

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States relating to the braking devices of certain categories of motor vehicles and of their trailers (71/320/EEC) (repealed)

- Article 1 (1) For the purposes of this Directive, ‘ vehicle ’ ...
Article 2 No Member State may refuse to grant EEC type-approval or...
Article 2a No Member State may refuse or prohibit the sale, registration,...
Article 3 The Member State which has granted type approval shall take...
Article 4 Pending the entry into force of a separate Directive on...
Article 5 The amendments necessary for adjusting the requirements of the Annexes...
Article 6 (1) Member States shall put into force the provisions containing...
Article 7 This Directive is addressed to the Member States.

ANNEX I

Definitions, construction and fitting requirements, application for EC type-approval, granting of EC type-approval, modifications of type and amendments to approvals, conformity of production

1. DEFINITIONS

- 1.1. ‘ Type of vehicle with respect to the braking equipment...’
1.1.1. In the case of motor vehicles
1.1.1.1. the vehicle category, as defined in Article 1 of this...
1.1.1.2. the maximum mass, as defined in point 1.1.4
1.1.1.3. the distribution of mass among the axles
1.1.1.4. the maximum design speed
1.1.1.5. a different type of braking equipment with particular reference to...
1.1.1.6. the number and arrangement of the axles
1.1.1.7. the engine type
1.1.1.8. the number and ratios of gears
1.1.1.9. ratio(s) of rear drive axle(s)
1.1.1.10 the tyre dimensions
1.1.2. In the case of trailers
1.1.2.1. the vehicle category, as defined in Article 1 of this...
1.1.2.2. the maximum mass, as defined in point 1.1.4
1.1.2.3. the distribution of mass among the axles
1.1.2.4. a different type of braking equipment
1.1.2.5. the number and arrangement of the axles
1.1.2.6. the tyre dimensions.
1.2. ‘ Braking system ’
1.3. ‘ Graduated braking ’
1.4. ‘ Control ’
1.5. ‘ Transmission ’
1.6. ‘ Brake ’ means the part in which the forces...
1.7. ‘ Different types of braking equipment ’

- 1.7.1. components having different characteristics
 - 1.7.2. a component made of materials having different characteristics or a...
 - 1.7.3. a different assembly of the components.
 - 1.8. 'Braking system component'
 - 1.9. 'Continuous braking'
 - 1.9.1. a single control which the driver actuates progressively, by a...
 - 1.9.2. the energy used for braking the vehicles constituting the combination...
 - 1.9.3. the braking installation ensures simultaneous or suitably phased braking of...
 - 1.10. 'Semi-continuous braking'
 - 1.10.1. a single control which the driver can actuate progressively, by...
 - 1.10.2. the energy used for braking the vehicles constituting the combination...
 - 1.10.3. the braking installation ensures simultaneous or suitably phased braking of...
 - 1.11. 'Automatic braking'
 - 1.12. 'Inertia or "overrun" braking'
 - 1.13. 'Laden vehicle'
 - 1.14. 'Maximum mass'
 - 1.14.1. 'The distribution of mass among the axles
 - 1.14.2. 'Wheel/axle load'
 - 1.14.3. 'Maximum stationary wheel/axle load'
 - 1.15. 'Hydraulic braking system with stored energy'
 - 1.16. 'Category O 3 and O 4 trailer types'
 - 1.16.1. 'Semi-trailer'
 - 1.16.2. 'Full trailer'
 - 1.16.3. 'Centre-axle trailer'
 - 1.17. 'Retarder'
 - 1.17.1. 'Independent retarder'
 - 1.17.2. 'Integrated retarder'
 - 1.17.3. 'Combined retarder'
 - 1.18. 'Inter-urban motor-coach'
 - 1.19. 'Long-distance touring motor-coach'
 - 1.20. 'Anti-lock system'
2. CONSTRUCTION AND FITTING REQUIREMENTS
- 2.1. General
 - 2.1.1. Braking equipment
 - 2.1.1.1. The braking equipment shall be so designed, constructed and fitted...
 - 2.1.1.2. In particular, the braking equipment shall be so designed, constructed...
 - 2.1.1.3. Brake linings shall not contain asbestos
 - 2.1.2. Functions of the braking equipment
 - 2.1.2.1. Service braking system
 - 2.1.2.2. Secondary braking system
 - 2.1.2.3. Parking braking system
 - 2.1.3. Pneumatic connections between motor vehicles and trailers
 - 2.1.3.1. In the case of a braking system operated by compressed...
 - 2.2. Characteristics of braking systems
 - 2.2.1. Vehicles of categories M and N
 - 2.2.1.1. The set of braking systems with which a vehicle is...
 - 2.2.1.2. The equipment providing service, secondary and parking braking may have...

- 2.2.1.2.1 There shall be at least two controls, independent of each...
- 2.2.1.2.2 The control of the service braking system shall be independent...
- 2.2.1.2.3 Where the service and secondary braking systems have the same...
- 2.2.1.2.4 Where the service and secondary braking systems have the same...
- 2.2.1.2.5 In the event of a breakage of any component other...
- 2.2.1.2.6 In particular, where the secondary braking system and the service...
 - 2.2.1.2.6.1 Where the service braking system is actuated by the muscular...
 - 2.2.1.2.6.2 Where the forces for the service braking system and transmission...
- 2.2.1.2.7 Certain parts, such as the pedal and its bearing, the...
- 2.2.1.3. Where there are separate controls for the service and secondary...
- 2.2.1.4. In the event of failure in a part of the...
 - 2.2.1.4.1 A sufficient number of wheels shall still brake by actuation...
 - 2.2.1.4.2 These wheels shall be so selected that the residual performance...
 - 2.2.1.4.3 However, the above requirements shall not apply to towing vehicles...
- 2.2.1.5. Where use is made of energy other than the muscular...
 - 2.2.1.5.1 In the event of failure in any part of the...
 - 2.2.1.5.2 Furthermore, storage devices located down-circuit of this device are such...
 - 2.2.1.5.3 However, for hydraulic braking systems with stored energy, these provisions...
- 2.2.1.6. The requirements of points 2.2.1.2, 2.2.1.4 and 2.2.1.5 shall be...
- 2.2.1.7. The service braking system shall act on all the wheels...
- 2.2.1.8. The action of the service braking system shall be appropriately...
- 2.2.1.9. The action of the service braking system shall be distributed...
- 2.2.1.10. The service braking system and the parking braking system shall...
- 2.2.1.11. Wear of the brakes shall be easily compensated by means...
 - 2.2.1.11.1 Wear adjustment shall be automatic for the service brakes. However,...
 - 2.2.1.11.2 It shall be possible to easily check this ear on...
- 2.2.1.12. In hydraulic braking systems:
 - 2.2.1.12.1 The filling ports of the fluid reservoirs shall be readily...
 - 2.2.1.12.2 The failure of a part of a hydraulic transmission system...
 - 2.2.1.12.3 The type of fluid to be used in the hydraulic...
- 2.2.1.13. Any vehicle fitted with a service braking system actuated by...
 - 2.2.1.13.1 However, in the case of vehicles which are only considered...

- 2.2.1.13 This acoustic device may be rendered inoperative while the parking...
- 2.2.1.14 Without prejudice to the requirements of point 2.1.2.3, where the...
- 2.2.1.15 In the case of a motor vehicle to which the...
- 2.2.1.16 The auxiliary equipment shall be supplied with energy in such...
- 2.2.1.17 Where a trailer belongs to category O 3 or O...
- 2.2.1.18 In the case of a vehicle authorised to tow a...
- 2.2.1.18 When the secondary braking system of the towing vehicle is...
- 2.2.1.18 Should the service braking system of the towing vehicle fail,...
- 2.2.1.18 In the case of a fracture or leak in one...
- 2.2.1.18 In the case of a two-line air supply system, the...
- 2.2.1.18 When the designated brake control of the controls mentioned in...
- 2.2.1.18 When the supply line is evacuated at the rate of...
- 2.2.1.19 The following vehicle types shall satisfy the Type IIA test...
- 2.2.1.20 In the case of a motor vehicle equipped to tow...
- 2.2.1.20 The power supply (generator and battery) of the motor vehicle...
- 2.2.1.20 In the event of a failure in the towing vehicle's...
- 2.2.1.20 The use of the stop-light switch and circuit for actuating...
- 2.2.1.21 In the case of a pneumatic service braking system comprising...
- 2.2.1.22 Motor vehicles of categories M 2 , M 3 ,...
- 2.2.1.23 If motor vehicles not mentioned in point 2.2.1.22 are fitted...
- 2.2.1.24 In the case of a motor vehicle authorised to tow...
- 2.2.1.25 Motor vehicles authorised to tow a trailer equipped with an...
- 2.2.1.26 Motor vehicles of category M 1 may be equipped with...
- 2.2.2. Vehicles of category O
- 2.2.2.1. Trailers of category O 1 need not be fitted with...
- 2.2.2.2. Every trailer of category O 2 shall be fitted with...
- 2.2.2.3. Every trailer of category O 3 or O 4 shall...
- 2.2.2.4. The service braking system shall act on all the wheels...
- 2.2.2.5. The action of the service braking system shall be suitably...
- 2.2.2.6. The action of every braking system shall be distributed between...
- 2.2.2.7. The braking surfaces required to attain the prescribed degree of...
- 2.2.2.8. Wear of the brakes shall be easily compensated by a...
- 2.2.2.8. Wear adjustment shall be automatic for the service brakes. However,...
- 2.2.2.8. It shall be possible to easily check the wear on...
- 2.2.2.9. The braking systems shall be such that the trailer is...
- 2.2.2.10 On every trailer which is required to be fitted with...
- 2.2.2.11 If the trailer is fitted with a device enabling compressed-air...
- 2.2.2.12 Trailers of categories O 3 and O 4 fitted with...
- 2.2.2.13 Trailers of categories O 3 and O 4 shall be...
- 2.2.2.14 If trailers not mentioned in point 2.2.2.13 are fitted with...

