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COMMISSION DIRECTIVE

of 25 July 1975

adapting to technical progress Council Directive No 71/320/EEC 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

(75/524/EEC)

(OJ L 236, 8.9.1975, p. 3)

Amended by:

		Official Journal		
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►**M1**	Commission Directive 79/489/EEC of 18 April 1979	L 128	12	26.5.1979

Corrected by:

►**C1**   Corrigendum, OJ L 247, 23.9.1975, p. 36 (75/524/EEC)

▼**B**

COMMISSION DIRECTIVE

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adapting to technical progress Council Directive No 71/320/EEC 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

(75/524/EEC)

THE COMMISSION OF THE EUROPEAN COMMUNITIES

Having regard to the Treaty establishing the European Economic Community;

Having regard to Council Directive No 70/156/EEC [1] of 6 February 1970 on the approximation of the laws of the Member States relating to the type approval of motor vehicles and their trailers, as amended by the Act [2] annexed to the Treaty concerning the accession of the new Member States to the EEC and EAEC signed in Brussels on 22 January 1972, and in particular to Articles 11, 12 and 13 thereof;

Having regard to Council Directive No 71/320/EEC [3] 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, as amended by the Act [4] annexed to the Treaty concerning the accession of new Member States to the EEC and EAEC signed in Brussels on 22 January 1972, and in particular to Article 5 thereof;

Whereas in Directive No 74/132/EEC [5] of 11 February 1974, the Commission adopted provisions adapting to technical progress the Council Directive of 26 July 1971 mentioned above; whereas these provisions solely relate to braking-pressure distributors and not, therefore, to conditions of compatibility; whereas in order to avoid certain combinations of vehicles (drawing and drawn vehicles) which are not likely to be able to provide every guarantee of safety from the point of view of braking, these provisions should be subject to conditions of compatibility between drawing and drawn vehicles; whereas technical progress now enables provisions on compatibility not only to be adopted but also enables them to be correctly implemented;

Whereas the laying down of provisions on the conditions of compatibility necessitates amendments to the provisions relating to the device which enables the braking pressure to be matched to the load and which are set out in the Annex to Council Directive No 74/132/EEC;

Whereas the provisions relating to wheel anti-locking systems will be adopted at a later date; whereas, until the entry into force of these provisions, it is consequently necessary to subject vehicles of all categories, with the exception of those in categories O_1 and O_2, to the provisions of this Directive, even if they are fitted with wheel anti-locking devices;

Whereas this Directive provides for an earlier date of entry into force of the amended provisions and whereas it is therefore no longer justified to retain the provisions of paragraphs 2 and 3 of Article 2 of Commission Directive No 74/132/EEC;

Whereas the provisions of this Directive are in accordance with the Opinion of the Committee on the Adaptation to Technical Progress of the Directives aimed at the Removal of Technical Barriers to Trade in the Motor-Vehicle Sector,

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[1] OJ No L 42, 23. 2. 1970, p. 1.
[2] OJ No L 73, 27. 3. 1972, pp. 115 and 157.
[3] OJ No L 202, 6. 9. 1971, p. 37.
[4] OJ No L 73, 27. 3. 1972, pp. 118, 119 and 158.
[5] OJ No L 74, 19. 3. 1974, p. 7.

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HAS ADOPTED THIS DIRECTIVE:

Article 1

Paragraphs 2 and 3 of Article 2 of Commission Directive No 74/132/EEC of 11 February 1974 adapting to technical progress the 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 are rescinded with effect from the date of adoption of this Directive.

Article 2

1.   Annexes I, II and IX to Council Directive No 71/320/EEC 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 their trailers, as amended by Commission Directive No 74/132/EEC of 11 February 1974, are amended as shown in the Annex to this Directive.

2.   Pending the entry into force of special requirements on wheel anti-locking systems, vehicles of categories M_1, M_2, M_3, N_1, N_2, N_3, O_3 and O_4 which are fitted with these systems are submitted to the prescriptions of this Directive.

Article 3

1.   With effect from 1 January 1976 no Member State may on grounds relating to the braking devices:

— refuse in respect of a type of vehicle to grant EEC type-approval, to issue the document referred to in the last indent of Article 10 (1) of Council Directive No 70/156/EEC of 6 February 1970, or to grant national type-approval; or

— prohibit the entry into service of vehicles,

if the braking devices of such type of vehicle or of such vehicles comply with the provisions of Council Directive No 71/320/EEC of 26 July 1971, as last amended by this Directive.

2.   With effect from 1 October 1976 Member States:

— may no longer issue the document referred to in the last indent of Article 10 (1) of Council Directive No 70/156/EEC of 6 February 1970 in respect of a type of vehicle of which the braking devices do not comply with the provisions of Council Directive No 71/320/EEC of 26 July 1971 as last amended by this Directive;

— may refuse to grant national type-approval in respect of a type of vehicle of which the braking devices do not comply with the provisions of Council Directive No 71/320/EEC of 26 July 1971 as last amended by this Directive.

3.   With effect from 1 October 1976 Member States may prohibit the entry into service of vehicles of which the braking devices do not comply with the provisions of Council Directive No 71/320/EEC of 26 July 1971 as last amended by this Directive.

4.   The Member States shall adopt and publish the provisions necessary in order to comply with this Directive not later than 1 January 1976 and shall forthwith inform the Commission thereof.

Article 4

This Directive is addressed to the Member States.

