

ECE No. 13.11/13H.00: Braking Technical requirement

The 61th Asia Expert meeting
5th – 6th Feb. 2020



JAPAN AUTOMOBILE STANDARDS INTERNATIONALIZATION CENTER

ECE No. 13.11/13H.00: Braking



<Contents>

1. The main purpose of this regulation
2. Scope
3. Summary of key points
 - General
 - Characteristics
 - Performance
4. Other requirement (EVSC, ESC)

1. The main purpose of this regulation
 - a. Reduce vehicle speed and stop vehicles safely
 - b. Keep to stop vehicles
 - c. Support to keep the vehicle stability by brake system
2. Scope

ECE No. 13.11: M2, M3, N*

ECE No. 13H.00: M1, N1*

*N1 can use ECE No. 13 or 13H based on country's decision.

Note:

Basically, the explanation is based on 13H.00

3. Summary of key points

General – Service Brake (5.1.2.1)

 - a. Possible to control the movement of the vehicle and to halt it safely, speedily and effectively, whatever its speed and load, on any up or down gradient.
 - b. Possible to graduate this braking action.
 - c. Possible to operate this braking action from the driving seat without removing his hands from the steering control.



3. Summary of key points

General – Parking Brake (5.1.2.3)

- a. Possible to hold the vehicle stationary on an up or down gradient even in the absence of the driver
- b. Working parts being held in the locked position by a purely mechanical device
- c. Possible to operate this braking action from driving seat.



<Hand control type>



<Foot control type>



<Electric control type>

3. Summary of key points

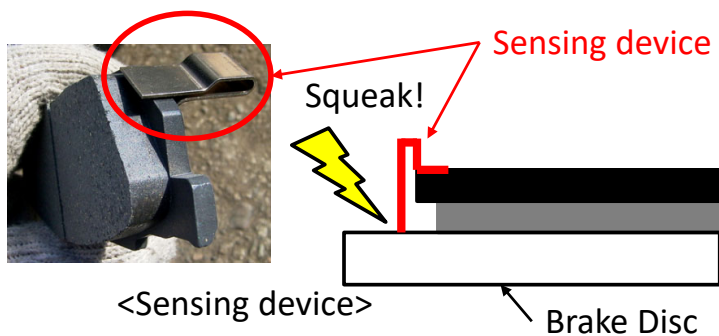
General – Periodic technical inspection (5.1.4) (1/2)

<Friction linings> (5.2.11.2.1)

- a. Possible to easily assess this wear on service brake linings from the outside or underside of the vehicle, without the removal of the wheels, by the provision of appropriate inspection holes or by some other means, or
- b. Equip the sensing device per wheel which will warn the driver at his driving position when lining replacement is necessary



<See directly>



<Sensing device>

Brake Disc

3. Summary of key points

General – Periodic technical inspection (5.1.4) (2/2)

<Brake disc, Drum> (5.2.11.2.2)

The following information shall be made freely available, e.g. vehicle handbook.

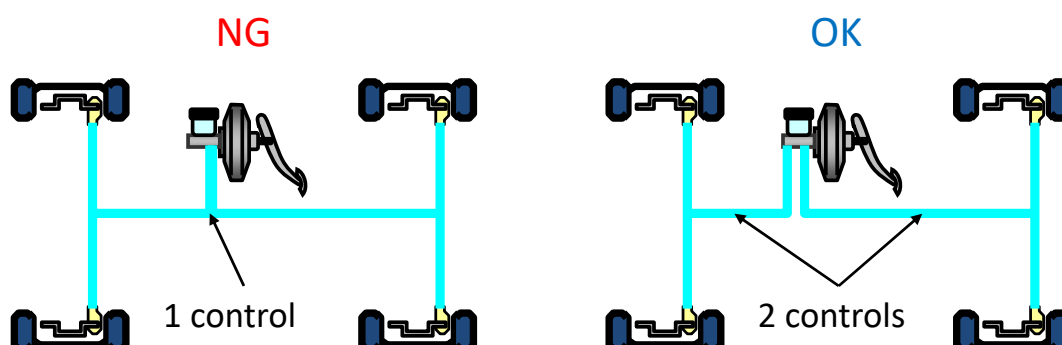
- a. The method by which wear of the friction surfaces of drums and discs may be assessed
- b. Information defining the maximum acceptable wear limit at the point at which replacement becomes necessary

7

3. Summary of key points

Characteristics (1/6)

- 5.2.2.1. Service brake shall have two controls, at least.
Designed such that it returns to the fully off position when released.
- 5.2.2.2. The control of the service braking system shall be independent of the control of the parking braking system.
- 5.2.2.4. The parking braking system shall be so designed that it can be actuated when the vehicle is in motion.



