increase in the speed of the test vehicle. Similarly, the starting vehicle speed may be raised upon declaration of the vehicle manufacturer, etc. Likewise, the ending vehicle speed may be lowered upon declaration of the vehicle manufacturer, etc. In any case, however, the test results for unexecuted speed conditions shall be treated as if the device did not operate.

Table 2: Test speed

	AEBS test	FCWS test
Test Vehicle	10、15、20 km/h	10、15、20 km/h
Vehicle target	30、40、50、60 km/h	30、40、50、60 km/h

(3) Transmission: If the transmission of the test vehicle is an automatic transmission, the gear position shall be D range. For manual transmissions, the highest gear position in which the engine speed is greater than 1500 rpm while running at the test speed shall be used, and the clutch shall not be disengaged during the test.

(4) Turn signals: The turn signals of the test vehicle shall be in operation during the test.

(5) Measurement section of the test: Measurement shall begin when the test vehicle approaches the test target and the TTC reaches 4.0 seconds. The measurement ends when one of the following conditions is reached.

・When the test vehicle is stopped.

・At the time of the test vehicle collision

・The point in time when the test vehicle avoids a collision

(6) Requirements for Successful Completion of Test: In the time between the initial measurement and the moment when the initial speed gap is obtained (at the time of AEBS activation for AEBS tests and at the time of FCWS activation for FCWS tests), if the prescribed measurement items deviate from the permissible error shown in Table 3 and when the test video of Section 6.3 is not acquired (except when the driving status of the test car, the operating status of the vehicle target and the collision / avoidance status can be confirmed by the in-vehicle video or the outside video), the attempted test shall be deemed invalid (foul) and shall not be counted in the number of tests. In addition, the measured value etc. shall round off the value less than the unit in each item. (Same in case in below test method)

If any abnormality is observed in the operation of the vehicle target, the recorded test video shall be checked and if the abnormality is evident, it shall be considered as a foul and shall not be included in the test count.

Table 3: Tolerance of test conditions

Test condition	Permissible range
Test vehicle speed	Test Speed + within 1.0 km/h
Test target speed	Test Speed + within 1.0 km/h
Lateral offset of test vehicle	Within ± 0.10 m
Lateral offset of test target	Within ±0.10 m
Target arrival error	Within ±0.05 s
Yaw rate	Within ±1.0°/s (Excluding turning※)
Steering angle velocity	Within ±15.0°/s (Excluding Turning※)
Temperature of brakes before braking	65-100°C

※Turning refers to the section of the turning parameters of the Table 1 reference runway.

(7) Number of tests: The number of tests shall be 3 per test speed. However, the third test may be omitted in the following cases.

・When a collision is avoided twice in a row

・If the same rate of velocity reduction is achieved twice in a row

(8) Test Implementation Procedures: For both the test vehicle speed and the vehicle target speed, the tests shall be started at the lowest speed condition or the speed condition declared by the vehicle manufacturer. Thereafter, the speed conditions are increased in the order of the vehicle target speed and the test vehicle speed until the highest speed condition or the speed condition declared by the vehicle manufacturer, etc., is reached. However, when the speed reduction is less than 5 km/h twice during the same vehicle target speed condition, the relevant test speed condition shall be terminated, and the test vehicle speed shall be increased. In such a case, the test results for the velocity conditions of the higher vehicle targets that were not performed shall be treated as if the device had not been activated.

In this test, the FCWS shall not be activated when the TTC reaches 2.0 seconds or less for the FCWS test, and when the TTC reaches 0.8 seconds or less (test vehicle speed: 10 km/h), 0.9 seconds (test vehicle

speed: 15 km/h), or 1.0 second (test vehicle speed: 20 km/h) for the AEBS test, the driver shall be able to avoid a collision or to reduce a collision impact by braking. In this case, the FCWS and AEBS shall be deemed not to have been activated, and the test result for that session shall be deemed inoperative. However, the above-mentioned TTC may be changed upon consultation with NASVA if a prior declaration is received from the automobile manufacturer, etc.

(9) Accelerator operation during AEBS test: The amount of gas pedal operation shall be kept constant during the measurement section so as not to affect the operation of the AEBS. In test vehicles where the accelerator pedal is controlled in accordance with the operation of the AEBS, the amount of gas pedal operation during the operation of the AEBS may be adjusted upon consultation with the vehicle manufacturer, etc.