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ANNEX

Amendments to the Annexes to Council Directive No 71/320/EEC of 26 July 1971

ANNEX I: **DEFINITIONS, REQUIREMENTS, CONSTRUCTION AND FITTING**

Item 2.2.1.12.2. shall read: The failure of a part of a hydraulic transmission system shall be signalled to the driver by a device comprising a red tell-tale lamp lighting up not later than on actuation of the control. However a device comprising a red tell-tale lamp lighting up when the level of the fluid in its reservoirs falls below the value specified by the manufacturer is admissible. The tell-tale lamp shall be visible even by daylight; the satisfactory condition of the lamp must be easily verifiable by the driver. The failure of a component of the device shall not entail total loss of effectiveness of the braking device in question.

ANNEX II: **BRAKING TEST AND PERFORMANCE OF BRAKING DEVICES**

Item 1.1.3.4. shall read: Without prejudice to the requirements contained in item 1.1.4.2 below, the road shall possess a surface having good adhesion.

After item 1.1.4.1 add item

1.1.4.2. The behaviour of vehicles in categories M_1, M_2, M_3, N_1, N_2, N_3, O_3 and O_4 on a road surface having reduced adhesion shall fulfil the conditions laid down in the Appendix.

Appendix (See 1.1.4.2): **DISTRIBUTION OF BRAKING EFFORT AMONG VEHICLE AXLES**

1.   GENERAL REQUIREMENTS

Vehicles of categories M_1, M_2, M_3, N_1, N_2, N_3, O_3 and O_4 shall fulfil the conditions of the present Appendix. If a special device is used, this must operate automatically.

2.   SYMBOLS

i   = axle index (i = 1, front axle; i = 2, second axle; etc.)

P_i = normal reaction of road surface on axle i under static conditions

N_i = normal reaction of road surface on axle i under braking

T_i = force exerted by the brakes on axle i under normal braking conditions on the road

f_i = T_i/N_i, adhesion used by axle i ([1])

J   = deceleration of vehicle

g   = acceleration due to gravity g = 10 m/s²

z   = braking rate of vehicle = J/g ([2])

P   = ►**M1** mass ◄ of vehicle

h   = height of centre of gravity

E   = wheelbase

k   = theoretical coefficient of adhesion between tyre and road

K_c = correction factor — semi-trailer laden

K_v = correction factor — semi-trailer unladen

_____

([1]) Adhesion curves used by each axle means curves showing the adhesion used by axle i plotted against the vehicle braking rate under the specified load conditions.
([2]) For semi-trailers, z is the braking force divided by the static ►**M1** mass ◄ on the semi-trailer axle(s).

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TM	=	sum of braking forces at the periphery of wheels of drawing vehicles for trailers or semi-trailers
PM	=	total normal static reaction between road surface and wheels of drawing vehicles for trailer or semi-trailer as referred to in items 3.1.4 and 3.1.5 respectively
p_m	=	pressure at coupling head of service line
TR	=	sum of braking forces at periphery of all wheels of trailer or semi-trailer
PR	=	total normal static reaction of road surface on wheels of trailer or semi-trailer
PR_{max}	=	value of PR at ►__M1__ maximum mass ◄ of semi-trailer
E_R	=	distance between king-pin and centre of axle or axles of semi-trailer
h_R	=	height above ground of centre of gravity of semi-trailer

3. REQUIREMENTS FOR MOTOR VEHICLES

3.1. **Two axle vehicles.**

3.1.1. (¹) For all categories of vehicle for k values between 0·2 and 0·8:

$$z \geq 0 \cdot 1 + 0 \cdot 85 \, (k - 0 \cdot 2)$$

For all states of load of the vehicle, the adhesion utilization curve of the front axle shall be situated above that for the rear axle:

— for all braking rates of between 0·15 and 0·8 in the case of vehicles of category M_1.

However, for vehicles of this category over the range of z values, between 0·3 and 0·45, an inversion of the adhesion utilization curves is permitted provided that the adhesion utilization curve of the rear axle does not exceed by more than 0·05 the line defined by the formula k = z (line of ideal adhesion utilization — see diagram 1A);

— for all braking rates of between 0·15 and 0·30, in the case of vehicles of other categories. This condition is also considered satisfied if the adhesion utilization curves for each axle of between 0·15 and 0·30 are situated between two parallels to the line of ideal adhesion utilization given by the equation k = z ± 0·08 as shown in diagram 1 B and the adhesion utilization curve for the rear axle for braking rates z ≥ 0·3 complies with the relationship

$$z \geq 0 \cdot 3 + 0 \cdot 74 \, (k - 0 \cdot 38)$$

▼__M1__

3.1.2. In the case of a vehicle authorized to draw trailers of category O_3 or O_4 fitted with air brakes, the pressure at full application of the braking control must be between 6·5 and 8 bar at the coupling head of the supply line and between 6 and 7·5 bar at the coupling head of the control line, irrespective of the load condition of the vehicle. These pressures must be demonstrably present in the drawing vehicle when uncoupled from the trailer.

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3.1.3. In order to verify the requirement of item 3.1.1, the manufacturer shall provide the adhesion utilization curves for the front and rear axles calculated by the formulas:

$$f_1 = \frac{T_1}{N_1} = \frac{T_1}{P_1 + z \, \dfrac{h}{E} \, P} \qquad\qquad f_2 = \frac{T_2}{N_2} = \frac{T_2}{P_2 - z \, \dfrac{h}{E} \, P}$$

(¹) The provisions of item 3.1.1 do not affect the requirements of Annex II relating to the braking efficiency. However, if, when verifying the provisions of item 3.1.1 braking efficiencies are obtained which are higher than those prescribed in Annex II, the provisions relating to the adhesion utilization curve shall be applied within the areas of diagrams IA and IB defined by the straight lines k = 0·8 and z = 0·8.