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- 2.2.2.15 The auxiliary equipment shall be supplied with energy in such...
- 2.2.2.15 In the event of a break or leak from the...
- 2.3. Brake linings and brake lining assemblies
 - 2.3.1. Brake lining assemblies used to replace components at the end...
 - 2.3.2. However, where the brake lining assemblies are of a type...
 - 2.3.2.1. Marking
 - 2.3.2.2. Packaging
 - 2.3.3. Brake lining assemblies supplied to vehicle manufacturers exclusively for use...
 - 2.3.4. The vehicle manufacturer shall provide to the technical service and/or...
- 3. APPLICATION FOR EC TYPE-APPROVAL
 - 3.1. The application for EC type-approval, pursuant to Article 3(4) of...
 - 3.2. A model for the information document is given in Annex...
 - 3.3. A vehicle representative of the vehicle-type to be approved shall...
- 4. GRANTING OF EC TYPE-APPROVAL
 - 4.1. If the relevant documents are complied with, EC type-approval pursuant...
 - 4.2. A model for the type-approval certificate is given in Annex...
 - 4.3. An approval number in accordance with Annex VII to Directive...
- 5. MODIFICATIONS OF THE TYPE-AND AMENDMENTS TO APPROVALS
 - 5.1. In the case of modifications of the type approved pursuant...
- 6. CONFORMITY OF PRODUCTION
 - 6.1. Measures to ensure the conformity of production shall be taken...

ANNEX II

Braking Tests and performance of braking systems

- 1. BRAKING TESTS
 - 1.1. General
 - 1.1.1. The performance prescribed for braking systems shall be based on...
 - 1.1.2. The stopping distance shall be the distance covered by the...
 - 1.1.3. For the type-approval of any vehicle, the braking performance shall...
 - 1.1.3.1. The vehicle's condition as regards mass shall be as prescribed...
 - 1.1.3.2. The test shall be carried out at the speeds prescribed...
 - 1.1.3.3. During the tests, the force applied to the control of...
 - 1.1.3.4. Without prejudice to the requirements contained in point 1.1.4.2, the...
 - 1.1.3.5. The tests shall be performed when there is no wind...
 - 1.1.3.6. At the start of the tests the tyres shall be...
 - 1.1.3.7. The prescribed performance shall be obtained without locking of the...
 - 1.1.4. Behaviour of the vehicle during braking
 - 1.1.4.1. In braking tests, and in particular in those at high...
 - 1.1.4.2. The braking behaviour of vehicles of categories M, N, O...
 - 1.2. Type O test (ordinary performance test with brakes cold)
 - 1.2.1. General
 - 1.2.1.1. The brakes shall be cold. A brake is deemed to...

- 1.2.1.2. The test shall be conducted in the following conditions:
 - 1.2.1.2.1. The vehicle shall be laden, the distribution of its mass...
 - 1.2.1.2.2. Every test shall be repeated on the unladen vehicle. In...
 - 1.2.1.2.3. The limits prescribed for minimum performance, both for tests with...
 - 1.2.1.2.4. The road shall be level.
 - 1.2.2. Type O test with engine disconnected
 - 1.2.2.1. The test shall be carried out at the speed prescribed...
 - 1.2.3. Type 0 test with engine connected
 - 1.2.3.1. Apart from the test prescribed in point 1.2.2, additional tests...
 - 1.2.3.2. Further tests shall be carried out with the engine connected,...
 - 1.2.4. Type 0 test for vehicle of category O equipped with...
 - 1.2.4.1. The braking performance of the trailer can be calculated either...
 - 1.2.4.2. With the exception of cases according to points 1.2.4.3 and...
 - 1.2.4.3. If a trailer has a continuous or semi-continuous braking system...
 - 1.2.4.4. Alternatively, the evaluation of the braking rate of the trailer...
 - 1.3. Type I test (fade test)
 - 1.3.1. With repeated braking
 - 1.3.1.1. The service braking system of all motor vehicles shall be...
 - 1.3.1.2. If the characteristics of the vehicle do not allow for...
 - 1.3.1.3. In these tests, the force applied to the control shall...
 - 1.3.1.4. During brake applications the highest gear ratio (excluding overdrive, etc.)...
 - 1.3.1.5. For regaining speed after braking, the gearbox shall be used...
 - 1.3.2. With continuous braking
 - 1.3.2.1. The service braking system of trailers of categories O 2...
 - 1.3.2.2. The test may be carried out on a level road,...
 - 1.3.3. Hot performance
 - 1.3.3.1. At the end of the Type I test (test described...
 - 1.3.3.2. In the case of a motor vehicle which satisfies the...
 - 1.4. Type II test (downhill behaviour test)
 - 1.4.1. Laden motor vehicles shall be tested in such a manner...
 - 1.4.2. For vehicles in which the energy is absorbed by the...
 - 1.4.3. At the end of the test, the hot performance of...
 - 1.5. Type IIA test
 - 1.5.1. Laden vehicles shall be tested in such a manner that...
 - 1.5.2. For vehicles in which the energy is absorbed by the...
 - 1.6. Type III test (Fade test for vehicles of category O...)
 - 1.6.1. Track test
 - 1.6.2. Hot performance
2. PERFORMANCE 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...
 - 2.1.1.1.2. In the case of a motor vehicle authorised to tow...
 - 2.1.2. Secondary braking systems

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- 2.1.2.1. The secondary braking system, even if the control which actuates...
- 2.1.2.2. If the secondary braking system control is a manual control,...
- 2.1.2.3. If the secondary braking systems control is a foot control,...
- 2.1.2.4. The performance of the secondary braking system shall be checked...
- 2.1.2.5. The secondary braking effectiveness test shall be conducted by simulating...
- 2.1.3. Parking braking systems
 - 2.1.3.1. The parking braking system shall, even if it is combined...
 - 2.1.3.2. On vehicles to which the coupling of a trailer is...
 - 2.1.3.3. If the control is a manual control, the force applied...
 - 2.1.3.4. If it is a foot control, the force exerted on...
 - 2.1.3.5. A parking braking system which has to be actuated several...
 - 2.1.3.6. To check compliance with the requirements of Annex I, point...
- 2.1.4. Residual service braking performance after transmission failure
 - 2.1.4.1. The residual performance of the service braking system, in the...
 - 2.1.4.2. The residual braking effectiveness test shall be conducted by simulating...
- 2.2. Vehicles of category O
 - 2.2.1. Service braking systems
 - 2.2.1.1. Requirement relating to tests of category O 1 vehicles
 - 2.2.1.1.1. Where the provision of a service braking system is mandatory,...
 - 2.2.1.2. Requirements relating to tests of category O 2 vehicles.
 - 2.2.1.2.1. If the service braking system is of the continuous or...
 - 2.2.1.2.2. Where the braking system is of the inertia type, it...
 - 2.2.1.2.3. In addition, these vehicles shall be subjected to the Type...
 - 2.2.1.2.4. In the Type I test of a semi-trailer, the mass...
 - 2.2.1.3. Requirements relating to the testing of category O 3 vehicles....
 - 2.2.1.3.1. The same requirements apply as to category O 2 vehicles....
 - 2.2.1.4. Requirements relating to tests of category O 4 vehicles.
 - 2.2.1.4.1. If the service braking system is of the continuous or...
 - 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...
 - 2.2.2. Parking braking systems
 - 2.2.2.1. The parking braking system with which the trailer or semi-trailer...
 - 2.2.3. Automatic braking systems
 - 2.2.3.1. The automatic braking performance in the event of a total...
- 2.3. Reaction time
 - 2.3.1. In an emergency manoeuvre, the time elapsing between the moment...
 - 2.3.2. In the case of vehicles fitted with compressed-air braking systems,...
 - 2.3.3. In the case of vehicles fitted with hydraulic braking systems,...