(10) Accelerator/brake operation during FCWS test: The accelerator pedal of the test vehicle shall be released 1.0 second after the FCWS is activated. The brake pedal shall begin to be depressed 1.2 seconds after the FCWS is activated and shall reach the depressed amount that generates a deceleration of 4.0 (+0.25) m/s2 under normal conditions in 0.2 seconds (however, the maximum depressed speed is 400 mm/s) and maintain the preset pedal force. For these brake operation settings (pedal stroke amount, depressing speed, and pedal force), the values declared by the vehicle manufacturer, etc., are used. If there is no declaration of the set value from the vehicle manufacturer, etc., or if the deceleration that normally occurs exceeds the allowable range (4.00 to 4.25 m/s2), the mechanism shall set the value by the method described in Appendix B.

In order to conduct this test with high accuracy, it is desirable that the test vehicle be equipped with an automatic driving device or other operation input device.

(11) If it is clear that the FCWS test yields the same results as the AEBS test with or without the FCWS function, the results of the AEBS test may be used as the results of such test. Similarly, in the AEBS test, if the time taken from FCWS activation to impact is 1.2 seconds or less, the AEBS test result shall be the relevant test result.

6.2 Measurement data and recording

(1) Confirmation of completion of testing: For each test, confirm whether the test conditions meet the permissible range of Table 3.

(2) Avoidance of collision: For each test, check whether or not a collision was avoided, and record in Attached Table 2 whether or not a collision was avoided. In the event of a collision, record the measured data from the next issue onward.

(3) Initial speed: Record in 0.1 km/h increments.

(4) Velocity reduction: Record in 0.1 km/h increments.

(5) Velocity reduction ratio: Find and record the velocity reduction ratio to second decimal places, rounding off to the third decimal place.

6.3 Recording of test images

(1) In-vehicle video: A video camera installed in the interior of the test vehicle shall be used to record the conditions in front of the test vehicle, near the driver's seat, and the operation of the FCWS. (If it is difficult to photograph the interior of a vehicle due to sunlight or other reasons, the photographing may be stopped after consultation with the vehicle manufacturer, etc.)

(2) Exterior video: A video camera installed at the side of the test track and in front of the test track at the

point where a collision between the test vehicle and the test target is expected to occur will record the driving conditions of the test vehicle and the operation and collision/avoidance conditions of the test target.

7. Arrangement of test results

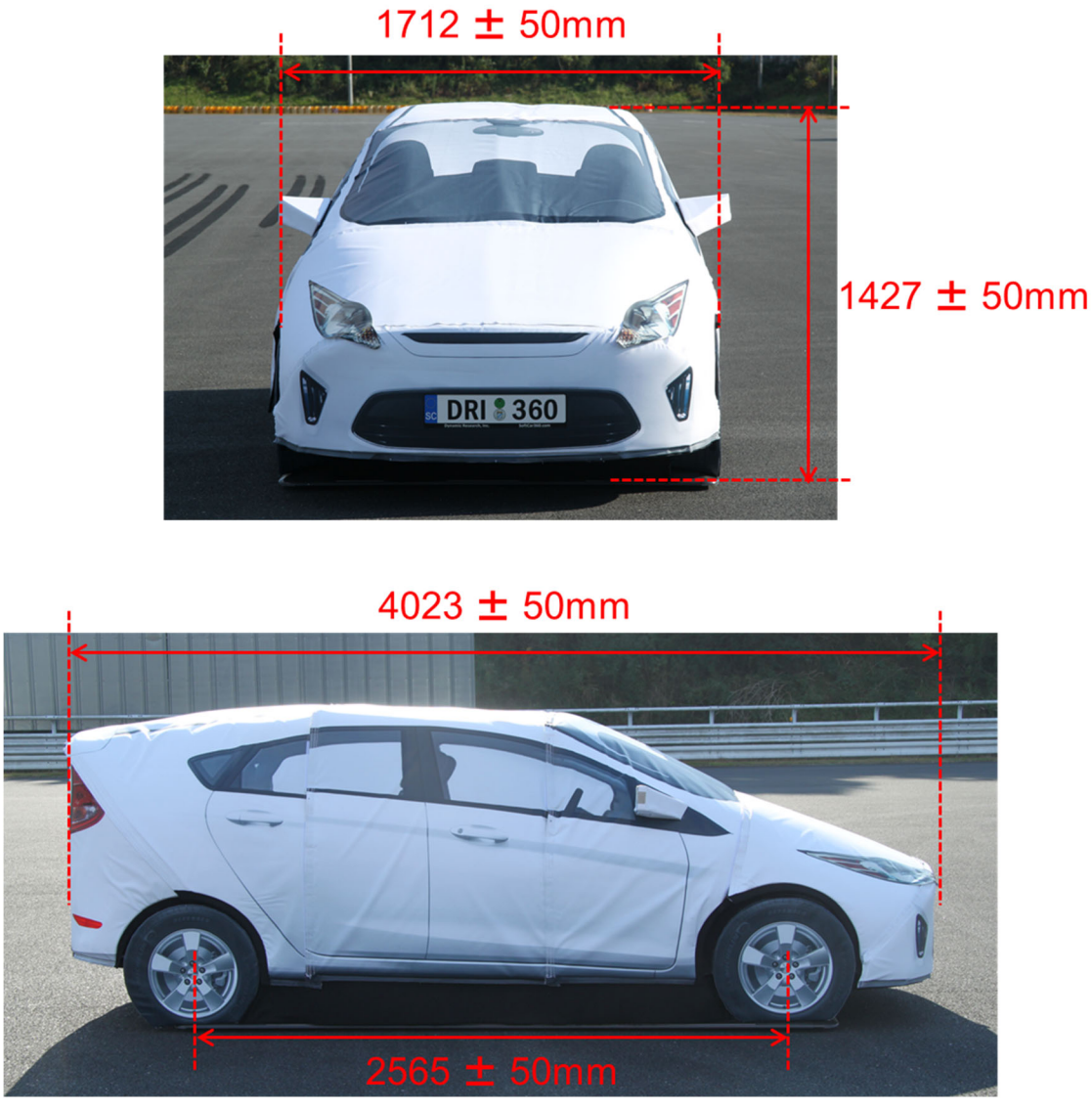
Record test results, etc. in Attached Table 2.