▼**B**

3.1.4.   Vehicles other than tractive units for semi-trailers.

3.1.4.1.   The graphs shall be plotted for both the following load conditions:

— unladen, in running order with the driver on board,

— laden. Where provision is made for several possibilities of load distribution, the one whereby the front axle is the most heavily laden shall be the one to be taken into consideration.

The height of the centre of gravity is specified by the manufacturer.

In the case of a vehicle fitted with air brakes, whether it is a trailer or a motor vehicle authorized to draw a trailer, the permissible relationship between the braking rate TR/PR or TM/PM and the pressure p_m shall be within the areas shown in diagram 2.

3.1.5.   Tractive units for semi-trailers.

3.1.5.1.   Tractive units with unladen semi-trailer

An unladen articulated combination is considered to be a tractive unit in running order, with the driver on board, coupled to an unladen semi-trailer. The dynamic load of the semi-trailer on the tractive unit shall be represented by a static ►**M1** mass ◄ applied at the coupling king-pin equal to 15 % of the ►**M1** maximum mass ◄ on the coupling. For the solo tractive unit the height of the centre of gravity shall be that specified by the manufacturer. The braking forces must continue to be regulated between the state of the tractive unit with semi-trailer (unladen) and that of the solo tractive unit; the braking forces relating to the solo tractive unit shall be verified.

3.1.5.2.   Tractive units with laden semi-trailer

A laden articulated combination is considered to be a tractive unit in running order with the driver on board coupled to a laden semi-trailer. The dynamic load of the semi-trailer on the tractive unit shall be represented by a static ►**M1** mass ◄ P_s applied at the coupling king-pin equal to:

$$P_s = P_{so} \, (1 + 0 \cdot 45 \; z)$$

where P_{so} represents the difference between the maximum laden ►**M1** mass ◄ of the tractive unit and its unladen ►**M1** mass ◄.

For h the following value shall be taken: $h = \dfrac{h_o P_o + h_s P_s}{P}$

where:

h_o is the height of the centre of gravity of the tractive unit

h_s is the height of the coupling on which the semi-trailer rests

P_o is the unladen ►**M1** mass ◄ of the solo tractive unit

$$P = P_o + P_s = P_1 + P_2.$$

3.1.5.3.   In the case of a vehicle fitted with a compressed air braking system, the permissible relationship between the braking rate TM/PM and the pressure p_m shall be within the areas shown in diagram 3.

3.2.   **Vehicles with more than two axles**

The requirements of item 3.1 shall apply to vehicles with more than two axles. The requirements of item 3.1.1 with respect to wheel lock sequence shall be considered tobe met, if, in the case of braking rates of between 0·15 and 0·30, the adhesion used by at least one of the front axles is greater than that used by at least one of the rear axles.

4.   REQUIREMENT FOR SEMI-TRAILERS

For semi-trailers fitted with compressed-air braking systems:

The permissible relationship between the braking rate TR/PR and the pressure p_m shall lie within two areas derived from diagrams 4A and 4B for the laden and unladen states of load. This requirement shall be met for all permissible load conditions of the semi-trailer axles.

▼**B**

5. REQUIREMENTS FOR TRAILERS

5.1. The following requirements shall only apply to trailers fitted with air brakes. They shall not apply to single-axle trailers nor to twin-axle trailers where the axle spread is less than two metres.

5.2. The requirements set out in item 3.1 shall apply to twin-axle trailers not excluded by the requirements contained in 5.1.

5.3. Trailers with more than two axles shall be subject to the requirements contained in item 3.2.

▼**M1**

6. CONDITIONS TO BE FULFILLED IN THE CASE OF FAILURE OF THE BRAKING DISTRIBUTION SYSTEM

When the requirements of this Appendix are fulfilled by means of a special device (e.g. controlled mechanically by the suspension of the vehicle), it shall be possible, in the event of the failure of this device or its means of control, to stop the vehicle under the conditions specified for secondary braking in the case of motor vehicles; for those vehicles authorized to draw a trailer fitted with air brakes, it must be possible to achieve a pressure at the coupling head of the control line within the range specified in item 3.1.2 of this Appendix. In the event of failure of the means of controlling the device in trailers and semi-trailers, a braking rate of at least 30% of the service brake performance prescribed for the vehicle in question shall be attained.

7. MARKINGS

7.1. Vehicles, other than those of category M_1, which meet the requirements of this Appendix by means of a device mechanically controlled by the suspension of the vehicle, shall be marked to show the useful travel of the device between the positions corresponding to vehicle unladen und laden states respectively and any further information to enable the setting of the device to be checked.

7.1.1. When a brake load sensing device is controlled via the suspension of the vehicle by any other means, the vehicle must be marked with information to enable the setting of the device to be checked.

7.2. When the requirements of this Appendix are met by means of a device which modulates the air pressure in the brake transmission, the vehicle must be marked to show a mass corresponding to the axle loads at the ground, the nominal outlet pressures of the device and an inlet pressure of not less than 80% of the maximum design inlet pressure, as declared by the vehicle manufacturer, for the following states of load:

7.2.1. Technically permissible maximum load on the axle(s) which control(s) the device.

7.2.2. Axle load(s) corresponding to the mass of the vehicle in running order as defined in item 2.6 of Annex I to Directive 70/156/EEC.