8

3. Summary of key points Characteristics (2/6)

- 5.2.6. The service braking system shall act on all wheels of the vehicle and shall distribute its action appropriately among the axles.
- 5.2.8. The action of the service braking system shall be distributed between the wheels of one and the same axle symmetrically in relation to the longitudinal median plane of the vehicle.
- 5.2.11. Wear of the brakes shall be capable of being easily taken up by means of a system of manual or automatic adjustment.
- 5.2.11.1. Wear adjustment shall be automatic for the service brakes.

3. Summary of key points Characteristics (3/6)



<Additional requirements for the electric parking braking (5.2.19)>

- 5.2.19.1 In the case of a failure within the electric transmission, any unintended actuation of the parking braking system shall be prevented.
- 5.2.19.2 In the case of an electrical failure, it shall remain possible to apply the parking braking system from the driver's seat and thereby be capable of holding the laden vehicle stationary on an 8 per cent up or down gradient.
The engine/manual transmission or the automatic transmission (park position) may be used to achieve or assist in achieving the above performance.
- 5.2.19.4 After the ignition/start switch which controls the electrical energy for the braking equipment has been switched off and/or the key removed, it shall remain possible to apply the parking braking system, whereas releasing shall be prevented.

3. Summary of key points

Characteristics (4/6)

<Warning>

- General

5.2.21.2. The warning signals shall be visible, even by daylight.

5.2.21.4. Specified failures or defects which should activate the warning signals mentioned above, but which are not detected under static conditions, shall be stored upon detection and be displayed at start-up and at all times when the ignition (start) switch is in the "On" (run) position, as long as the failure or defect persists.

- Summary table of RED warning signal



Fault	Warning	Note
Differential circuit pressure/Low fluid level	Red	5.2.3
PKB application (not failure)		
Brake power unit (stored energy) failure / Low pressure	Red or acoustic	5.2.14.1
System failure in Electric PKB	Red	5.2.19.2.1

11

3. Summary of key points

Characteristics (5/6)

<Warning>

- Summary table of Yellow warning signal



Fault	Warning	Note
Brake lining / pad wear (if optical warning is fitted)	Yellow	5.2.11.2.1
Electric electrical failure in electrical PKB	Yellow	5.2.19.2.1
Electric electrical failure in ABS(Anti-lock Brake System)	Yellow	Annex 6 4.1
Electric electrical failure in ESC(Electronic Stability Control)	Yellow	Annex 9 3.4.1
ESC Off tell-tale	Yellow	Annex 9 3.6

