

Council Directive of 26 July 1971 on the approximation of the laws of the Member States relating to the braking devices of certain categories of motor vehicles and of their trailers (71/320/EEC) (repealed)

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[^{F1}ANNEX II

Braking Tests and performance of braking systems

Textual Amendments

F1 Substituted by [Commission Directive 98/12/EC](#) of 27 January 1998 adapting to technical progress [Council Directive 71/320/EEC](#) on the approximation of the laws of the Member States relating to the braking devices of certain categories of motor vehicles and their trailers (Text with EEA relevance).

2. PERFORMACE OF BRAKING SYSTEMS

2.1. *Vehicles of categories M and N*

2.1.1. *Service braking systems*

2.1.1.1. Provisions relating to tests

2.1.1.1.1. The service braking systems of vehicles of categories M and N shall be tested under the conditions shown in the following table:

Type of test		M ₁ 0-I	M ₂ 0-I	M ₃ 0-I-II/IIA	N ₁ 0-I	N ₂ 0-I	N ₃ 0-I-II/IIA
Type 0 test with engine connected	prescribed speed	80 km/h	60 km/h	60 km/h	80 km/h	60 km/h	60 km/h
	$s \leq$	$0,1 v + v^2 150$	$0,15 v + v^2 130$				
	$d_m \geq$	$5,8 \text{ ms}^{-2}$	5 ms^{-2}				
Type 0 test with engine disconnected	$v = 80 \%$ v_{\max} but \leq :	160 km/h	100 km/h	90 km/h	120 km/h	100 km/h	90 km/h
	$s \leq$	$0,1 v + v^2 130$	$0,15 v + v^2 103,5$				
	$d_m \geq$	5 ms^{-2}	4 ms^{-2}				
	$F \leq$	500 N	700 N				

where:

v = test speed in km/h
s = stopping distance in m
d_m = mean fully developed deceleration at normal engine speed
F = force applied to foot control
v_{max} = maximum speed of the vehicle.

2.1.1.1.2. In the case of a motor vehicle authorised to tow an unbraked trailer, the minimum performance prescribed for the corresponding motor vehicle category (for the Type 0 test with engine disconnected) shall be attained with the unbraked trailer coupled to the motor vehicle and with the unbraked trailer laden to the maximum mass declared by the motor vehicle manufacturer. However, in the case of category M₁ vehicles, the minimum combination performance shall be not less than $5,4 \text{ m/s}^2$ both in laden and unladen conditions.

The combination performance shall be verified by calculations referring to the maximum braking performance actually achieved by the motor vehicle alone, laden, (and unladen in the case of M₁) during the Type 0 test with engine disconnected, using the following formula (no practical tests with a coupled unbraked trailer are required):

$$d_{M+R} = d_M \times \frac{PM}{PM + PR}$$

where

- d_{M+R} = calculated mean fully developed deceleration of the motor vehicle when coupled to an unbraked trailer in m/s²
- d_M = maximum mean fully developed deceleration of the motor vehicle alone achieved during the Type 0 test with engine disconnected in m/s²
- PM = mass of the motor vehicle, laden (and unladen in the case of M₁)
- PR = maximum mass of an unbraked trailer which may be coupled, as declared by the motor vehicle manufacturer.

2.1.2. Secondary braking systems

- 2.1.2.1. The secondary braking system, even if the control which actuates it is also used for other braking functions, shall give a stopping distance not exceeding the following values and a mean fully developed deceleration not less than the following values:

category M₁:

$$s = 0,1 v + \frac{2 v^2}{150}$$

(the second term corresponding to a mean fully developed deceleration of 2,9 m/s²)

category M₂, M₃:

$$s = 0,15 v + \frac{2 v^2}{130}$$

(the second term corresponding to a mean fully developed deceleration of 2,5 m/s²)

category N:

$$s = 0,15 v + \frac{2 v^2}{115}$$

(the second term corresponding to a mean fully developed deceleration of 2,2 m/s²).