7.2.3. The axle load(s) approximating to the vehicle with proposed bodywork in running order where the axle load(s) mentioned in item 7.2.2 relate(s) to the vehicle chassis with cab.

7.2.4. The axle load(s) designated by the manufacturer to enable the setting of the device to be checked in service if this is (these are) different from the loads specified in items 7.2.1, 7.2.2 and 7.2.3.

7.3. Item 17 (a) 2 of Annex IX must include information to enable compliance with the requirements of items 7.1 and 7.2 to be checked.

7.4. The markings referred to under items 7.1 and 7.2 must be affixed in a visible position in indelible form. An example of the markings for a mechanically controlled device in a vehicle fitted with compressed air braking is shown in Diagram 5.

8. PRESSURE TEST CONNECTIONS

Braking systems incorporating the devices referred to in item 7.2 shall be fitted with pressure test connections which conform with ISO Standard 3583/1975 in the pressure line upstream and downstream of the device.

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►**M1** 9. ◄ VEHICLE INSPECTION

During the EEC type-approval testing of a vehicle the technical inspection authority shall verify conformity with the requirements contained in the present Appendix and carry out any further tests considered necessary to this end. The report on the additional tests shall be appended to the EEC type-approval certificate.
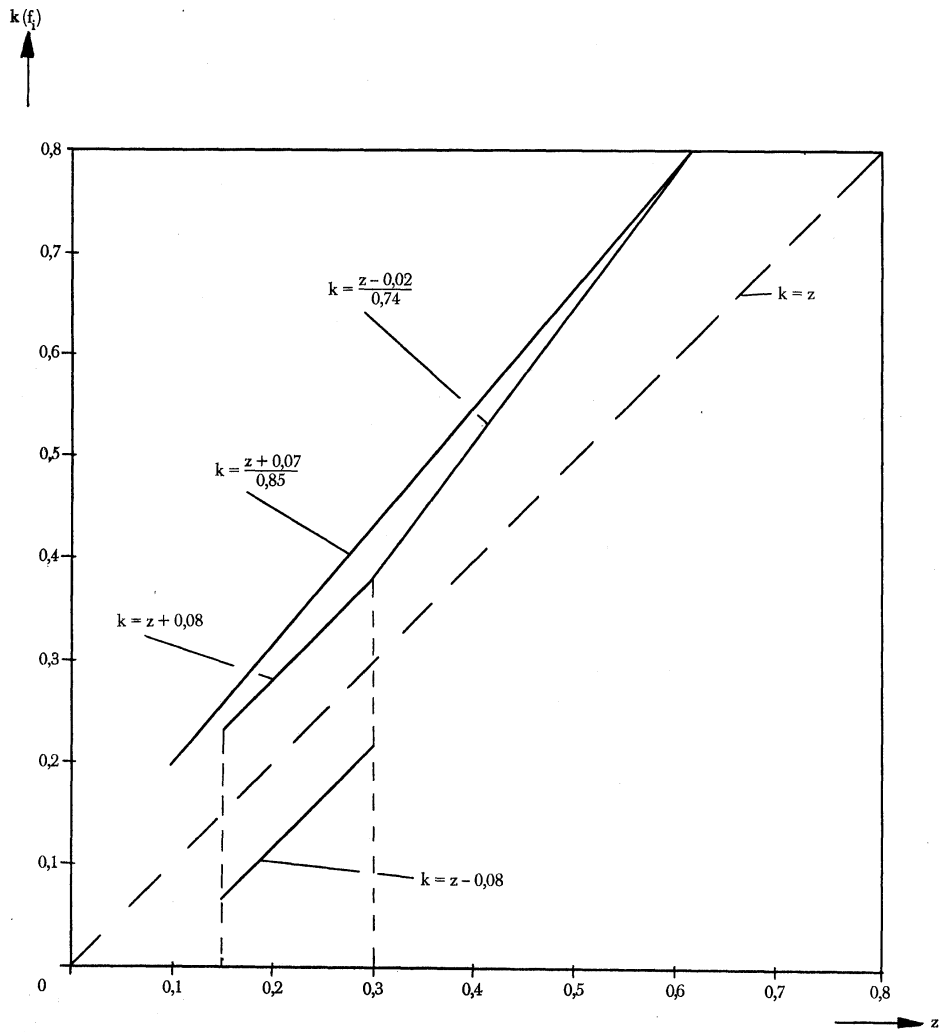
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DIAGRAM 1 A

VEHICLES OF CATEGORY M₁

(see item 3.1.1)