The rate of velocity reduction for each test speed shall be the median value of three valid test results. However, the velocity reduction ratio for the condition where collision is avoided shall be 1.00.

Furthermore, if only 2 tests are conducted in accordance with Section 6.1 (7) shall be the Velocity Reduction Rate obtained the test results.

Appendix A. Test target specifications

For the test target, those having specifications equivalent to those of ISO 19206-3, Road vehicles - Test devices for target vehicles, vulnerable road users and other objects, for assessment of active safety functions - Part 3：Requirements for passenger vehicle 3D targets shall be used. Attached Figure A shows external appearance and dimensions of the test target. The test target is designed to be detected by such sensors as laser radars, millimeter-wave radars and cameras in an equivalent manner to Segment C vehicles in the EU. A "JNCAP" logo made of fabric shall be placed in the license plate position of the test target.



Attached Figure A. Appearance and dimensional specifications of the test target

Appendix B. How to set up brake operation in FCWS test

B.1 Definitions

(1) $T_{BRAKE:}$ When brake pedal stroke exceeds 5 mm.

(2) $T_{2m/s^2:}$ The point in time when the filtered deceleration data exceeds 2 m/s^2 for the first time.

(3) $T_{6m/s^2:}$ The point in time when the filtered deceleration data exceeds 6 m/s^2 for the first time.

B.2 Measurement method

The measurement methods and filters described in Chapter 3 of this rule shall be applied.

B.3 How to set brake input characteristics

B.3.1 Preparation for setup

Perform the warm-up operation of brakes and tires defined in the Section 4.2 first. Check brake input characteristics right before conducting the FCWS test.

B.3.2 Setting brake input characteristics:

(1) Accelerate the test vehicle to 85 km/h or more. If the transmission of the test vehicle is an automatic transmission, the gear position shall be in D range. For manual transmissions, use the highest gear position in which the engine speed is greater than 1500 rpm while running at the test speed.

(2) Release the accelerator pedal, and when the speed falls below 80 (±1) km/h, start braking at a pedal stroke speed of 20 (±5) mm/s until the deceleration rate is 7 m/s2. For manual transmission, disengage the clutch as soon as possible before the engine speed drops below 1500 rpm. When the deceleration reaches 7 m/s2, the driving is terminated, and the amount of pedal stroke and pedal force during braking are measured.

(3) Conduct the above runs three times in succession. The interval between each run shall be between 90 seconds and 10 minutes. If the interval exceeds 10 minutes, the driver shall warm up the car again before resuming the run.