Appendix

(See point 1.1.4.2)

1. GENERAL REQUIREMENTS
2. SYMBOLS
3. REQUIREMENTS FOR MOTOR VEHICLES
 - 3.1. Two-axle vehicles
 - 3.1.1. For all categories of vehicles for k values between 0,2...
 - 3.1.2. In the case of a motor vehicle authorised to tow...
 - 3.1.2.1. When tested with the energy source stopped, the supply line...
 - 3.1.2.2. It shall be ensured that at the coupling head of...
 - 3.1.3. Verification of the requirements of point 3.1.1
 - 3.1.4. Towing vehicles other than tractive units for semi-trailers
 - 3.1.4.1. In the case of a motor vehicle authorised to tow...
 - 3.1.5. Tractive units for semi-trailers
 - 3.1.5.1. Tractive units with unladen semi-trailer
 - 3.1.5.2. Tractive units with laden semi-trailer
 - 3.1.5.3. In the case of a vehicle fitted with a compressed-air...
 - 3.2. Vehicles with more than two axles
4. REQUIREMENTS FOR SEMI-TRAILERS
 - 4.1. For semi-trailers fitted with compressed-air braking systems
 - 4.2. If the requirements of point 4.1 cannot be satisfied in...
5. REQUIREMENTS FOR FULL AND CENTRE-AXLE TRAILERS
 - 5.1. For full trailers fitted with compressed-air braking systems:
 - 5.1.1. The requirements set out in point 3.1 shall apply to...
 - 5.1.2. Full trailers with more than two axles shall be subject...
 - 5.1.3. The permissible relationship between the braking rate
 - 5.2. For centre-axle trailers fitted with compressed-air braking systems:
 - 5.2.1. the permissible relationship between the braking rate
 - 5.2.2. If the requirements of point 2.2.1.2.1 of Annex II cannot...
6. CONDITIONS TO BE FULFILLED IN THE CASE OF FAILURE OF...
7. MARKINGS
 - 7.1. Vehicles, other than those of category M 1 , which...
 - 7.1.1. When a load sensing device is controlled via the suspension...
 - 7.2. When the requirements of this Appendix are met by means...
 - 7.2.1. Technically permissible maximum axle load for the axle(s) which control(s)...
 - 7.2.2. Axle load(s) corresponding to the mass of the vehicle in...
 - 7.2.3. The axle load(s) approximating to the vehicle with proposed bodywork...
 - 7.2.4. The axle load(s) designated by the manufacturer to enable the...
 - 7.3. Point 1.7.2 of the addendum to the type-approval certificate (Appendix...
 - 7.4. The markings referred to under points 7.1 and 7.2 shall...
8. PRESSURE TEST CONNECTIONS
 - 8.1. Braking systems incorporating the devices referred to in point 7.2...

8.2. The pressure test connections shall comply with clause 4 of...

9. VEHICLE INSPECTION

Diagram 1A Vehicles of category M 1 and certain vehicles of category...(see point 3.1.1)

Diagram 1B Motor vehicles (other than those...

Diagram 1B Motor vehicles (other than those of categories M 1 and...(see point 3.1.1)

NB: The lower limit of the corridor...

NB:

Diagram 1C Vehicles of category N 1 (with certain exceptions from 1...(see point 3.1.1)

NB: The lower limit of the corridor...

NB:

Diagram 2 Towing vehicles and trailers (see points 3.1.4 and 5) NB:... (see points 3.1.4 and 5) NB: 1. It is understood...

NB:

1. It is understood that, between the values TM $PM = \dots$
2. The relationships required by the diagram apply progressively for intermediate...

Diagram 3 Tractive units for semi-trailers (see point 3.1.5) NB: 1. It...(see point 3.1.5)

NB: 1. It is understood that, between...

NB:

1. It is understood that, between the values TM $PM = \dots$
2. The relationships required by the diagram apply progressively for intermediate...

Diagram 4A Semi-trailers (see point 4) NB: 1. It is understood that,... (see point 4) NB:

1. It is understood that, between...

NB:

1. It is understood that, between the values TR $PR = \dots$
2. The relationship between the braking rate TR PR

Diagram(4B point 4)

Explanatory note on the use of diagram 4B

1. Formula from which diagram 4B is derived is:
2. Description of the method of use by means of a...
 - 2.1 The dashed lines shown on diagram 4B refer to the...
 - 2.2 Calculate the ratios:
 - 2.3. Determination of the laden factor K_c :
 - 2.4. Determination of the unladen factor K_v :
 - 2.4.1. Determination of the factor K_2
 - 2.4.2. Determination of factor K_1
 - 2.4.3. Determination of factor K_v

Diagram 5 Load sensing device (see point 7.4) ANNEX III Method of...(see point 7.4)

ANNEX III Method of measuring the reaction...

ANNEX III

Method of measuring the reaction time for vehicles with compressed-air braking systems

1. GENERAL REQUIREMENTS
 - 1.1. The reaction time for the braking system shall be determined...
 - 1.2. During the tests, the stroke of the brake cylinders of...
 - 1.3. The times determined in implementing the provisions of this Annex...
2. MOTOR VEHICLES
 - 2.1. At the start of each test, the pressure in the...
 - 2.2. Reaction times in terms of actuation time (t_f)...
 - 2.3. Reaction times corresponding to an actuation time of 0,2 seconds...
 - 2.4. In the case of the actuation time of 0,2 seconds,...
 - 2.5. In the case of motor vehicles having a brake coupling...
 - 2.6. The time which elapses between the start of the activation...
 - 2.7. In the case of motor vehicles authorised to tow trailers...
3. TRAILERS (including semi-trailers)
 - 3.1. The reaction times for trailers shall be measured without a...
 - 3.2. The pressure in the supply line shall be 6,5 bar...
 - 3.3. The simulator shall have the following features:
 - 3.3.1. It shall have a reservoir with a capacity of 30...
 - 3.3.2. The braking system control shall be so designed that its...
 - 3.3.3. The simulator shall be set, e.g. through the choice of...
 - 3.3.4. The diagram in the Appendix to this Annex gives an...
 - 3.4. The time elapsing between the moment when the pressure produced...
4. PRESSURE TEST CONNECTIONS
 - 4.1. On each independent circuit of the braking system a pressure...
 - 4.2. The pressure test connections shall comply with clause 4 of...

Appendix

EXAMPLE OF A SIMULATOR

1. Setting the simulator
2. Testing the trailer braking system via the simulator

ANNEX IV

Energy reservoirs and sources of energy

- A. Compressed-air braking systems
 1. CAPACITY OF RESERVOIRS
 - 1.1. General requirements
 - 1.1.1. Vehicles on which the operation of the braking system depends...
 - 1.1.2. However, the reservoirs shall not be required to be of...