$k (f_i)$

$k = \dfrac{z + 0{,}07}{0{,}85}$

$k = z + 0{,}05$
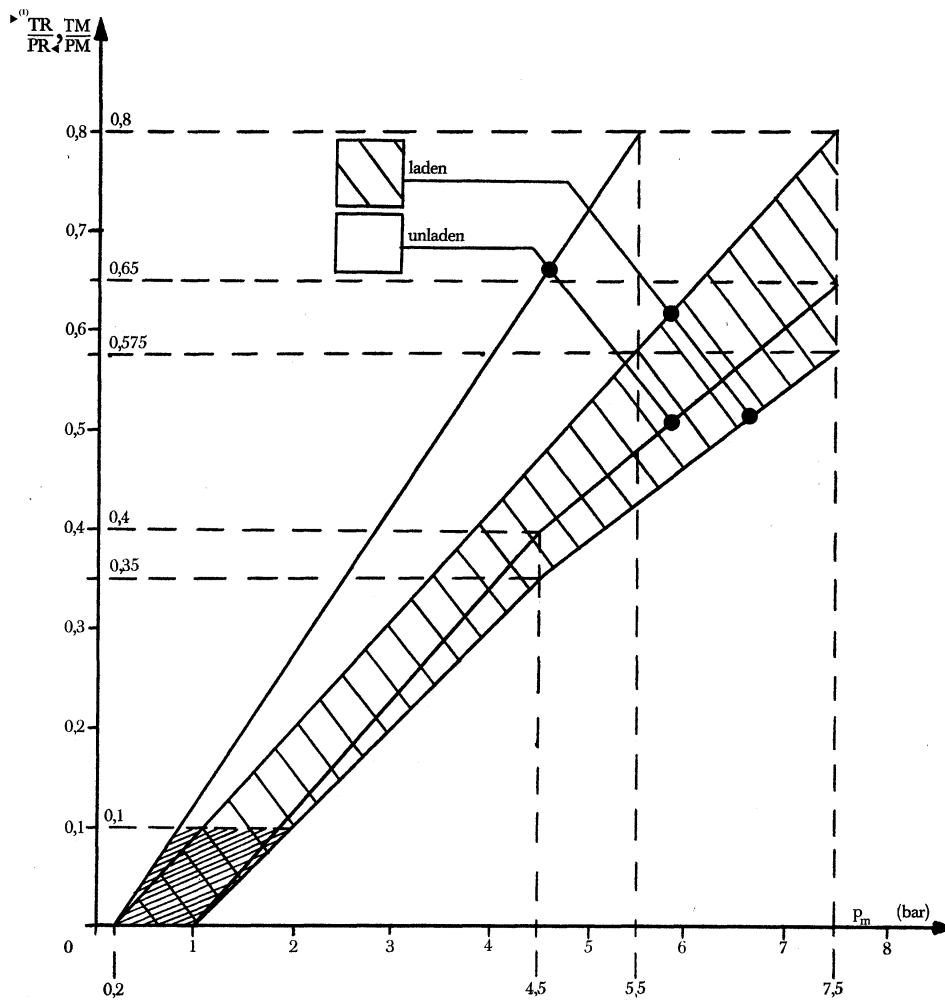
$k = z$

z
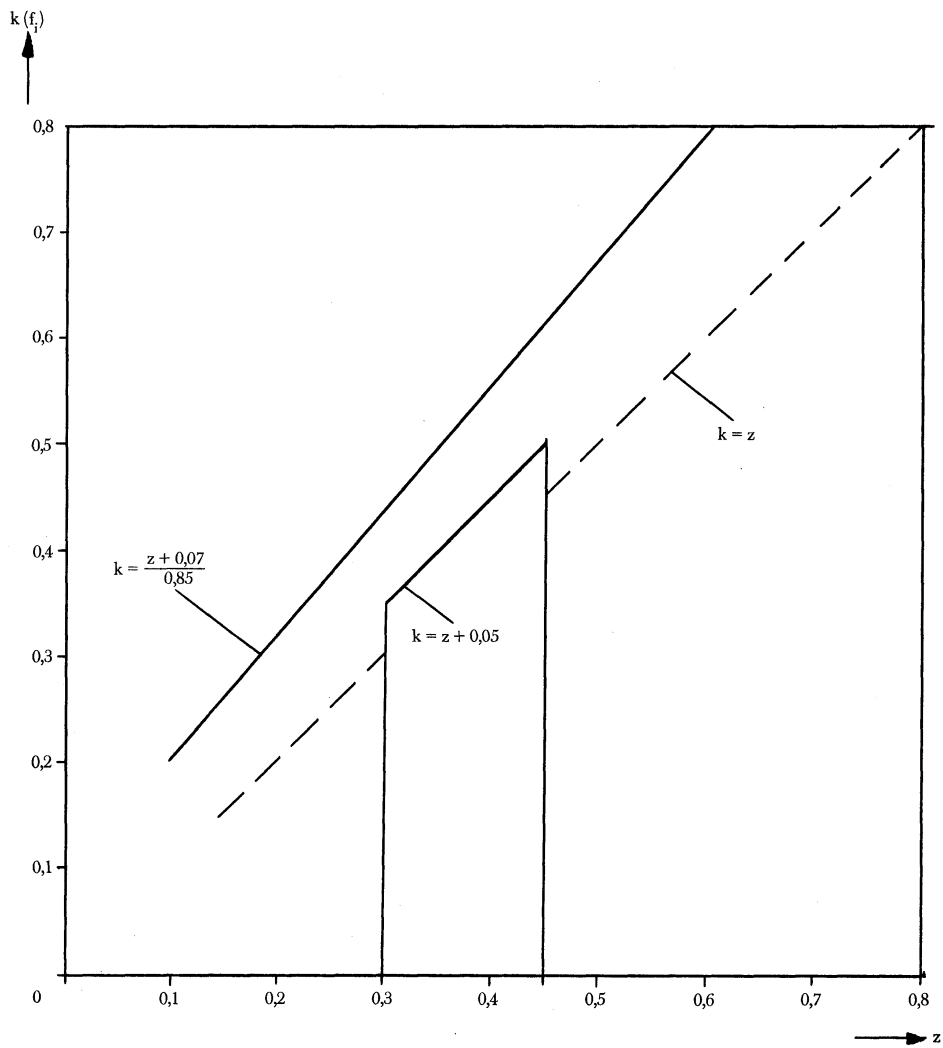
▼ <u>**B**</u>

DIAGRAM 1 B

VEHICLES OTHER THAN VEHICLES OF CATEGORY M$_1$

(see item 3.1.1)