(4) Using the deceleration data corresponding to pedal stroke between T_{2m/s^2} and T_{6m/s^2}, a quadratic curve approximation using the least-squares method is used to calculate the pedal stroke corresponding to a deceleration of $4_{m/s^2}$ (which is "D4", unit m). The same method is used for the pedal force to obtain the pedal force value corresponding to a deceleration of $4_{m/s^2}$ (this is "F4", unit N).

B.3.3 How to set brake pedal force and repetition procedure

(1) The test vehicle is driven at a constant speed of 80 (+1) km/h. The gear position of the test vehicle shall be the same as in B.3.2.

(2) Apply the brake according to the brake operation method described in B.4, not according to FCWS but by manual triggering. Using the measured deceleration data, determine the average deceleration for the interval from T_{BRAKE} + 1 second to T_{BRAKE}+ 3 seconds. If the average deceleration deviates from 4 (+0.25) m/s^2, then the following correction formula is used to correct the value of F4

$F4_{new=}$ $F4_{original}$ * (4 / average deceleration)

(For example, if the average deceleration was 5 m/s^2, then $F4_{new}$ = $F4_{original}$ * 4 / 5)

Repeat the braking operation in C.4 using the modified F4 so that the average deceleration is within the range of 4 (+0.25) m/s^2.

B.4 Brake operation method in FCWS test

(1) The activation of FCWS is detected and the time at which it occurs is T_{FCW}.

(2) Release the accelerator in T_{FCW} + 1 second.

(3) Brake pedal depression control starts at T_{FCW} + 1.2 seconds, and the depression speed is D4 x 5 mm/s or 400 mm/s, whichever is smaller. (i.e., the speed to reach the pedal stroke D4 in 200 ms, with an upper limit of 400 mm/s.)

(4) The pedal force value, secondarily filtered at a cutoff frequency of 20 Hz or moving averaged at 50 ms, is monitored and switched to pedal force control with F4 as the target value when either of the following is reached the time at this time is recorded as $T_{switch.}$

a. When the pedal stroke D4 defined in B.3 is exceeded for the first time.

b. When the tread force value F4 defined in B.3 is exceeded for the first time.

If, even with filtering, etc., the control switches to tread force control before a sufficient amount of tread pressure is reached, the timing of T_{switch} can be adjusted after consultation with the vehicle manufacturer, etc. (For example, measures should be taken to prevent switching to tread force control until a certain amount of tread is reached.)

(5) After T_{switch}, the brake pedal is controlled so that the pedal force is within F4 ± 25%. Stable tread force control should be achieved within 200 ms from T_{switch}, but even if the tread force value exceeds F4 ± 25% due to AEBS intervention, the duration is still acceptable as long as the duration is less than 200 ms.

(6) The average pedal force between TFCW + 1.4 seconds and the end of the test preferably should fall within the range of F4 ± 10 N.

Attached Table 1: Conditions and specifications of the test vehicle for Autonomous Emergency Braking System [on-coming car to car: turning right in intersection] performance test

[To be filled out by the vehicle manufacturer, etc.]

1. Test vehicle specifications

(1) Model/Type (Model Name):_____/_____(_____)

(2) Overall width of vehicle

(3) Front axle overhang

(4) Sensor System:_____

(5) Installed Tires

	Front	Rear
Size		
Brand/Type		
Air Pressure (kPa)		

2. Declarations, etc by vehicle manufacturer, etc.

(1) AEBS test start vehicle speed：Test vehicle speed 10 km/h Vehicle target speed km/h

(2) AEBS test end vehicle speed：Test vehicle speed 10 km/h Vehicle target speed km/h

(3) AEBS test start vehicle speed：Test vehicle speed 15 km/h Vehicle target speed km/h

(4) AEBS test end vehicle speed：Test vehicle speed 15 km/h Vehicle target speed km/h

(5) AEBS test start vehicle speed：Test vehicle speed 20 km/h Vehicle target speed km/h

(6) AEBS Test end vehicle speed：Test vehicle speed 20 km/h Vehicle target speed km/h

(7) FCWS function availability: Available / Not Available

(8) FCWS test start vehicle speed：Test vehicle speed 10 km/h Vehicle target speed km/h

(9) FCWS test end vehicle speed：Test vehicle speed 10 km/h Vehicle target speed km/h

(10) FCWS test start vehicle speed：Test vehicle speed 15 km/h Vehicle target speed km/h

(11) FCWS test end vehicle speed：Test vehicle speed 15 km/h Vehicle target speed km/h

(12) FCWS test start vehicle speed：Test vehicle speed 20 km/h Vehicle target speed km/h

(13) FCWS test end vehicle speed：Test vehicle speed 20 km/h Vehicle target speed km/h

(14) Specifications of FCWS function: “Auditory and visual information” and “auditory and haptic information”

Frequency of auditory information: Hz Hz

Attach a document stating the location of the provision of such information (speaker location, display location, etc.).

