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# COMMISSION DIRECTIVE

**of 15 July 1991**

**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**

(91/422/EEC)

(OJ L 233, 22.8.1991, p. 21)

Corrected by:

►**C1** Corrigendum, OJ L 275, 2.10.1991, p. 36 (91/422/EEC)

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# COMMISSION DIRECTIVE

## of 15 July 1991

## 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

(91/422/EEC)

THE COMMISSION OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community,

Having regard to Council Directive 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 [1], as last amended by Commission Directive 88/194/EEC [2], and in particular Article 5 thereof,

Whereas in the light of the progress made in braking technology, it is now possible to make the requirements more stringent and, in particular, to make it compulsory to fit certain heavy vehicles and trailers with automatic brake lining adjusters with a view to increasing road safety;

Whereas the provisions of this Directive are in accordance with the opinion of the Committee for the Adaptation to Technical Progress of the Directives on Motor Vehicles,

HAS ADOPTED THIS DIRECTIVE:

*Article 1*

Annexes I, II, III, IV, V, VII, IX, X and XII to Directive 71/320/EEC are hereby amended in accordance with the Annex to this Directive.

*Article 2*

1. As from 1 October 1991 no Member State may, on grounds relating to braking devices:

— refuse, in respect of a type of vehicle, to grant EEC type-approval, or to issue the copy of the certificate provided for in the last indent of Article 10 (1) of Council Directive 70/156/EEC [3], or to grant national type-approval, or

— prohibit the entry into service of vehicles,

where the braking devices of such type of vehicle or of such vehicles comply with the provisions of Directive 71/320/EEC, as last amended by this Directive.

2. As from 1 October 1992 Member States:

— shall no longer issue the copy of the certificate provided for in the last indent of Article 10 (1) of Directive 70/156/EEC in respect of a type of vehicle of which the braking devices do not comply with the provisions of Directive 71/320/EEC, as last amended by this Directive,

— may refuse to grant national type-approval of a type of vehicle of which the braking devices do not comply with the provisions of Directive 71/320/EEC, as last amended by this Directive.

3. As from 1 October 1994 Member States may prohibit the entry into service of vehicles of which the braking devices do not comply with the provisions of Directive 71/320/EEC, as last amended by this Directive.

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(1) OJ No L 202, 6. 9. 1971, p. 37.
(2) OJ No L 92, 9. 4. 1988, p. 47.
(3) OJ No L 42, 23. 2. 1970, p. 1.

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*Article 3*

Member States shall bring into force the provisions necessary in order to comply with this Directive before 1 October 1991. They shall immediately inform the Commission thereof.

When Member States adopt these provisions these shall contain a reference to this Directive or shall be accompanied by such reference at the time of their official publication. The procedure for such a reference shall be adopted by Member States.

*Article 4*

This Directive is addressed to the Member States.

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*ANNEX*

**AMENDMENTS TO THE ANNEXES TO DIRECTIVE 71/320/EEC, AS AMENDED BY DIRECTIVES 74/132/EEC, 75/524/EEC, 79/489/EEC, 85/647/EEC AND 88/194/EEC**

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

Item 1.16.3 shall read:

‘1.16.3 *Centre-axle trailer*

“Centre-axle trailer” means a towed vehicle equipped with a towing device which cannot move vertically (in relation to the trailer), and in which the axle(s) is (are) positioned close to the centre of gravity of the vehicle (when uniformly loaded) such that only a small static vertical load, not exceeding 10 % of that corresponding to the maximum mass of the trailer or load of 1 000 daN (whichever is the lesser) is transmitted to the drawing vehicle.’ (remainder unchanged)

Item 2.1.2.3, add at the end:

‘The trailer air brake and the parking brake of the drawing vehicle may be operated simultaneously, provided that the driver is able to check, at any time, that the parking brake performance of the vehicle combination, obtained by the purely mechanical action of the parking brake device, is sufficient.’

Item 2.2.1.5.2 shall read: (only English text amended)

‘2.2.1.5.2 Furthermore, storage devices located …’ (remainder unchanged).

Item 2.2.1.8 shall read:

‘2.2.1.8 The action of the service braking device must be appropriately distributed among the axles. In the case of vehicles with more than two axles, in order to avoid wheel-locking or glazing of the brake linings, the brake force on certain axles may be reduced to zero automatically when carrying a much reduced load, provided that the vehicle meets all the performance requirements prescribed in Annex II.’