▼**B**

DIAGRAM 2

DRAWING VEHICLES AND TRAILERS
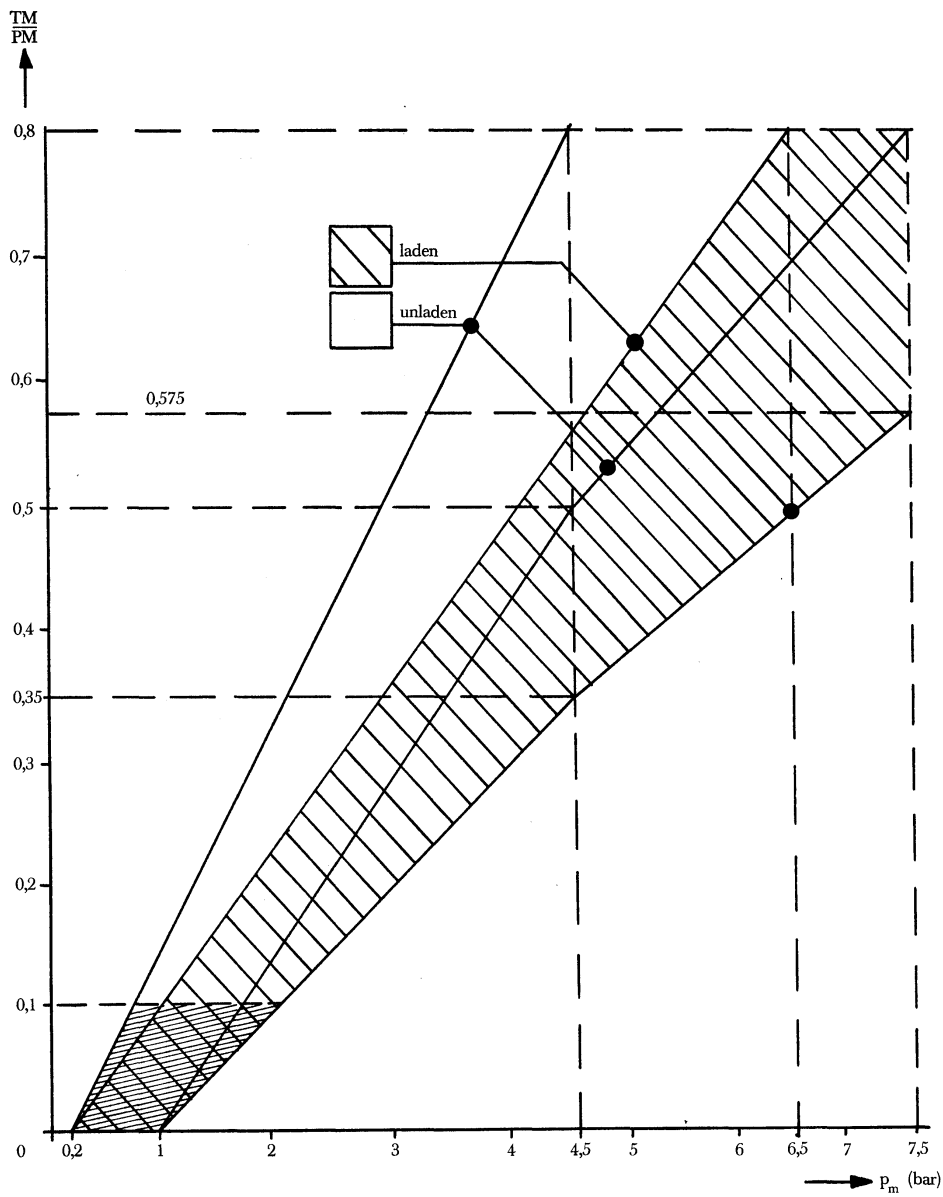
(see item 3.1.4.1)

►(1) **M1**

Note:

It is understood that between the values $\dfrac{TM}{PM} = 0$ and $\dfrac{TM}{PM} = 0 \cdot 1$ or $\dfrac{TR}{PR} = 0$ and $\dfrac{TR}{PR} = 0 \cdot 1$ it is not

necessary that there should be proportionality between the braking rate $\dfrac{TM}{PM}$ or $\dfrac{TR}{PR}$ and the control pressure as measured at the coupling head.