(15) Set value of brake operation during FCWS test:

Test implemented or not: Yes/No

Pedal stroke amount: mm Depression speed: mm/s Pedal force: N

(16) Manual setting of activation start timing: Yes ( )/No

(17) Cross point conditions: ① ②

(18) Restrictions on sunlight conditions during the test: Yes/No (No need to consider shadows, backlighting, etc.)

(19) Limit on the number of AEBS operations: Yes (up to times per trip) / No

(20) Protective devices: A written statement describing the method of deactivation of occupant and pedestrian protective devices, or a written statement outlining the modifications to be made to deactivate them.

(21) Advance data submission: Yes (Appendix Table 3 or equivalent)/No

(22) Installation of lane markers: Yes ・ No

(23) Other special notes, etc.

3. Functions and notes about the system to support users, etc.

Documents shall be attached relating to the subjects and conditions of activation under the environment determined by the vehicle manufacturer, etc and the idea of functions of the system.

Attached Table 2 Test results of Autonomous Emergency Braking System [on-coming car to car: turning right in intersection] performance test

[To be filled out by examining officer]

Test date (YYYY/MM/DD): _____ Place :_____

1. Test vehicle specifications

(1) Model/Type (Model Name):_____/_____(_____)

(2) Frame number:_____

(3) Overall width of vehicle:

(4) Front axle overhang:

(5) Sensor system:_____

(6) Installed Tires

	Front	Rear
Size		
Brand/Type		
Air pressure (kPa)		

(7) Test vehicle load distribution

		Left wheel	Right wheel	Subtotal	Grand Total	Front-rear Distribution
Load distribution at vehicle delivery (daN)	Front axle					%
	Rear axle					%
Load distribution at testing time (daN)	Front axle					%
	Rear axle					%

(Note) Indicate as 1daN = 1kgf

2. Setting of conditions for testing, etc.

(1) AEBS test start speed: Test vehicle speed 10 km/h Vehicle target speed: km/h

(2) AEBS test end speed: Test vehicle speed 10 km/h Vehicle target speed: km/h

(3) AEBS test start speed: Test vehicle speed 15 km/h Vehicle target speed: km/h

(4) AEBS test end speed: Test vehicle speed 15 km/h Vehicle target speed: km/h

(5) AEBS test start speed: Test vehicle speed 20 km/h Vehicle target speed: km/h

(6) AEBS test end speed: Test vehicle speed 20 km/h Vehicle target speed: km/h

(7) FCWS function availability: Available / Not Available

(8) FCWS test start speed: Test vehicle speed 10 km/h Vehicle target speed: km/h

(9) FCWS test end speed: Test vehicle speed 10 km/h Vehicle target speed: km/h

(10) FCWS test start speed: Test vehicle speed 15 km/h Vehicle target speed: km/h

(11) FCWS test end speed: Test vehicle speed 15 km/h Vehicle target speed: km/h

(12) FCWS test start speed: Test vehicle speed 20 km/h Vehicle target speed: km/h

(13) FCWS test end speed: Test vehicle speed 20 km/h Vehicle target speed: km/h

(14) Specifications of FCWS function: “Auditory and visual information” and “auditory and haptic information”

(15) Set value of brake operation during FCWS test:

Test implemented or not: Yes/No

Pedal stroke amount: mm Depression speed: mm/s Pedal force: N

(16) Manual setting of activation start timing: Yes ( )/No

(17) Cross point conditions: ① ②

(18) Installation of lane markers: Yes ・ No

3. Environmental Conditions

Day 1 Test date (YYYY/MM/DD):_____ Place:_____

Start Time:_____ Weather:_____ Temp.:_____ Wind Speed:_____

End Time: _____ Weather:_____ Temp.:_____ Wind Speed:_____

Remarks:_____

Day 2 Test date (YYYY/MM/DD):_____ Place:_____

Start Time:_____ Weather:_____ Temp.:_____ Wind Speed:_____

End Time: _____ Weather:_____ Temp.:_____ Wind Speed:_____

Remarks:_____

Day 3 Test date (YYYY/MM/DD):_____ Place:_____

Start Time:_____ Weather:_____ Temp.:_____ Wind Speed:_____

End Time: _____ Weather:_____ Temp.:_____ Wind Speed:_____

Remarks:_____

4. Test Results

(1) AEBS test (a) (b) (c) = (a)-(b) (d) =(c)/ (a)