- 2.1.2.2. If the secondary braking system control is a manual control, the prescribed performance shall be obtained by applying to the control a force not exceeding 400 N in the case of category M₁ vehicles and 600 N in the case of other vehicles, and the control shall be so placed that it can be easily and quickly grasped by the driver.
- 2.1.2.3. If the secondary braking systems control is a foot control, the prescribed performance shall be obtained by applying to the control a force not exceeding 500 N in the case of category M₁ vehicles and 700 N in the case of other vehicles, and the control shall be so placed that it can be easily and quickly actuated by the driver.
- 2.1.2.4. The performance of the secondary braking system shall be checked by the Type 0 test with the engine disconnected from the following initial speeds:

M ₁ = 80 km/h	M ₂ = 60 km/h	M ₃ = 60 km/h
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$N_1 = 70 \text{ km/h}$	$N_2 = 50 \text{ km/h}$	$N_3 = 40 \text{ km/h}$
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2.1.2.5. The secondary braking effectiveness test shall be conducted by simulating the actual failure conditions in the service braking system.

2.1.3. Parking braking systems

2.1.3.1. The parking braking system shall, even if it is combined with one of the other braking systems, be capable of holding a laden vehicle stationary on an 18 % up or down gradient.

2.1.3.2. On vehicles to which the coupling of a trailer is authorised, the parking braking system of the towing vehicle shall be capable of holding the combination of vehicles stationary on a 12 % gradient.

2.1.3.3. If the control is a manual control, the force applied to it shall not exceed 400 N in the case of category M_1 vehicles and 600 N in the case of all other vehicles.

2.1.3.4. If it is a foot control, the force exerted on the control shall not exceed 500 N in the case of category M_1 vehicles and 700 N in the case of all other vehicles.

2.1.3.5. A parking braking system which has to be actuated several times before attaining the prescribed performance shall be admissible.

2.1.3.6. To check compliance with the requirements of Annex I, point 2.2.1.2.4, a Type 0 test shall be carried out with the engine disconnected at the initial speed of 30 km/h. The mean fully developed deceleration on application of the control of the parking brake system and the deceleration immediately before the vehicle stops shall not be less than $1,5 \text{ m/s}^2$. The test shall be carried out with the laden vehicle. The force exerted on the braking control device shall not exceed the specified values.

2.1.4. *Residual service braking performance after transmission failure*

2.1.4.1. The residual performance of the service braking system, in the event of failure in a part of its transmission, shall give a stopping distance not exceeding the following values and a mean fully developed deceleration not less than the following values, using a control force not exceeding 700 N, when checked by the Type 0 test with the engine disconnected from the following initial speeds for the relevant vehicle category:

Stopping distance (m) and mean fully developed deceleration (m/s^2)

Type	km/h	Laden	m/s^2	Unladen	m/s^2
M_1	80	$0,1 v + \frac{100}{30} \times v^2 150$	1,7	$0,1 v + \frac{100}{25} \times v^2 150$	1,5
M_2	60	$0,15 v + \frac{100}{30} \times v^2 130$	1,5	$0,15 v + \frac{100}{25} \times v^2 130$	1,3
M_3	60	$0,15 v + \frac{100}{30} \times v^2 130$	1,5	$0,15 v + \frac{100}{30} \times v^2 130$	1,5
N_1	70	$0,15 v + \frac{100}{30} \times v^2 115$	1,3	$0,15 v + \frac{100}{25} \times v^2 115$	1,1
N_2	50	$0,15 v + \frac{100}{30} \times v^2 115$	1,3	$0,15 v + \frac{100}{25} \times v^2 115$	1,1
N_3	40	$0,15 v + \frac{100}{30} \times v^2 115$	1,3	$0,15 v + \frac{100}{30} \times v^2 115$	1,3

2.1.4.2. The residual braking effectiveness test shall be conducted by simulating the actual failure conditions in the service braking systems.