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DIAGRAM 3

TRACTIVE UNITS FOR SEMI-TRAILERS
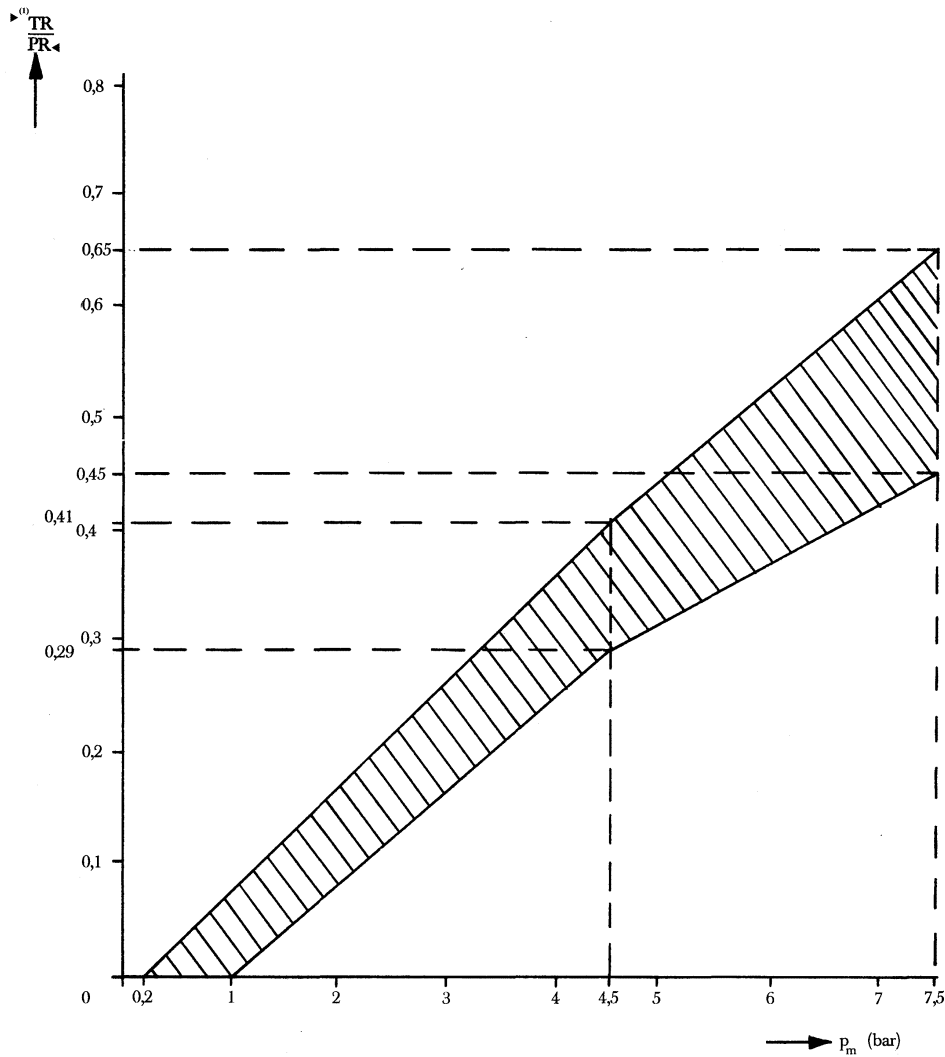
(see item 3.1.5)

Note:

(1) Between the values $\dfrac{TM}{PM} = 0$ and $\dfrac{TM}{PM} = 0 \cdot 1$, it is not necessary that there should be proportionality between the braking rate $\dfrac{TM}{PM}$ and the service line pressure as measured at the coupling head.

(2) The relationships required by the diagram shall apply progressively for intermediate states of loading between the laden and the unladen states and shall be achieved by automatic means.

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DIAGRAM 4 A

SEMI-TRAILERS

(see item 4)

$\blacktriangleright^{(1)} \dfrac{TR}{PR}\blacktriangleleft$

[Graph: vertical axis labelled $\frac{TR}{PR}$ with values 0,1 0,2 0,29 0,3 0,4 0,41 0,45 0,5 0,6 0,65 0,7 0,8; horizontal axis labelled p_m (bar) with values 0,2 1 2 3 4 4,5 5 6 7,5]

$\blacktriangleright^{(1)} \underline{M1}$

The relationship between the braking rate $\dfrac{TR}{PR}$ and control line pressure for the laden and unladen condition is determined as follows:
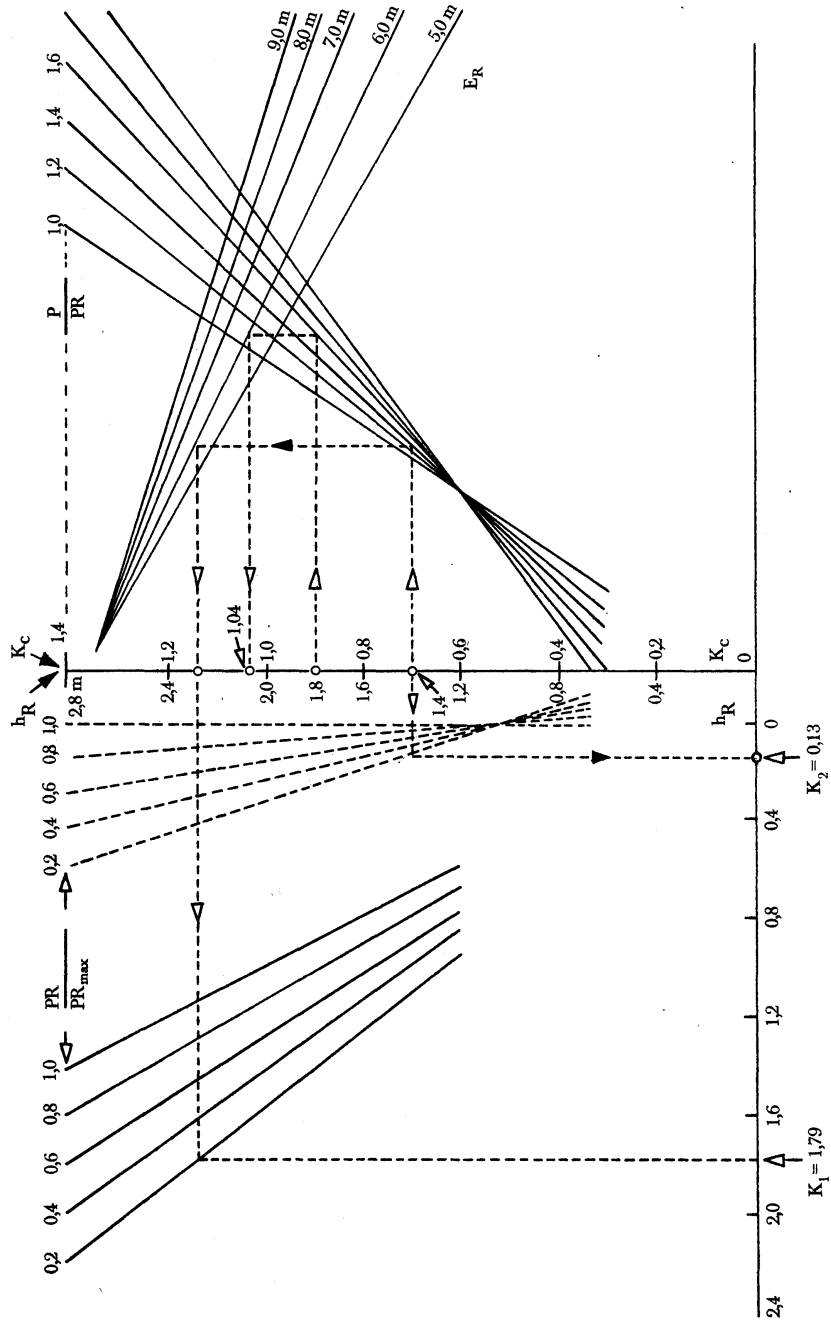
The factors K_c (laden), K_v (unladen) are obtained by reference to diagram 4 B.