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- 1.1.3. When verifying compliance with the requirements of points 1.2 and...
 - 1.2. Motor vehicles
 - 1.2.1. The air brake reservoirs of motor vehicles shall be so...
 - 1.2.2. During the test, the following requirements shall be satisfied:
 - 1.2.2.1. The initial pressure in the reservoirs shall be that indicated...
 - 1.2.2.2. The reservoir or reservoirs shall not be replenished; in addition,...
 - 1.2.2.3. In the case of motor vehicles authorised to tow a...
 - 1.3. Trailers (including semi-trailers)
 - 1.3.1. Reservoirs fitted to trailers shall be such that after eight...
 - 1.3.2. During the test, the following requirements shall be satisfied:
 - 1.3.2.1. The pressure in the reservoirs at the beginning of the...
 - 1.3.2.2. The supply line shall be blocked off; in addition, the...
 - 1.3.2.3. The reservoir shall not be replenished during the test.
 - 1.3.2.4. For each brake application, the pressure in the control line...
 2. CAPACITY OF ENERGY SOURCES
 - 2.1. General provisions
 - 2.2. Definitions
 - 2.2.1. p_1 the pressure corresponding to 65 % of the pressure...
 - 2.2.2. p_2 is the value specified by the manufacturer and...
 - 2.2.3. T_1 is the time required for the relative pressure...
 - 2.3. Conditions of measurement
 - 2.3.1. In all cases the speed of the compressor shall be...
 - 2.3.2. The auxiliary equipment reservoirs shall be isolated during the tests...
 - 2.3.3. On motor vehicles constructed to tow trailers, the trailer shall...
 - 2.4. Interpretation of results
 - 2.4.1. The time T_1 for the least efficient reservoir shall...
 - 2.4.2. The time T_2 for the least efficient reservoir shall...
 - 2.5. Additional test
 - 2.5.1. When the vehicle is equipped with an auxiliary equipment reservoir...
 - 2.5.2. The test shall be performed in the conditions prescribed in...
 - 2.6. Towing vehicles
 - 2.6.1. Vehicles to which the coupling of a category O vehicle...
 3. PRESSURE TEST CONNECTIONS
 - 3.1. A pressure test connection shall be fitted at the closest...
 - 3.2. The pressure test connections shall comply with clause 4 of...
- B. Vacuum braking systems
1. CAPACITY OF RESERVOIRS
 - 1.1. General
 - 1.1.1. Vehicles on which the operation of the braking system requires...
 - 1.1.2. However, the reservoirs shall not be required to be of...
 - 1.1.3. In verifying compliance with the requirements of points 1.2 and...
 - 1.2. Motor vehicles
 - 1.2.1. The reservoirs of motor vehicles shall be such that it...

- 1.2.1.1. after eight full-stroke actuations of the service braking system control...
 - 1.2.1.2. after four full-stroke actuations of the service braking system control...
 - 1.2.2. Testing shall be performed in conformity with the following requirements:...
 - 1.2.2.1. The initial energy level in the reservoir(s) shall be that...
 - 1.2.2.2. The reservoir(s) shall not be fed; in addition, any reservoir(s)...
 - 1.2.2.3. In the case of motor vehicles authorised to tow a...
 - 1.3. Trailers (category O 1 and O 2 only)
 - 1.3.1. The reservoir(s) with which trailers are equipped shall be such...
 - 1.3.2. Testing shall be performed in conformity with the following requirements:...
 - 1.3.2.1. The initial energy level in the reservoir(s) shall be that...
 - 1.3.2.2. The reservoir(s) shall not be fed; in addition, any reservoir(s)...
 - 2. CAPACITY OF ENERGY SOURCES
 - 2.1. General
 - 2.1.1. Starting from the ambient atmospheric pressure, the energy source shall...
 - 2.2. Conditions of measurement
 - 2.2.1. The speed of the vacuum source shall be:
 - 2.2.1.1. Where the vacuum source is the vehicle engine, the engine...
 - 2.2.1.2. where the vacuum source is a pump, the speed obtained...
 - 2.2.1.3. where the vacuum source is a pump and the engine...
 - 2.2.2. Where it is intended to couple to the motor vehicle...
- C. Hydraulic braking systems with stored energy
 - 1. CAPACITY OF STORAGE DEVICES (ENERGY ACCUMULATORS)
 - 1.1. General
 - 1.1.1. Vehicles on which the operation of the braking system requires...
 - 1.1.2. However, the energy storage devices shall not be required to...
 - 1.1.3. In verifying compliance with the requirements of points 1.2.1, 1.2.2...
 - 1.2. Motor vehicles
 - 1.2.1. Motor vehicles equipped with a hydraulic braking system with stored...
 - 1.2.1.1. After eight full-stroke actuations of the service braking system control,...
 - 1.2.1.2. Testing shall be performed in conformity with the following requirements:...
 - 1.2.1.2.1. Testing shall commence at a pressure that may be specified...
 - 1.2.1.2.2. The accumulator(s) shall not be fed; in addition, any accumulator(s)...

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- 1.2.2. Motor vehicles equipped with a hydraulic braking system with stored...
 - 1.2.2.1. After any single transmission failure it shall still be possible...
 - 1.2.2.2. Testing shall be performed in conformity with the following requirements:...
 - 1.2.2.2.1. with the energy source stationary or operating at a speed...
 - 1.2.2.2.2. The auxiliary equipment and its accumulators, if any, shall be...
- 2. CAPACITY OF HYDRAULIC FLUID ENERGY SOURCES
 - 2.1. The energy sources shall meet the requirements set out in...
 - 2.1.1. Definitions
 - 2.1.1.1. 'p 1 ' represents the maximum system operational pressure (cut-out...
 - 2.1.1.2. 'p 2 ' represents the pressure after four full-stroke actuations...
 - 2.1.1.3. 't' represents the time required for the pressure to rise...
 - 2.1.2. Conditions of measurement
 - 2.1.2.1. During the test to determine the time t, the feed...
 - 2.1.2.2. During the test to determine the time t, accumulator(s) for...
 - 2.1.3. Interpretation of results
 - 2.1.3.1. In the case of all vehicles except those of categories...
 - 2.1.3.2. In the case of vehicles of categories M 3 ,...
- 3. CHARACTERISTICS OF ALARM DEVICES

ANNEX V

Spring brakes

- 1. DEFINITIONS
 - 1.1. ' Spring brakes ' are braking devices for which the...
 - 1.1.1. The energy necessary to compress the spring in order to...
 - 1.2. ' Spring compression chamber ' means the chamber where the...
 - 1.3. If the compression of the springs is obtained by means...
- 2. GENERAL REQUIREMENTS
 - 2.1. A spring brake shall not be used as a service...
 - 2.2. A small variation in any of the pressure limits which...
 - 2.3. The feed circuit to the spring compression chamber shall either...
 - 2.4. In motor vehicles, the system shall be so designed that...
 - 2.5. In the case of motor vehicles, the pressure in the...
 - 2.6. When the pressure in the line feeding energy to the...
 - 2.7. On motor vehicles fitted with spring brakes and authorised to...
- 3. RELEASE SYSTEM
 - 3.1. A spring braking system shall be so designed that, in...
 - 3.1.1. For the purposes of the requirement of point 3.1, components...
 - 3.2. If the operation of the auxiliary device referred to in...

ANNEX VI

Parking braking by mechanical locking of the brake cylinders (lock actuators)

1. DEFINITION
2. SPECIAL PROVISIONS
 - 2.1. When the pressure in the locking chamber approaches the level...
 - 2.2. In the case of brake actuators fitted with a mechanical...
 - 2.3. The locked brake cylinder may only be released if it...
 - 2.4. In the event of a failure of the source of...
 - 2.5. The control shall be such that, when actuated, it performs...

ANNEX VII

Cases in which Type I and/or II (or IIA) or III tests do not have to be carried out on a vehicle submitted for type-approval

1. Type I and/or II (or IIA) or Type III tests...
 - 1.1. Where the vehicle in question is a motor vehicle, a...
 - 1.1.1. has passed a Type I and/or II (or IIA) or...
 - 1.1.2. has been type-approved, with regard to braking energy absorbed, for...
 - 1.2. Where the vehicle in question is a motor vehicle, a...
 - 1.3. Where the vehicle submitted for type-approval is fitted with a...
 - 1.3.1. In a test carried out on a gradient of at...
 - 1.3.2. During the above test it shall be verified that the...
 - 1.4. Where the vehicle concerned is a trailer equipped with 'S'-cam...
2. The term ' identical ' as used in points 1.1,...
3. When advantage is taken of the above provisions, the type-approval...
 - 3.1. Where point 1.1 is applicable, the type of the approval...
 - 3.2. Where point 1.2 is applicable, the table in point 2.7.2...
 - 3.3. Where point 1.3 is applicable, the table in point 2.7.3...
 - 3.4. Where point 1.4 is applicable, the table in point 2.7.4...
4. When a person applying for type-approval in a Member State...

Appendix 1

Alternative procedures for Type I and Type III tests for trailer brakes

1. GENERAL
 - 1.1. In accordance with point 1.4 of this Annex, the Type...
 - 1.2. Tests carried out in accordance with the methods detailed in...
2. SYMBOLS AND DEFINITIONS (the reference brake symbols shall have the...)
3. TEST METHODS
 - 3.1. Track tests
 - 3.1.1. The brake performance tests should preferably be carried out on...
 - 3.1.2. The results of tests on a combination of axles may...