After item 2.2.1.11, the following new items 2.2.1.11.1 and 2.2.1.11.2 shall be added:

‘2.2.1.11.1 Wear adjustment shall be automatic for the service brakes. However, the fitting of automatic adjustment devices is optional for off-road vehicles of categories $N_2$ and $N_3$, and for rear brakes of vehicles of categories $M_1$ and $N_1$. Automatic wear adjustment devices shall be such that after heating followed by cooling of the brakes, effective braking is still ensured. In particular, the vehicle shall remain capable of normal running after the tests conducted in accordance with Annex II, item 1.3 (Type I test) and Annex II, item 1.4 (Type II test).

2.2.1.11.2 It shall be possible to easily check this wear on service brake linings, from the outside or underside of the vehicle, utilizing only the tools or equipment normally supplied with the vehicle; for instance, by the provision of appropriate inspection holes or by some other means. Alternatively, acoustical or optical devices warning the driver at his driving position when lining replacement is necessary are acceptable. The removal of front and/or rear wheels is permitted for this purpose on category $M_1$ and $N_1$ vehicles only.’

After item 2.2.1.12.2, the following new item 2.2.1.12.3 shall be added:

‘2.2.1.12.3 the type of fluid to be used in the hydraulic transmission braking devices shall be identified in accordance with ISO Standard 9128-1987. The relevant symbol according to figure 1 or 2 must be affixed in a visible position in indelible form within 100 mm of the filling ports of the fluid reservoirs; additional information may be provided by the manufacturers.’

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Item 2.2.1.18.3 shall read:

‘2.2.1.18.3 in the case of a break or leak in one of the air supply pipes (or in such other type of connection as may be adopted), it must nevertheless be possible for the driver to fully or partially actuate the trailer brakes, by means either of the service braking control or of the secondary braking control or of the parking braking control, unless the break or leak automatically causes the trailer to be braked with the performance prescribed in item 2.2.3 of Annex II;’

Items 2.2.1.18.4.1 and 2.2.1.18.4.2 shall read:

‘2.2.1.18.4.1 when the designated brake control of the controls mentioned in item 2.2.1.18.3 above is fully actuated, the pressure in the supply line must fall to 1,5 bar within the following two seconds;

2.2.1.18.4.2 when the supply line is evacuated at the rate of at least 1 bar/s, the automatic braking of the trailer must start to operate before the pressure in the supply line falls to 2 bar.’

After item 2.2.1.23, the following new item 2.2.1.24 shall be added:

‘2.2.1.24 In the case of a motor vehicle authorized to draw a trailer of category $O_3$ or $O_4$, the service braking device of the trailer may only be operated in conjunction with the service, secondary or parking braking device of the drawing vehicle.’

After item 2.2.2.8, the following new items 2.2.2.8.1 and 2.2.2.8.2 shall be added:

‘2.2.2.8.1 Wear adjustment shall be automatic for the service brakes. However, the fitting of automatic adjustment devices is optional for vehicles of categories $O_1$ and $O_2$. Automatic wear adjustment devices shall be such that after heating followed by cooling of the brakes, effective braking is still ensured.

In particular, the vehicle shall remain capable of normal running after the tests conducted in accordance with Annex II, item 1.3 (Type I test) and Annex II, item 1.4 (Type II test).

2.2.2.8.2 It shall be possible to easily check this wear on service brake linings, from the outside or underside of the vehicle, utilizing only the tools or equipment normally supplied with the vehicle; for instance, by the provision of appropriate inspection holes or by some other means.’

Item 2.2.2.9, delete the words ‘single-axled’ in the third line and substitute ‘separation’ for ‘breakage’ and ‘separates’ for ‘breaks’ in this item.

Item 2.2.2.11 shall read:

‘2.2.2.11 If the trailer is fitted with a device enabling compressed-air actuation of the braking device, other than the parking braking device, to be cut out, the first-mentioned device must be so designed and constructed that it is positively restored to the “at rest” position not later than on the resumption of the supply of compressed air to the trailer.’

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

Item 1.1.1 shall read:

‘1.1.1 The performance prescribed for braking devices shall be based on the stopping distance and/or the mean fully developed deceleration. The performance of a braking device shall be determined by measuring the stopping distance in relation to the initial speed of the vehicle and/or by measuring the mean fully developed deceleration during the test.’

Item 1.1.3.7, add at the end:

‘Wheel-locking is permitted where specifically mentioned.’