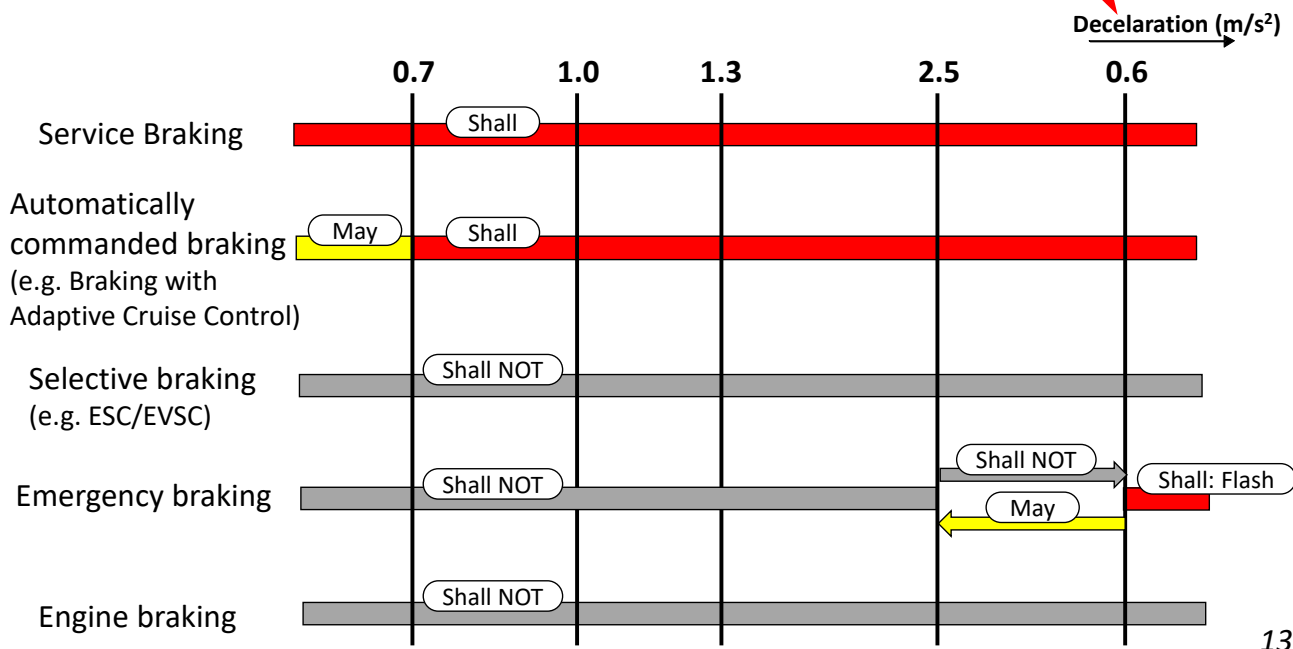
12

3. Summary of key points

Characteristics (6/6)

<Stop lamp> (5.2.22, 5.2.23)

- Summary table of Stop Lamp illumination



3. Summary of key points

Performance (Annex3) (1/6)

<General>

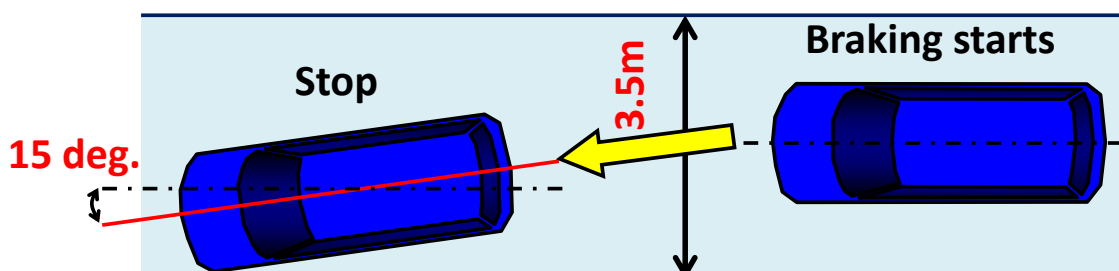
1.2.7

In the test, without

- locking of the wheels at speeds exceeding 15 km/h



- deviation of the vehicle from a 3.5 m wide lane
- exceeding a yaw angle of 15 deg.
- abnormal vibrations



3. Summary of key points

Performance (Annex3) (2/6)



<Dynamic performance: Type 0> (1.4)

Type 0: Ordinary performance test with cold brakes

(Temperature of brake linings, braking disc/drum: 65 - 100 deg)

The criteria **for service brake** is below.

(A) Type-0 test with engine disconnected (Transmission gear: Neutral)	v	100 km/h
	s <	$0.1 v + 0.0060 v^2$ (m) (e.g. V= 100 km/h -> 70 m)
	dm >	6.43 m/s ²
(B) Type-0 test with engine connected	v	80% v _{max} < 160 km/h
	s <	$0.1 v + 0.0067 v^2$ (m) (e.g. V= 100 km/h -> 77 m)
	dm >	5.76 m/s ²
	f	6.5 - 50 daN

\underline{v} = test speed, \underline{s} = stopping distance, \underline{dm} = mean fully developed deceleration,
 \underline{f} = force applied to foot control, $\underline{v_{max}}$ = maximum speed of the vehicle,

15

3. Summary of key points

Performance (Annex3) (3/6)



<Dynamic performance: Type 0> (1.4)

Type 0: Ordinary performance test with cold brakes

(Temperature of brake linings, braking disc/drum: 65 - 100 deg)

The criteria **for secondary service brake (2.2)** is below.

Type-0 test with engine disconnected (Transmission gear: Neutral)	v	100 km/h
	s <	$0.1 v + 0.0158 v^2$ (m) (e.g. V= 100 km/h -> 70 m)
	dm >	2.44 m/s ²
	f	6.5 - 50 daN

\underline{v} = test speed
 \underline{s} = stopping distance
 \underline{dm} = mean fully developed deceleration
 \underline{f} = force applied to foot control

16

3. Summary of key points

Performance (Annex3) (4/6)



<Dynamic performance: Type 0> (1.4)

Type 0: Ordinary performance test with cold brakes
(Temperature of brake linings, braking disc/drum: 65 - 100 deg)

The criteria **for parking brake (2.3)** is below.



Perking brake test (Static) (On slope)	Possible to holding the laden vehicle stationary on a 20 % up or down gradient	
Perking brake test (Dynamic) (On flat)	v	30 km/h
	s <	$0.1 v + 0.0257 v^2$ (m) (e.g. V= 30 km/h -> 26.1 m)
	Deceleration immediately before stop	1.5 m/s ²
	f	Foot type: 50 daN or less Hand type: 40 daN or less

\underline{v} = test speed, \underline{s} = stopping distance, \underline{f} = force applied to foot control

17

3. Summary of key points

Performance (Annex3) (5/6)



<Dynamic performance: Type 1> (1.4)

Type 1: Fade and Recovery test

The criteria **for Fade test for service brake (1.5.2)** is below.