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- 3.1.2.1. This is ensured if the following are identical for each...
 - 3.1.2.2. The result recorded for a combination of axles will be...
 - 3.1.3. The axle(s) should preferably be loaded with the maximum static...
 - 3.1.4. Allowance shall be made for the effect of the increased...
 - 3.1.5. The initial speed of the test is prescribed. The final...
 - 3.2. Inertia dynamometer tests
 - 3.2.1. The test machine shall have a rotary inertia simulating that...
 - 3.2.2. The test shall be carried out with a complete wheel,...
 - 3.2.3. Air cooling at a velocity and air flow direction simulating...
 - 3.2.4. Where the tyre rolling resistance is not automatically compensated for...
 - 3.3. Rolling road dynamometer tests
 - 3.3.1. The axle should preferably be loaded with the maximum static...
 - 3.3.2. Air cooling at a velocity and air flow direction simulating...
 - 3.3.3. The braking time has a duration of 1 second after...
 - 3.4. Test conditions
 - 3.4.1. The test brake(s) shall be instrumented so that the following...
 - 3.4.1.1. A continuous recording to enable the brake torque or force...
 - 3.4.1.2. A continuous recording of air pressure in the brake actuator...
 - 3.4.1.3. Speed during the test.
 - 3.4.1.4. Initial temperature on the outside of the brake drum.
 - 3.4.1.5. Brake actuator stroke used during the Type 0 test and...
 - 3.5. Test procedures
 - 3.5.1. Supplementary cold performance test
 - 3.5.1.1. This test shall be carried out at an initial speed...
 - 3.5.1.2. Three brake applications shall be made at the same pressure...
 - 3.5.2. Type I test
 - 3.5.2.1. This test shall be carried out at a speed equivalent...
 - 3.5.2.2. A braking rate shall be maintained at 0,07 including the...
 - 3.5.2.3. The duration of the test shall be two minutes and...
 - 3.5.2.4. Not later than 60 seconds after the end of the...
 - 3.5.3. Type III test (fade test)
 - 3.5.3.1. Test methods for repeated braking.
 - 3.5.3.1.1. Track tests (see Annex II, point 1.6).
 - 3.5.3.1.2. Inertia dynamometer test.
 - 3.5.3.1.3. Rolling road dynamometer test
 - 3.5.3.2. Not later than 60 seconds after the end of the...
 - 3.6. Test report
 - 3.6.1. The result of tests carried out in accordance with point...
 - 3.6.2. The brake and the axle shall be identified. Particulars of...
- 4. VERIFICATION
 - 4.1. Verification of components
 - 4.2. Verification of brake forces developed
 - 4.2.1. The brake forces (T) for each subject brake (for the...
 - 4.3. Verification of hot performance
 - 4.3.1. The brake force (T) for each subject brake for a...
 - 4.3.1.1. The predicted actuator stroke (s) of the subject brake shall...
 - 4.3.1.2. The average thrust output (Th A) of the actuator...
 - 4.3.1.3. The camshaft input torque (C) shall be then given by...
 - 4.3.1.4. The predicted brake performance for the subject brake shall be...
 - 4.3.2. The predicted brake performance for the subject trailer shall be...

4.3.3. The hot performances following the Type I or Type III...

Appendix 2

Model reference axle test report form as prescribed in Appendix 1, point 3.6

Figure 1 Section through axle assembly

Figure 2 Brake geometry

ANNEX VIII

Conditions governing the testing of vehicles with inertia (overrun) braking systems

1. GENERAL PROVISIONS
 - 1.1. The ' inertia (overrun) braking system ' of a trailer...
 - 1.2. The ' control device ' is the combination of components...
 - 1.3. The ' transmission ' is the combination of components comprised...
 - 1.4. The ' brake ' is the part in which the...
 - 1.5. Braking systems in which accumulated energy (for instance, electric, pneumatic...
 - 1.6. Tests
 - 1.6.1. Determination of the main characteristics of the brake.
 - 1.6.2. Determination of the main characteristics of the control device and...
 - 1.6.3. Testing on the vehicle:
2. SYMBOLS AND DEFINITIONS
 - 2.1. Units used
 - 2.1.1. Masses: kg
 - 2.1.2. Forces: N
 - 2.1.3. Torques and moments: Nm
 - 2.1.4. Areas: cm²
 - 2.1.5. Pressures: bar
 - 2.1.6. Lengths: units specified in each case.
 - 2.1.7. Acceleration due to gravity: $g = 10 \text{ m/s}^2$.
 - 2.2. Symbols valid for all types of braking systems (see diagram...
 - 2.2.1. G A ' maximum mass ' of the trailer declared...
 - 2.2.2. G A ' maximum mass ' of the trailer which,...
 - 2.2.3. G B ' maximum mass ' of the trailer which...
 - 2.2.4. G Bo fraction of the permissible ' maximum mass '...
 - 2.2.5. B* braking force required
 - 2.2.6. B required braking force taking account of rolling resistance
 - 2.2.7. D* permitted thrust on coupling
 - 2.2.8. D load on the coupling
 - 2.2.9. P' control device output force
 - 2.2.10. K supplementary force of control device by convention; this is...
 - 2.2.11. K A threshold force of control device — this is...
 - 2.2.12. D 1 this is the maximum force applied to the...
 - 2.2.13. D 2 This is the maximum force applied to the...
 - 2.2.14. $\eta_H 0$ efficiency of the inertia control device
 - 2.2.15. $\eta_H 1$ efficiency of the transmission system
 - 2.2.16. η_H total efficiency of the control device and of the...
 - 2.2.17. s travel of control (expressed in millimetres)

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- 2.2.18. s' effective travel of control (expressed in millimetres) fixed in...
- 2.2.19. s'' spare travel of the master cylinder actuator, measured in...
- 2.2.20. s_0 loss of travel, that is to say the...
- 2.2.21. $2s_B$ brake-shoe lift measured on the diameter parallel to...
- 2.2.22. $2s_{B^*}$ minimum brake shoe centre lift (minimum brake shoe...
- 2.2.23. M braking moment
- 2.2.24. R dynamic tyre rolling radius in metres, rounded to the...
- 2.2.25. n number of brakes
- 2.2.26. D_A application force at input side of the control...
- 2.2.27. M_A braking torque at which the overload protector is...
- 2.3. Symbols for mechanical transmission braking systems (see diagram 5 in...
 - 2.3.1. i_{H_0} reduction ratio between travel of the coupling...
 - 2.3.2. i_{H_i} reduction ratio between travel of the lever...
 - 2.3.3. i_H reduction ratio between travel of the coupling head...
 - 2.3.4. i_g reduction ratio between travel of the brake lever...
 - 2.3.5. P force applied to the brake control lever
 - 2.3.6. P_0 brake retraction force; that is, in the graph...
 - 2.3.7. ρ characteristic of the brake defined by: $M = \rho \dots$
- 2.4. Symbols for hydraulic-transmission braking systems (see diagram 8 in Appendix...
 - 2.4.1. i_h reduction ratio between travel of the coupling head...
 - 2.4.2. i_g reduction ratio between travel of the actuation point...
 - 2.4.3. F_{Rz} surface area of piston of one wheel...
 - 2.4.4. F_{Hz} surface area of piston in master cylinder...
 - 2.4.5. p hydraulic pressure in brake cylinder
 - 2.4.6. p_0 retraction pressure in brake cylinder; that is, in...
 - 2.4.7. ρ' characteristic of the brake defined by: $M = \rho' \dots$
- 3. GENERAL REQUIREMENTS
 - 3.1. The transmission of braking power from the coupling head to...
 - 3.2. All pins at joints shall be adequately protected. In addition,...
 - 3.3. Inertia braking systems shall be arranged in such a way...
 - 3.4. The inertia braking system shall allow the trailer to be...
 - 3.5. Any special device incorporated for the purpose of point 3.4...
 - 3.6. Only inertia braking systems with disc brakes may incorporate overload...
- 4. REQUIREMENTS FOR CONTROL DEVICES
 - 4.1. The sliding members of the control device shall be long...
 - 4.2. The sliding members shall be protected by a bellows or...
 - 4.3. The threshold force of the control equipment (K_A)...
 - 4.4. The maximum damping force D_1 may not exceed $0,10 \times g \times G' \dots$
 - 4.5. The maximum towing force D_2 shall be between $0,1 \times g \times G' \dots$
- 5. TESTS AND MEASUREMENTS TO BE CARRIED OUT ON THE CONTROL...
 - 5.1. Compliance with the requirements of points 3 and 4 shall...
 - 5.2. The following shall be measured in respect of all types...
 - 5.2.1. The travel s and the effective travel s' .
 - 5.2.2. The supplementary force K .
 - 5.2.3. The threshold force K_A .
 - 5.2.4. The damping force D_1 .
 - 5.2.5. The towing force D_2 .
 - 5.3. In the case of mechanical-transmission inertia braking systems, the following...
 - 5.3.1. The reduction ratio i_{H_0} measured at the mid-travel position...