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Item 1.2.1.2.3, add at the end:

'the vehicle must satisfy both the prescribed stopping distance and the prescribed mean fully developed deceleration for the relevant vehicle category, but it may not be necessary to actually measure both parameters;'

After item 1.2.3.1, the following new item 1.2.3.2 shall be added:

'1.2.3.2 Further tests shall be carried out with the engine connected, from the speed prescribed for the category to which the vehicle belongs. The minimum performance prescribed for each category must be attained. Tractive units for semi-trailers, artificially loaded to simulate the effects of a laden semi-trailer, shall not be tested beyond 80 km/h.'

Item 1.3.1.3 shall read:

'1.3.1.3 In these tests, the force applied to the control must be so adjusted as to attain a mean fully developed deceleration of 3 $m/s^2$ at the first application of the brakes. This force must remain constant throughout the succeeding brake applications.'

Item 1.3.3 shall read:

'1.3.3 Hot performance

1.3.3.1 At the end of the Type I test … the hot performance of the service braking device … For motor vehicles, this hot performance … However, in the case of trailers, the hot brake force … (remainder unchanged).

1.3.3.2 In the case of a motor vehicle which satisfies the 60 % requirement specified in item 1.3.3.1 above, but which cannot comply with the 80 % requirement specified in item 1.3.3.1 above, a further hot performance test may be carried out using a control force not exceeding that specified in item 2.1.1.1 of this Annex. The results of both tests shall be entered in the report.'

Item 1.4.3 shall read:

'1.4.3 At the end of the test, the hot performance of the service braking device …

For motor vehicles, this hot performance must 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:

category $M_3$: $s = 0,15\ V + \frac{1,33\ V^2}{130}$ (the second term corresponding to a mean fully developed deceleration of 3,75 $m/s^2$);

category $N_3$: $s = 0,15\ V + \frac{1,33\ V^2}{115}$ (the second term corresponding to a mean fully developed deceleration of 3,3 $m/s^2$).

However, in the case of trailers the hot brake force at the periphery of the wheels … (remainder unchanged).'

Item 2.1.1.1.1 shall read:

'2.1.1.1.1 The service brakes of vehicles of cateogries M and N shall be tested under the conditions shown in the following table:

| | Type of test | $M_1$ | $M_2$ | $M_3$ | $N_1$ | $N_2$ | $N_3$ |
|---|---|---|---|---|---|---|---|
| | | O-I | O-I | O-I-II | O-I | O-I | O-I-II |
| Type O test with engine disconnected | V | 80 km/h | 60 km/h | 60 km/h | 80 km/h | 60 km/h | 60 km/h |
| | $s \leq$ | $0,1\ V + \frac{V^2}{150}$ | $0,15\ V + \frac{V^2}{130}$ | | | | |
| | $d_m \geq$ | 5,8 $m/s^2$ | 5 $m/s^2$ | | | | |

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| | Type of test | $M_1$ | $M_2$ | $M_3$ | $N_1$ | $N_2$ | $N_3$ |
|---|---|---|---|---|---|---|---|
| | | O-I | O-I | O-I-II | O-I | O-I | O-I-II |
| Type O test with engine connected | V = 80 % max but ≤ | 160 km/h | 100 km/h | 90 km/h | 120 km/h | 100 km/h | 90 km/h |
| | $s \leq$ | $0,1\ V + \frac{V^2}{130}$ | $0,15\ V + \frac{V^2}{103,5}$ | | | | |
| ▼C1 | $d_m$ | 5 m/s² | 5 m/s² | | | | |
| ▼B | F ≤ | 500 N | 700 N | | | | |

where:

V = test speed

s = stopping distance

$d_m$ = mean fully developed deceleration

f = force applied to foot control

$V_{max}$ = maximum speed of the vehicle'

Item 2.1.2.1 shall read:

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

category $M_1$: $s = 0,1\ V + \frac{2\ V^2}{150}$ (the second term corresponding to a mean fully developed deceleration of 2,9 m/s²);

category $M_2$, $M_3$: $s = 0,15\ V + \frac{2\ V^2}{130}$ (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).'

After item 2.1.2.4, the following new item 2.1.2.5 shall be added:

'2.1.2.5 The secondary braking effectiveness test shall be conducted by simulating the actual failure conditions in the service braking system.'

Item 2.1.4.1 shall read:

'2.1.4.1 The residual performance of the service braking device, in the event of failure in a part of its transmission, must 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 O test with the engine disconnected from the following initial speeds for the relevant vehicle category:

**Stopping distance (m) and mean fully developed deceleration (m/s²)**

(remaining table is unchanged).'