Fade test	v	100 km/h
	s <	75 % requirement: $0.1 v + 0.0080 v^2$ (m) (e.g. V= 100 km/h -> 90 m)
		60 % requirement: 60 % of Type 0 test result
	dm >	75 % requirement: 4.82 m/s ²
		60 % requirement: 60 % of Type 0 test result
	f	6.5 - 50 daN

\underline{v} = test speed

\underline{s} = stopping distance

\underline{dm} = mean fully developed deceleration

\underline{f} = force applied to foot control

18

3. Summary of key points

Performance (Annex3) (6/6)

<Dynamic performance: Type 1> (1.4)

Type 1: Fade and Recovery test



The criteria **for Recovery test for service brake (1.5.4)** is below.

Fade test	v	100 km/h
	s <	Not be less than 70 % - 150 % of the result in the Type-0 test with the engine disconnected
	dm >	75 % requirement: 4.82 m/s ²
	f	6.5 - 50 daN

\underline{v} = test speed

\underline{s} = stopping distance

\underline{dm} = mean fully developed deceleration

\underline{f} = force applied to foot control

4. Other requirement

EVSC(Electrical Vehicle Stability Control (R13))

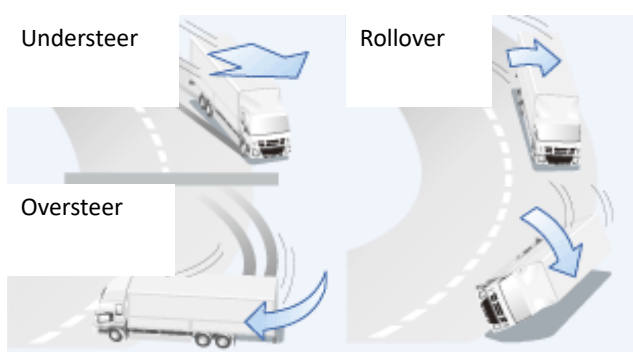
< Purpose >

- ✓ Active Safety
- ✓ In order to reduce a sideslip accident and a rollover accident

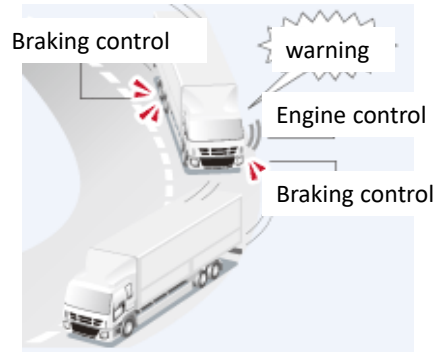
< Requirement >

- ✓ Show an effect about the vehicle stability
(the vehicle stability with EVSC is better than that without EVSC)
- ✓ Warning (EVSC active, EVSC failure, EVSC off)

(I) Without EVSC



(II) with EVSC



4. Other requirement

ESC(Electronic stability control (R13H))

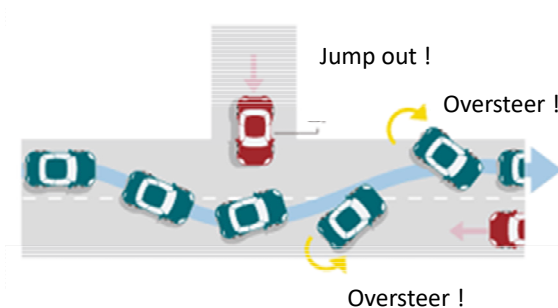
< Purpose >

- ✓ Active Safety
- ✓ In order to reduce a sideslip accident

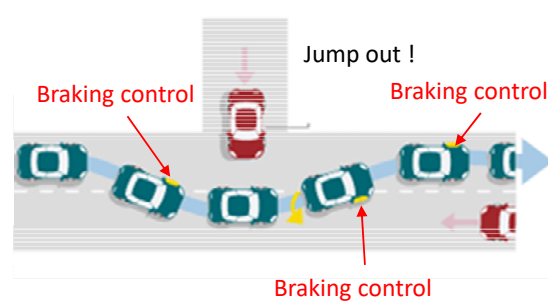
< Requirement >

- ✓ Show an effect about the vehicle stability
(the vehicle stability with ESC is better than that without ESC)
- ✓ Warning (ESC active, ESC failure, ESC off)

(I) Without ESC



(II) With ESC



Thank you!