- 5.3.2. The force P' at the output side of the control...
- 5.4. In the case of hydraulic-transmission inertia braking systems, the following...
 - 5.4.1. The reduction ratio i_h measured at the mid-travel position...
 - 5.4.2. The pressure p at the output side of the master...
 - 5.4.3. The spare travel of the master cylinder actuator s'' mentioned...
- 5.5. In the case of inertia braking systems on multi-axled trailers...
- 6. REQUIREMENTS FOR BRAKES
 - 6.1. The manufacturer shall make available to the technical service responsible...
 - 6.2. The braking torque M_{max} specified by the manufacturer shall...
 - 6.2.1. In the case when no overload protector is either fitted...
 - 6.2.2. In the case when an overload protector is fitted or...
- 7. TESTS AND MEASUREMENTS TO BE CARRIED OUT ON THE BRAKES...
 - 7.1. The brakes and items of equipment made available to the...
 - 7.2. The following shall be determined:
 - 7.2.1. The minimum shoe centre lift $2s_B^*$.
 - 7.2.2. The shoe centre lift $2s_B$ (which shall be greater...
 - 7.2.3. The braking moment M as a function of the force...
 - 7.2.3.1. The retraction force P_O and the characteristic p_{in} ...
 - 7.2.3.2. The retraction pressure p_o and the characteristic p'_in ...
- 8. TEST REPORTS
- 9. COMPATIBILITY OF THE CONTROL DEVICE AND THE BRAKES OF A...
 - 9.1. A check shall be made on the vehicle, taking into...
 - 9.2. General tests for all types of brakes
 - 9.2.1. Those parts of the transmission which have not been tested...
 - 9.2.2. Mass
 - 9.2.2.1. The maximum mass of the trailer G_A shall not...
 - 9.2.2.2. The maximum mass of the trailer G_A shall not...
 - 9.2.3. Forces
 - 9.2.3.1. The threshold force K_A shall not be less than...
 - 9.2.3.2. The maximum damping force D_1 shall not exceed $0,10 \times g \times G...$
 - 9.2.3.3. The maximum towing force D_2 shall be between $0,1 \times g \times G...$
 - 9.3. Test of braking efficiency
 - 9.3.1. The sum of the braking forces exerted on the circumference...
 - 9.3.1.1. In the case of inertia braking systems with mechanical transmission...
 - 9.3.1.2. In the case of inertia braking systems with hydraulic transmission...
 - 9.4. Control travel test
 - 9.4.1. In the case of control devices for multi-axle trailers with...
 - 9.4.2. The effective travel of the control s' shall be determined...
 - 9.4.2.1. If the brake rod system is affected by the relative...
 - 9.4.2.2. If there is no loss of travel, then
 - 9.4.2.3. In the case of hydraulic braking systems
 - 9.4.3. The following inequalities shall be applied in order to check...
 - 9.4.3.1. In the case of inertia braking systems with mechanical transmission:...
 - 9.4.3.2. In the case of inertia braking systems with hydraulic transmission:...

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- 9.5. Additional tests
 - 9.5.1. In the case of inertia braking systems with mechanical transmission,...
 - 9.5.2. In the case of inertia braking systems with hydraulic transmission,...
 - 9.5.3. The general behaviour of the vehicle when braking shall be...

10. GENERAL COMMENTS

Appendix 1

Explanatory diagrams

Diagram 1 Symbols valid for all types of braking systems (see point...(see point 2.2)
Diagram 2 Mechanical transmission (see points 2.2.10...

Diagram 2 Mechanical transmission (see points 2.2.10 and 5.3.2) Diagram 3 Hydraulic...(see points 2.2.10 and 5.3.2) Diagram 3 Hydraulic transmission (see...

Diagram 3 Hydraulic transmission (see points 2.2.10 and 5.4.2) Diagram 4 Brake...(see points 2.2.10 and 5.4.2) Diagram 4 Brake checks (see...

Diagram 4 Brake checks (see points 2.2.22 and 2.3.4) Brake-shoe centre lift:...(see points 2.2.22 and 2.3.4) Brake-shoe centre lift: S B...

Diagram 5 Brakes with mechanical transmission (see point 2.3) Diagram 6 Mechanical...(see point 2.3) Diagram 6 Mechanical brake (see points 2.3.6...

Diagram 6 Mechanical brake (see points 2.3.6 and 7.2.3.1) Diagram 7 Hydraulic...(see points 2.3.6 and 7.2.3.1) Diagram 7 Hydraulic brake (see...

Diagram 7 Hydraulic brake (see points 2.4.6 and 7.2.3.2) Diagram 8 Hydraulic...(see points 2.4.6 and 7.2.3.2) Diagram 8 Hydraulic transmission braking...

Diagram 8 Hydraulic transmission braking system (see point 2.4) Appendix 2 Test...(see point 2.4) Appendix 2 Test report on the control...

Appendix 2

Test report on the control device

Appendix 3

Test report on the brake

Appendix 4

Test report on the compatibility of the control device, the transmission and the brakes

ANNEX IX

Type-approval documentation

Appendix 1

MODEL(maximum format: A4 (210 × 297 mm))

Addendum EC type-approval certificate No ... concerning the type-approval of...

Appendix 2

Appendix 3

1. Description of the vehicle type
 - 1.1. Trade name or mark of the vehicle, if available:
 - 1.2. Vehicle category:
 - 1.3. Vehicle type according to Annex IX, Appendix 1:
 - 1.4. Models or trade names of vehicles constituting the vehicle type,...
 - 1.5. Manufacturer's name and address:
2. Make and type of brake linings
 - 2.1. Brake linings tested to all relevant prescriptions of Annex II:...
 - 2.2. Brake linings tested to Annex XII:
3. Minimum mass of vehicle:
 - 3.1. Distribution of mass of each axle (minimum value):
4. Maximum mass of vehicle:
 - 4.1. Distribution of mass of each axle (maximum value):
5. Maximum vehicle speed:
6. Tyre and wheel dimensions:
7. Brake circuit configuration (e.g. front/rear or diagonal split):
8. Declaration of which system is the secondary braking system:
9. Specifications of brake valves (if applicable)
 - 9.1. Adjustment specifications of the load sensing valve:
 - 9.2. Setting of pressure valve:
10. Designed brake force distribution:
11. Specification of brake
 - 11.1. Disc brake type
 - 11.2. Drum brake type
 - 11.3. In the case of compressed air brake systems, e.g. type...
12. Master cylinder type and size:
13. Booster type and size:

ANNEX X

Test requirements for vehicles with anti-lock braking systems

1. GENERAL
 - 1.1. This Annex defines the required braking performance for road vehicles...
 - 1.2. The anti-lock braking systems known at present comprise a sensor...
2. DEFINITIONS
 - 2.1. An 'anti-lock braking system' is part of a...
 - 2.2. 'Sensor' means a component designed to identify and...
 - 2.3. 'Controller' means a component designed to evaluate the...
 - 2.4. 'Modulator' means a component designed to vary the...
 - 2.5. 'Directly controlled wheel' means a wheel whose braking force is...
 - 2.6. 'Indirectly controlled wheel' means a wheel whose braking force is...
3. TYPES OF ANTI-LOCK BRAKING SYSTEMS
 - 3.1. A motor vehicle shall be deemed to be equipped with...
 - 3.1.1. Category 1 anti-lock braking system:
 - 3.1.2. Category 2 anti-lock braking system:
 - 3.1.3. Category 3 anti-lock braking system:
 - 3.2. A trailer shall be deemed to be equipped with an...
 - 3.2.1. Category A anti-lock braking system:
 - 3.2.2. Category B anti-lock braking system:
4. GENERAL REQUIREMENTS
 - 4.1. Any electrical failure or sensor anomaly that affects the system...
 - 4.1.1. The warning signal shall light up when the anti-lock braking...
 - 4.1.2. The static sensor check may verify that a sensor was...
 - 4.2. Motor vehicles equipped with an anti-lock braking system and authorised...
 - 4.2.1. This warning signal shall not light up when a trailer...
 - 4.3. The abovementioned optical warning signal(s) shall be visible even in...
 - 4.4. Except for vehicles of categories M 1 and N 1...
 - 4.5. In the event of a failure of the anti-lock braking...
 - 4.6. The operation of the system shall not be adversely affected...
 - 4.7. A manual device may not be provided to disconnect or...
 - 4.7.1. the motor vehicle with the anti-lock braking system disconnected or...
 - 4.7.2. an optical warning signal shall inform the driver that the...
 - 4.7.3. the anti-lock braking system shall automatically be reconnected/
returned to on-road...
 - 4.7.4. the vehicle user's handbook provided by the manufacturer should
warn...
 - 4.7.5. the device referred to in point 4.7 above may, in...
5. SPECIAL PROVISIONS CONCERNING MOTOR VEHICLES
 - 5.1. Energy consumption
 - 5.1.1. Test procedure
 - 5.1.1.1. The initial energy level in the energy storage device(s) shall...
 - 5.1.1.2. From an initial speed of not less than 50 km/h, on...
 - 5.1.1.3. The vehicle's engine shall be then stopped or the supply...
 - 5.1.1.4. The service braking control shall be then fully actuated four...
 - 5.1.1.5. When the control is applied for the fifth time, it...
 - 5.1.1.6. During the tests, in the case of a motor vehicle...