Construct the laden and unladen bands by multiplying the upper and lower boundaries of the band in diagram 4 A shown below by the two factors obtained, K_c and K_v respectively.

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DIAGRAM 4 B

(see item 4)

▼<u>B</u>

Explanatory note on the use of diagram 4B

1.   Formula from which Diagram 4 B is derived is:

$$K = \left[1 \cdot 7 - \frac{0 \cdot 7 \, PR}{PR_{max}} \right] \left[1 \cdot 35 - \frac{0 \cdot 96}{E_R} \left(1 \cdot 0 + (h_R - 1 \cdot 2) \frac{P}{PR} \right) \right] -$$

$$\left[1 \cdot 0 - \frac{PR}{PR_{max}} \right] \left[\frac{h_R - 1 \cdot 0}{2 \cdot 5} \right]$$

2.   Description of the method of use by means of a worked example.

2.1.   The dashed lines shown on Diagram 4B refer to the determination of the factors K_c and K_v for the following vehicle where:
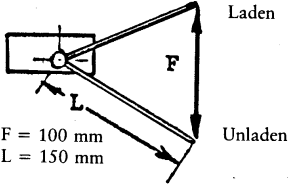
	Laden	Unladen
P	24 t	4·2 t
PR	15 t	3 t
PR_{max}	15 t	15 t
h_R	1·8 m	1·4 m
E_R	6·0 m	6·0 m

In the following items the figures in parenthesis relate only to the vehicle being used for the purpose of illustrating the method of use of Diagram 4B.

2.2.   Calculate the ratios

(a) $\left[\dfrac{P}{PR} \right]$ laden (= 1·6)

(b) $\left[\dfrac{P}{PR} \right]$ unladen (= 1·4)

(c) $\left[\dfrac{PR}{PR_{max}} \right]$ unladen (= 0·2)

2.3.   Determination of the laden factor, K_c

(a) Start at appropriate h_R (h_R = 1·8 m)

(b) Move horizontally to the appropriate P/PR line (P/PR = 1·6)

(c) Move vertically to appropriate E_R line (E_R = 6·0) m

(d) Move horizontally to K_c scale, K_c is the laden factor required (K_c = 1·04).

2.4.   Determination of the unladen factor, K_v.

2.4.1.   Determination of the factor K_2

(a) Start at appropriate h_R (h_R = 1·4) m

(b) Move horizontally to appropriate PR/PR_{max} line in group of curves nearest to vertical axis (PR/PR_{max} = 0·2)

(c) Move vertically to horizontal axis and read off the value of K_2 (K_2 = 0·13 m).

2.4.2.   Determination of factor K_1

(a) Start at appropriate h_R (h_R = 1·4 m)

(b) Move horizontally to the appropriate P/PR line (P/PR = 1·4)

(c) Move vertically to the appropriate E_R line (E_R = 6·0 m)

(d) Move horizontally to the appropriate PR/PR_{max} line in group of curves furthest from the vertical axis.

(PR/PR_{max} = 0·2)

(e) Move vertically to horizontal axis and read off the value of K_1 (K_1 = 1·79).

2.4.3.   Determination of factor K_v

The unladen factor K_v is obtained from the following expression:
$K_v = K_1 - K_2$ (K_v = 1·66).

▼__M1__

DIAGRAM 5

BRAKE LOAD SENSING DEVICE

(see item 7.4)

Control data	Vehicle loading	Axle No 2 —load at the ground (kg)	Inlet pressure (bar)	Nominal outlet pressure (bar)
Laden F L F = 100 mm L = 150 mm Unladen	Laden	10 000	6	6
	Unladen	1 500	6	2·4
	....	....	....	....
	....	....	....	....

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ANNEX IX

MODEL COMMUNICATION CONCERNING THE EEC TYPE-APPROVAL OF A VEHICLE WITH REGARD TO BRAKING

After item 17, the following new items 17 (a) and 17 (a) 1 shall be added:

17 (a)   Distribution of braking among the axles of a vehicle.

17 (a) 1. Does the vehicle fulfil the requirements contained in the Appendix (see item 1.1.4.2) … yes/no (^{4}).