Test Vehicle Speed	Target Speed	Number of Tests	Avoided or Not (*)	Initial Velocity	Speed at Collision	Velocity Reduction Amount	Velocity Reduction Rate	Velocity Reduction Rate Median
10km/h	30km/h	1st						
		2nd						
		3rd						
	40km/h	1st						
		2nd						
		3rd						
	50km/h	1st						
		2nd						
		3rd						
	60km/h	1st						
		2nd						
		3rd						
15km/h	30km/h	1st						
		2nd						
		3rd						
	40km/h	1st						
		2nd						
		3rd						
	50km/h	1st						
		2nd						
		3rd						
	60km/h	1st						
		2nd						
		3rd						
20k/h	30km/h	1st						
		2nd						
		3rd						
	40km/h	1st						
		2nd						
		3rd						
	50km/h	1st						
		2nd						
		3rd						
	60km/h	1st						
		2nd						
		3rd						

(*) ○: Collision avoided, P: Passed (deemed avoided), △: Speed reduced, ×: No activation, －: Not implemented

(2) FCWS test (a) (b) (c) = (a)-(b) (d) =(c)/ (a)

Test Vehicle Speed	Target Speed	Number of Tests	Avoided or Not (*)	Initial Velocity	Speed at Collision	Velocity Reduction Amount	Velocity Reduction Rate	Velocity Reduction Rate Median
10km/h	30km/h	1st						
		2nd						
		3rd						
	40km/h	1st						
		2nd						
		3rd						
	50km/h	1st						
		2nd						
		3rd						
	60km/h	1st						
		2nd						
		3rd						
15km/h	30km/h	1st						
		2nd						
		3rd						
	40km/h	1st						
		2nd						
		3rd						
	50km/h	1st						
		2nd						
		3rd						
	60km/h	1st						
		2nd						
		3rd						
20k/h	30km/h	1st						
		2nd						
		3rd						
	40km/h	1st						
		2nd						
		3rd						
	50km/h	1st						
		2nd						
		3rd						
	60km/h	1st						
		2nd						
		3rd						

(*) ○: Collision avoided, P: Passed (deemed avoided), △: Speed reduced, ×: No activation, －: Not implemented

Attached Table 3 Test results of Autonomous Emergency Braking System [on-coming car to car: turning right in intersection] performance test

[For advance data as defined in the detailed regulations of the New Car, etc. Assessment Information Provision Project]

***Only the results of tests conducted on the same type of vehicle as the assessment test vehicle (with optional equipment similar to that of the test vehicle) using the test methods specified by NASVA may be submitted.**

Test date (YYYY/MM/DD): Place :

1. Test Vehicle Specifications

(1) Model/Type (Model Name): / ( )

(2) Frame number:_____

(3) Overall width of vehicle:_____

(4) Front axle overhang:_____

(5) Sensor system:_____

(6) Installed Tire

	Front	Rear
Size		
Brand/Type		
Air pressure (kPa)		

(7) Test vehicle load distribution

		Left wheel	Right wheel	Subtotal	Grand Total	Front-rear Distribution
Load distribution at vehicle delivery (daN)	Front axle					%
	Rear axle					%
Load distribution at testing time (daN)	Front axle					%
	Rear axle					%

(Note) Indicate as 1daN = 1kgf

2. Setting of conditions for testing, etc.

(1) AEBS test start speed: Test vehicle speed 10 km/h Vehicle target speed: km/h

(2) AEBS test end speed: Test vehicle speed 10 km/h Vehicle target speed: km/h

(3) AEBS test start speed: Test vehicle speed 15 km/h Vehicle target speed: km/h

(4) AEBS test end speed: Test vehicle speed 15 km/h Vehicle target speed: km/h

(5) AEBS test start speed: Test vehicle speed 20 km/h Vehicle target speed: km/h

(6) AEBS test end speed: Test vehicle speed 20 km/h Vehicle target speed: km/h

(7) FCWS function availability: Available / Not Available

(8) FCWS test start speed: Test vehicle speed 10 km/h Vehicle target speed: km/h

(9) FCWS test end speed: Test vehicle speed 10 km/h Vehicle target speed: km/h

(10) FCWS test start speed: Test vehicle speed 15 km/h Vehicle target speed: km/h