After item 2.1.4.1, the following new item 2.1.4.2 shall be added:

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

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Item 2.2.1.2.1 shall read: (amendment refers only to English text)

‘2.2.1.2.1 If the service braking device is of the ocntinuous or semi-continuous type, the sum of the forces exerted at the periphery of the braked wheels … (remainder unchanged).’

After item 2.2.2.1, the following new item 2.2.3 shall be added:

‘2.2.3 *Automatic braking*

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, must not be less than 13,5 % of the force corresponding to the maximum mass borne by the wheels when the vehicle is stationary. Wheel-locking at performance levels above 13,5 % is permitted.’

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*APPENDIX TO ANNEX II:* **DISTRIBUTION OF BRAKING EFFORT AMONG VEHICLE AXLES (75/524/EEC)**

Item 3.1.2 shall read:

‘3.1.2 In the case of a motor vehicle authorised to draw trailers of category $O_3$ or $O_4$ fitted with compressed air brake systems, when tested with the energy source stopped, the supply line blocked off and a reservoir of 0,5 litre capacity connected to the control line, and the system at cut-in and cut-out pressures, the pressure at full application of the braking control must be between 6,5 and 8,5 bar at the coupling heads of the supply line and the control line, irrespective of the load conditions of the vehicle. These pressures must be demonstrably present in the drawing vehicle when uncoupled from the trailer. The compatibility bands in diagrams 2, 3 and 4A should not be extended beyond 7,5 bar.’

Item 3.1.4.1 shall read:

‘3.1.4.1 In the case of a motor vehicle authorized to draw trailers of category $O_3$ or $O_4$ fitted with compressed air braking systems, the permissible relationship between the braking rate $\frac{TM}{PM}$ and the pressure $p_m$ shall be within the areas shown in diagram 2.’

After item 5.1.2, the following new item 5.1.3 shall be added:

‘5.1.3. The permissible relationship between the braking rate $\frac{TR}{PR}$ and the pressure $p_m$ shall lie within the designated areas in diagram 2 for the laden and undladen stated of load.’

Item 7.3 shall read: ‘Item 18.2 of Annex IX must include …’ (rest inchanged).

Item 8.2 shall read:

‘8.2 The pressure test connections shall comply with clause 4 of ISO Standard 3583-1984.’

Add to the footnote of diagram 4A the following new first sentence:

‘It is understood that, between the values $\frac{TR}{PR} = O$ and $\frac{TR}{PR} = 0,1$, it is not necessary that there should be proportionality between braking rate $\frac{TR}{PR}$ and the control line pressure as measured at the coupling head.’

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*ANNEX III:* **METHOD OF MEASURING THE RESPONSE TIME FOR VEHICLES FITTED WITH COMPRESSED AIR BRAKING DEVICES**

Item 1.1, add at the end:

‘For vehicles equiped with load-sensing valves, these devices must be set in the laden position.’

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After item 2.6, the following new item 2.7 shall be added:

‘2.7 In the case of motor vehicles authorized to draw trailers of category $O_3$ or $O_4$ fitted with compressed air braking systems, in addition to the above mentioned requirements, the prescriptions in item 2.2.1.18.4.1 of Annex I shall be verified by conducting the following test:

(a) by measuring the pressure at the extremity of a pipe 2,5 m long with an internal diameter of 13 mm which shall be joined to the coupling head of the supply line;

(b) by simulating a failure of the control line at the coupling head;

(c) by actuating the service braking control device in 0,2 seconds, as described in item 2.3 above.’

Item 4.2 shall read:

‘4.2. The pressure test connections shall comply with clause 4 of ISO Standard 3583-1984.’

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*ANNEX IV:* **ENERGY RESERVOIRS AND SOURCES OF ENERGY**

A. *COMPRESSED AIR BRAKING SYSTEMS*

Item 1.3.1 shall read:

‘1.3.1 Reservoirs fitted to trailers must be such that after eight full stroke actuations of the drawing vehicle's service braking device, the pressure supplied to the operating parts using it does not fall below a level equivalent to one-half the figure obtained at the first brake application and without actuating either the automatic or the parking braking device of the trailer.’.

Item 1.3.2.1 shall read:

‘1.3.2.1 The pressure in the reservoirs at the beginning of the test shall be 8,5 bar;’

Item 3.2 shall read:

‘3.2 The pressure test connections shall comply with clause 4 of ISO Standard 3583-1984.’

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*ANNEX V:* **SPRING BRAKES**

Item 2.3, add the following new sentences between the current third and fourth sentences:

‘In any case during re-charging of the braking system from zero pressure, the spring brakes must not release until the pressure in the service braking system is sufficient to ensure at least the prescribed secondary braking performance of the laden vehicle, using the service brake control.’