- 5.1.2. Additional requirements
 - 5.1.2.1. The coefficient of adhesion of the road surface is measured...
 - 5.1.2.2. The braking test shall be conducted with the engine disconnected...
 - 5.1.2.3. The braking time t shall be determined by the formula:...
 - 5.1.2.4. If the time t cannot be completed in a single...
 - 5.1.2.5. If the test is conducted in several phases, no fresh...
 - 5.1.2.6. The performance prescribed in point 5.1.1.5 shall be deemed to...
- 5.2. Utilisation of adhesion
 - 5.2.1. The utilisation of adhesion by the anti-lock braking system takes...
 - 5.2.2. The adhesion utilisation (ϵ) shall be measured on road surfaces...
 - 5.2.3. The test procedure to determine the coefficient of adhesion (k)...
 - 5.2.4. The utilisation of adhesion by the anti-lock braking system shall...
 - 5.2.5. The condition $\epsilon \geq 0,75$ shall be checked with the vehicle laden...
- 5.3. Additional checks
 - 5.3.1. The wheels directly controlled by an anti-lock braking system shall...
 - 5.3.2. When an axle passes from a high-adhesion surface (k_H)...
 - 5.3.3. When a vehicle passes from a low-adhesion surface (k_L)...
 - 5.3.4. In the case of vehicles equipped with anti-lock braking systems...
 - 5.3.5. Furthermore, laden vehicles equipped with anti-lock braking systems of category...
 - 5.3.6. However, in the tests provided for in points 5.3.1, 5.3.2,...
 - 5.3.7. During the tests provided for in points 5.3.4 and 5.3.5...
- 6. SPECIAL PROVISIONS CONCERNING TRAILERS
 - 6.1. Energy consumption
 - 6.1.1. Compliance with the above requirement shall be checked by the...
 - 6.1.2. In the case of compressed-air braking systems, the initial energy...
 - 6.1.3. With an initial vehicle speed of at least 30 km/h, the...
 - 6.1.4. At the end of the braking, with the vehicle stationary,...
 - 6.2. Utilisation of adhesion
 - 6.2.1. Trailers equipped with an anti-lock braking system shall be deemed...
 - 6.2.2. To eliminate the effects of differential brake temperatures, it is...
 - 6.3. Additional checks
 - 6.3.1. At speeds exceeding 15 km/h, the wheels directly controlled by an...
 - 6.3.2. The provisions of this point shall only apply to trailers...
 - 6.3.3. At vehicle speeds ≥ 15 km/h, the directly controlled wheels are permitted...

Appendix 1

Symbols and definitions

Appendix 2

Utilisation of adhesion

- 1. METHOD OF MEASUREMENT FOR MOTOR VEHICLES
 - 1.1. Determination of the coefficient of adhesion (k)
 - 1.1.1. The coefficient of adhesion (k) shall be determined as the...
 - 1.1.2. The brakes shall be applied only on one axle of...

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- 1.1.3. A number of tests at increments of line pressure shall...
 - 1.1.3.1. Wheel-lock may occur below 20 km/h.
 - 1.1.3.2. Starting from the minimum measured value of t , called t_{min} ...
 - 1.1.4. The braking forces shall be calculated from the measured braking...
 - 1.1.5. The dynamic load on the axle shall be that given...
 - 1.1.6. The value of k shall be rounded to three decimal...
 - 1.1.7. Then, the test will be repeated for the other axles(s)...
 - 1.1.8. For example, in the case of a two-axle rear-wheel drive...
 - 1.1.9. One coefficient will be determined for the front axle k_{f1} ...
 - 1.2. Determination of the adhesion utilised (ϵ)
 - 1.2.1. The adhesion utilised (ϵ) is defined as the quotient of...
 - 1.2.2. From an initial vehicle speed of 55 km/h, the maximum value...
 - 1.2.3. The coefficient of adhesion k_M shall be determined by...
 - 1.2.4. The value of ϵ shall be rounded to two decimal...
 - 1.2.5. In the case of a vehicle equipped with an anti-lock...
 - 1.2.6. In the case of a vehicle equipped with an anti-lock...
 - 1.3. If $\epsilon > 1,00$, the measurements of coefficients of adhesion shall...
 - 1.4. For motor vehicles equipped with three axles, only the axle...
 - 1.5. For vehicles of categories N 2 and N 3 with...
 - 1.5.1. In that case, the adhesion utilised (ϵ) is defined as...
2. METHOD OF MEASUREMENT FOR TRAILERS
- 2.1. General
 - 2.1.1. The coefficient of adhesion (k) shall be determined as the...
 - 2.1.2. The brakes shall be applied on only one axle of...
 - 2.1.3. A number of tests at increments of line pressure shall...
 - 2.1.3.1. Wheel-lock may occur below 20 km/h.
 - 2.1.3.2. Starting from the minimum measured value of t , called t_{min} ...
 - 2.1.4. The adhesion utilised (ϵ) shall be calculated by means of...
 - 2.1.5. If $\epsilon > 1,00$ the measurements of coefficients of adhesion shall be...
 - 2.1.6. The maximum braking rate (z_{RAL}) shall be measured...
 - 2.2. Full trailers
 - 2.2.1. The measurement of k (with the anti-lock braking system being...
 - 2.2.2. The values of k_f and k_r shall be...
 - 2.2.3. The coefficient of adhesion k_R shall be determined proportionally...
 - 2.2.4. Measurement of z_{RAL} (with the anti-lock braking system operative)...
 - 2.3. Semi-trailers and centre-axle trailers
 - 2.3.1. The measurement of k (with the anti-lock braking system being...
 - 2.3.2. The measurement of z_{RAL} (with the anti-lock braking system...

Appendix 3

Performance on differing adhesion surfaces

1. MOTOR VEHICLES
 - 1.1. The prescribed braking rate referred to in point 5.3.5 of...
 - 1.2. The coefficient of adhesion (k_H and k_L)...
 - 1.3. The braking rate (z_{MALS}) for laden motor vehicles...
2. TRAILERS
 - 2.1. The braking rate referred to in point 6.3.2 of this...
 - 2.2. The braking rate z

Appendix 4

Method of selection of the low-adhesion surface

1. Details of the coefficient of adhesion of the surface selected,...
 - 1.1. These data shall include a curve of the coefficient of...
 - 1.1.1. The maximum value of the curve will represent k peak...
 - 1.1.2. The ratio R shall be determined as the quotient of...
 - 1.1.3. The value of R shall be rounded to one decimal...
 - 1.1.4. The surface to be used shall have a ratio R...
2. Prior to the tests, the technical service shall ensure that...
 - 2.1. The value of R shall be mentioned in the test...

ANNEX XI

Test conditions for trailers with electrical braking systems

1. GENERAL
 - 1.1. For the purposes of the following provisions, electrical brakes are...
 - 1.2. The electrical energy required for the electrical braking system shall...
 - 1.3. Electrical braking systems shall be actuated by operating the service...
 - 1.4. The nominal voltage rating shall be 12 V.
 - 1.5. The maximum current consumption shall not exceed 15 A.
 - 1.6. The electrical connection of the electrical braking system to the...
2. CONDITIONS CONCERNING THE TRAILER
 - 2.1. If there is a battery on the trailer fed by...
 - 2.2. With trailers whose unladen mass is less than 75 % of...
 - 2.3. Electrical braking systems shall be such that even if the...
 - 2.4. Control devices for regulating the braking force, which react to...
 - 2.5. The relay for actuating the braking current in accordance with...
 - 2.6. A dummy socket shall be provided for the plug.
 - 2.7. A tell-tale shall be provided at the control device, lighting...
3. PERFORMANCE
 - 3.1. Electrical braking systems shall respond at a deceleration of the...
 - 3.2. The braking effect may commence with an initial braking force,...
 - 3.3. The braking forces may also be increased in steps. At...
 - 3.4. The prescribed braking force of the trailer of at least...
 - 3.5. The test shall be carried out with an initial speed...
 - 3.6. Automatic braking of the trailer shall be provided in accordance...