2.2. *Vehicles of category O*

2.2.1. *Service braking systems*

2.2.1.1. Requirement relating to tests of category O₁ vehicles

2.2.1.1.1. Where the provision of a service braking system is mandatory, the performance of the system shall meet the requirements laid down for category O₂ vehicles.

2.2.1.2. Requirements relating to tests of category O₂ vehicles.

2.2.1.2.1. If the service braking system is of the continuous or semi-continuous type, the sum of the forces exerted at the periphery of the braked wheels shall be at least X % of the maximum stationary wheel load, X having the following values:

Full trailer, laden and unladen	50
Semi-trailer, laden and unladen	45
Centre-axle trailer, laden and unladen	50.

Where the trailer is fitted with a compressed-air braking system, the pressure in the control line shall not exceed 6,5 bar⁽¹⁾ and the pressure in the supply line shall not exceed 7,0 bar⁽¹⁾ during the brake test. The test speed is 60 km/h.

A supplementary test at 40 km/h must be carried out with the laden vehicle for comparison with the Type I test result.

2.2.1.2.2. Where the braking system is of the inertia type, it shall comply with the conditions laid down in Annex VIII.

2.2.1.2.3. In addition, these vehicles shall be subjected to the Type I test.

2.2.1.2.4. In the Type I test of a semi-trailer, the mass braked by its axle(s) shall correspond to the maximum axle load(s) (not including the king pin load).

2.2.1.3. Requirements relating to the testing of category O₃ vehicles.

2.2.1.3.1. The same requirements apply as to category O₂ vehicles.

2.2.1.4. Requirements relating to tests of category O₄ vehicles.

2.2.1.4.1. If the service braking system is of the continuous or semi-continuous type, the sum of the forces exerted at the periphery of the braked wheels shall be equal to at least X % of the maximum stationary wheel load, X having the following values:

full trailer, laden and unladen	50
semi-trailer, laden and unladen	45
centre-axle trailer, laden and unladen	50.

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Where the trailer is fitted with a compressed air braking system, the pressure in the control line shall not exceed 6,5 bar⁽¹⁾ and the pressure in the supply line shall not exceed 7,0 bar⁽¹⁾ during the brake test. The test speed is 60 km/h.

2.2.1.4.2. In addition, the vehicles shall undergo the Type-III test.

2.2.1.4.3. In the Type-III test of a semi-trailer, the mass braked by the latter's axle(s) shall correspond to the maximum axle load(s).

2.2.2. *Parking braking systems*

2.2.2.1. The parking braking system with which the trailer or semi-trailer is fitted shall be capable of holding the laden trailer or semi-trailer stationary, when separated from the towing vehicle, on an 18 % up or down gradient. The force applied to the control shall not exceed 600 N.

2.2.3. *Automatic braking systems*

2.2.3.1. The automatic braking performance in the event of a total pressure loss in the air supply line, when testing the laden vehicle from 40 km/h, shall not be less than 13,5 % of the maximum stationary wheel load. Wheel-locking at performance levels above 13,5 % is permitted.

2.3. *Reaction time*

Where a vehicle is fitted with a service braking system which is totally or partially dependent on a source of energy other than the muscular effort of the driver, the following requirements shall be satisfied:

2.3.1. In an emergency manoeuvre, the time elapsing between the moment when the control begins to be actuated and the moment when the braking force on the least favourably placed axle reaches the level corresponding to the prescribed performance shall not exceed 0,6 seconds.

2.3.2. In the case of vehicles fitted with compressed-air braking systems, the requirements of point 2.3.1 are considered to be satisfied if the vehicle complies with the provisions of Annex III.

2.3.3. In the case of vehicles fitted with hydraulic braking systems, the requirements of point 2.3.1 are considered to be satisfied if, in an emergency manoeuvre, the deceleration of the vehicle, or the pressure at the least favourable brake cylinder, reaches a level corresponding to the prescribed performance within 0,6 seconds.]

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- (1) [^{F1}The pressures specified here and in the following Annexes are relative pressures measured in bars.]

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