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*ANNEX VII:* **CASES IN WHICH TYPE I AND/OR II (OR IIA) TESTS DO NOT HAVE TO BE CARRIED OUT ON A VEHICLE SUBMITTED FOR TYPE APPROVAL**

In all the following items change the word ‘residual’ to the word ‘hot’.

Appendix 1:

items 3.1.2, 3.2.1, 3.5.1.1, 3.5.2.4, 3.5.3.4 and 4.3.7;

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Appendix 2:

item 2 (table)

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*ANNEX IX:* **COMMUNICATION CONCERNING THE TYPE APPROVAL OF A VEHICLE WITH REGARD TO BRAKING**

Item 7 shall read:

‘7. Distribution of the mass on each axle (maximum value) …’.

Item 8 shall read:

‘8. Make and type of brake linings …

8.1. Alternative brake linings …

8.1.1. Approval test method: vehicle tests/Annex XII/other (4) …’.

Item 9.4.3. shall read:

‘9.4.3. centre axle trailer: indicate also the …’

After item 9.4.4. the following new item 9.4.5. shall be added:

‘9.4.5. trailer category o: braked/unbraked (4)’

After item 9.5. the following new item 9.6. shall be added:

‘9.6. vehicle is/is not (4) equipped to tow a trailer with anti-lock devices.’

Item 13 shall read:

‘13. Mass of vehicle at …’.

Item 14.2. shall read:

‘14.2. Type O test
engine connected
service braking
in accordance with Annex II
paragraph 2.1.1.1.1…’.

3rd column of table shall read: ‘Measured force applied to the control (N).’

Item 14.5. shall read:

‘14.5. Braking device(s) used during the Type II/II A (4) test’.

Item 14.6. shall read:

‘14.6. Response time and …

14.6.1. Response time at …

14.6.2. Response time at …’

Item 14.7.2. shall read:

‘14.7.2.

| | Vehicle axles | | | Reference axles | | |
|---|---|---|---|---|---|---|
| | Mass per axle (*) | Required braking force to the wheels | Speed | Mass per axle (*) | Actual braking force developed at the wheels | Speed |
| | kg | N | km/h | kg | N | km/h |
| Axle 1 | | | | | | |
| Axle 2 | | | | | | |
| Axle 3 | | | | | | |
| Axle 4 | | | | | | |

(*) This is the technically permissible maximum mass per axle.’

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'14.7.3. shall read:

'14.7.3.

| | |
|---|---|
| Maximum mass of the vehicle presented for type approval | ... kg |
| Required braking force to the wheels | ... N |
| Required retarding torque on the main shaft of the brake | ... Nm |
| Retarding torque obtained on the main shaft of the brake (according to diagram)' | ... Nm |

Item 14.7.4. In the table, references to 'residual' shall read 'hot'.

After item 19.2. the following new items 20 and 21 shall be added:

'20. Automatic braking on trailers with compressed air brakaing system

20.1. Braking rate achieved …

21. Trailers with electrical braking systems

21.1. Does the vehicle fulfill the requirements contained in Annex XI: yes/no ([4]).

21.2. Braking rate achieved …'

Items 20 to 27 shall be renumbered as items 22 to 29.

The footnote shall read:

'([1]) In the case of a semi-trailer, indicate here the mass corrsponding to the load on the fifth wheel.'

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*ANNEX X:* **REQUIREMENTS APPLICABLE TO TESTS FOR VEHICLES EQUIPPED WITH ANTI-LOCK DEVICES**

Item 6.1.2 shall read:

'6.1.2 The initial energy level … equivalent to a pressure of 8,5 bar at the coupling head of the trailer's supply line.' (remainder unchanged).

Item 6.1.5 shall read:

'6.1.5 At the end of the braking, with the vehicle stationary, the service braking control shall be fully actuated once. During this application, the pressure in the operating circuits must be sufficient to provide a total braking force at the periphery of the wheels equal to not less than 22,5 % of the force corresponding to the maximum mass borne by the wheels when the vehicle is stationary and without causing an automatic application of any braking system not being under the control of the anti-lock device.'

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*ANNEX XII:* **INERTIA DYNAMOMETER TEST METHOD FOR BRAKE LININGS**

In items 4.4.3, 4.4.3.1, 4.4.3.2, 4.5.3, 4.5.3.1 and 4.5.3.2 change the word 'residual' to the word 'hot'.