(11) FCWS test end speed: Test vehicle speed 15 km/h Vehicle target speed: km/h

(12) FCWS test start speed: Test vehicle speed 20 km/h Vehicle target speed: km/h

(13) FCWS test end speed: Test vehicle speed 20 km/h Vehicle target speed: km/h

(14) Specifications of FCWS function: “Auditory and visual information” and “auditory and haptic information”

(15) Set value of brake operation during FCWS test:

Test implemented or not: Yes/No

Pedal stroke amount: mm Depression speed: mm/s Pedal force: N

(16) Manual setting of activation start timing: Yes ( )/No

(17) Cross point conditions: ① ②

(18) Accelerator/brake operation input: Automatic driving system, etc./Driver

[If the driver performs the accelerator/brake operation input, a written record of the actual measured values for each of the accelerator/brake operation input provisions in Section 6.1 (10) of the test method shall be submitted.]

(19) Installation of lane markers: Yes ・ No

3. Environmental conditions

Day 1 Test date (YYYY/MM/DD):_____ Place:_____

Start Time:_____ Weather:__ Temp.____ Wind Speed:____

End Time:_____ Weather:__ Temp.:____ Wind Speed:____

Remarks:_____

Day 2 Test date (YYYY/MM/DD):_____ Place:_____

Start Time:_____ Weather:__ Temp.____ Wind Speed:____

End Time:_____ Weather:__ Temp.:____ Wind Speed:____

Remarks:_____

Day 3 Test date (YYYY/MM/DD):_____ Place:_____

Start Time:_____ Weather:__ Temp.____ Wind Speed:____

End Time:_____ Weather:__ Temp.:____ Wind Speed:____

Remarks:_____

4. Test Results

(1) AEBS test (a) (b) (c) = (a)-(b) (d) =(c)/ (a)

Test Vehicle Speed	Target Speed	Number of Tests	Avoided or Not (*)	Initial Velocity	Speed at Collision	Velocity Reduction Amount	Velocity Reduction Rate	Velocity Reduction Rate Median
10km/h	30km/h	1st						
		2nd						
		3rd						
	40km/h	1st						
		2nd						
		3rd						
	50km/h	1st						
		2nd						
		3rd						
	60km/h	1st						
		2nd						
		3rd						
15km/h	30km/h	1st						
		2nd						
		3rd						
	40km/h	1st						
		2nd						
		3rd						
	50km/h	1st						
		2nd						
		3rd						
	60km/h	1st						
		2nd						
		3rd						
20k/h	30km/h	1st						
		2nd						
		3rd						
	40km/h	1st						
		2nd						
		3rd						
	50km/h	1st						
		2nd						
		3rd						
	60km/h	1st						
		2nd						
		3rd						

(*) ○: Collision avoided, P: Passed (deemed avoided), △: Speed reduced, ×: No activation, －: Not implemented

(2) FCWS test (a) (b) (c) = (a)-(b) (d) =(c)/ (a)

Test Vehicle Speed	Target Speed	Number of Tests	Avoided or Not (*)	Initial Velocity	Speed at Collision	Velocity Reduction Amount	Velocity Reduction Rate	Velocity Reduction Rate Median
10km/h	30km/h	1st						
		2nd						
		3rd						
	40km/h	1st						
		2nd						
		3rd						
	50km/h	1st						
		2nd						
		3rd						
	60km/h	1st						
		2nd						
		3rd						
15km/h	30km/h	1st						
		2nd						
		3rd						
	40km/h	1st						
		2nd						
		3rd						
	50km/h	1st						
		2nd						
		3rd						
	60km/h	1st						
		2nd						
		3rd						
20k/h	30km/h	1st						
		2nd						
		3rd						
	40km/h	1st						
		2nd						
		3rd						
	50km/h	1st						
		2nd						
		3rd						
	60km/h	1st						
		2nd						
		3rd						

(*) ○: Collision avoided, P: Passed (deemed avoided), △: Speed reduced, ×: No activation, ー: Not implemented