Appendix

Compatibility of the braking rate of the trailer and the mean fully developed deceleration of the tractor/trailer combination

Notes:

1. Limits indicated in the diagram refer to laden and unladen...
2. Limits indicated in the diagram shall not affect the provisions...

ANNEX XII

Inertia dynamometer test method for brake linings

1. GENERAL
 - 1.1. The procedure described in this Annex may be applied in...
 - 1.2. The alternative types of brake linings shall be checked by...
 - 1.3. The technical authority responsible for conducting approval tests may, at...
 - 1.4. Application for approval by comparison shall be made by the...
 - 1.5. In the context of this Annex ' vehicle ' means...
2. TEST EQUIPMENT
 - 2.1. A dynamometer having the following characteristics shall be used:
 - 2.1.1. it shall be capable of generating the inertia required by...
 - 2.1.2. the test brakes fitted shall be identical with those of...
 - 2.1.3. air cooling, if provided, shall be in accordance with point...
 - 2.1.4. the instrumentation for the test shall be capable of providing...
 - 2.1.4.1. a continuous recording of disc or drum rotational speed;
 - 2.1.4.2. number of revolutions completed during a stop, to resolution not...
 - 2.1.4.3. stop time;
 - 2.1.4.4. a continuous recording of the temperature measured in the centre...
 - 2.1.4.5. a continuous recording of brake application control line pressure or...
 - 2.1.4.6. a continuous recording of brake output torque.
3. TEST CONDITIONS
 - 3.1. The dynamometer shall be set as close as possible, with...
 - 3.2. The initial rotational speed of the inertia dynamometer shall correspond...
 - 3.3. Brake linings shall be at least 80 % bedded and shall...
 - 3.4. Cooling air may be used, flowing over the brake in...
4. TEST PROCEDURE
 - 4.1. Five sample sets of the brake lining shall be subjected...
 - 4.2. Brake lining equivalence shall be based on a comparison of...
 - 4.3. Type 0 cold performance test
 - 4.3.1. Three brake applications shall be made when the initial temperature...
 - 4.3.2. In the case of brake linings intended for use on...
 - 4.3.3. In the case of brake linings intended for use on...
 - 4.3.4. The mean braking torque during the above cold performance tests...
 - 4.4. Type I test
 - 4.4.1. With repeated braking
 - 4.4.1.1. Brake linings for vehicles of categories M and N shall...
 - 4.4.2. With continuous braking
 - 4.4.2.1. Brake linings for trailers of category O shall be tested...
 - 4.4.3. Hot performance
 - 4.4.3.1. On completion of the tests required under points 4.4.1 and...
 - 4.4.3.2. The mean braking torque during the above hot performance tests...
 - 4.5. Type II test
 - 4.5.1. This test shall be required only if, on the vehicle-type...
 - 4.5.2. Brake linings for motor vehicles of category M 3 and...

- 4.5.3. Hot performance
 - 4.5.3.1. On completion of the test required under point 4.5.2 above,...
 - 4.5.3.2. The mean braking torque during the above hot performance tests...
- 4.6. Fade test (Type III test)
 - 4.6.1. Test with repeated braking
 - 4.6.1.1. Brake linings for trailers of category O 4 , shall...
 - 4.6.3. Hot performance
 - 4.6.3.1. On completion of the tests required under points 4.6.1 and...
 - 4.6.3.2. The mean braking torque during the above hot performance test...
- 5. INSPECTION OF BRAKE LININGS
 - 5.1. Brake linings shall be visually inspected on completion of the...

ANNEX XIII

Braking and deviation test for vehicles with temporary-use spare wheels/tyres

- 1. GENERAL CONDITIONS
 - 1.1. The test track shall be substantially level and have a...
 - 1.2. The test shall be performed when there is no wind...
 - 1.3. The vehicle shall be loaded to its maximum mass as...
 - 1.4. The axle loads resulting from the loading condition in accordance...
 - 1.5. The tyres shall be inflated to the pressure recommended for...
- 2. BRAKING AND DEVIATION TEST
 - 2.1. The test shall be carried out with the temporary-use spare...
 - 2.2. The test shall be carried out using the service braking...
 - 2.3. The stopping distance shall not exceed the value resulting from...
 - 2.4. Tests shall be carried out for each of the fitting...
 - 2.5. The prescribed braking performance shall be obtained without any wheel-locking,...

ANNEX XIV

Alternative procedure for testing trailer anti-lock braking system (ABS)

- 1. GENERAL
 - 1.1. Testing of a trailer in accordance with Annex X of...
- 2. INFORMATION DOCUMENT
 - 2.1. The manufacturer of the ABS shall supply to the technical...
 - 2.1.1. General
 - 2.1.1.1. Name of manufacturer
 - 2.1.1.2. System name
 - 2.1.1.3. System variations
 - 2.1.1.4. System configurations (e. g. 2S/1M, 2S/2M etc.)
 - 2.1.1.5. Explanation of the basic function and/or philosophy of the system...
 - 2.1.2. Applications

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- 2.1.2.1. List of trailer types and ABS configurations for which approval...
 - 2.1.2.2. Schematic diagrams of the system configurations installed on the trailers...
 - 2.1.2.3. Relationship of tyre circumference to the resolution of the exciter,...
 - 2.1.2.4. Tolerance on tyre circumference between one axle and another fitted...
 - 2.1.2.5. Scope of application with respect to suspension type, e. g....
 - 2.1.2.6. Recommendations on differential brake input torque (if any) in relation...
 - 2.1.2.7. Test data shall be supplied to enable the worst-case axle...
 - 2.1.2.8. Additional information (if applicable) to the application of the anti-lock...
 - 2.1.3. Component description
 - 2.1.3.1. Sensor(s)
 - 2.1.3.2. Controller(s)
 - 2.1.3.3. Modulator(s)
 - 2.1.3.4. Electrical Equipment
 - 2.1.3.5. Pneumatic Circuits
 - 2.1.4. Electro-magnetic compatibility (EMC)
 - 2.1.4.1. Compliance with point 4.6. of Annex X concerning EMC in...
3. DEFINITION OF TEST VEHICLE(S)
- 3.1. Based on the information supplied in the information document, in...
 - 3.1.1. Suspension type
 - 3.1.2. Wheelbase
 - 3.1.3. Brake type
 - 3.1.4. Load sensing device
 - 3.1.5. Brake actuation
 - 3.1.6. Energy consumption
 - 3.2. For each type of trailer under test, documentation showing brake...
 - 3.3. For the purpose of the approval semi-trailers and centre-axle trailers...
4. TEST SCHEDULE
- 4.1. The following tests shall be conducted by the technical service...
 - 4.1.1. Utilisation of adhesion
 - 4.1.2. Energy consumption
 - 4.1.2.1. Axle loading — The axle loadings of the trailer being...
 - 4.1.2.2. Energy consumption test — Test shall be carried out according...
 - 4.1.2.3. To enable trailers submitted for approval to be checked for...
 - 4.1.2.3.1. Prior to the commencement of the energy consumption test (point...
 - 4.1.2.3.2. With the load sensing device set to the laden condition...
 - 4.1.3. Split-friction test Where an anti-lock braking system is to be...
 - 4.1.4. Low and high speed performance
 - 4.1.4.1. With the trailer set as for the utilisation of adhesion...
 - 4.1.4.2. Where a tolerance exists between the number of exciter teeth...
 - 4.1.5. Additional checks
 - 4.1.5.1. When an axle/bogie passes from a high-adhesion surface (k H...

- 4.1.5.2. When a trailer passes from a low-adhesion surface (k L...
- 4.1.6. Failure mode simulation
- 5. APPROVAL REPORT
 - 5.1. An approval report shall be produced, the content of which...
- 6. VERIFICATION
 - 6.1. Verification of components and installation
 - 6.2. Verification of reservoir capacity
 - 6.2.1. As the range of braking systems and auxiliary equipment used...
 - 6.2.1.1. Brake adjustment shall be such as to represent the conditions...
 - Note:
 - 6.2.1.2. With the brakes adjusted according to point 6.2.1.1 — when...
 - 6.3. Verification of function
 - 6.3.1. This shall be limited to a dynamic functional check of...

Appendix 1

Trailer anti-lock braking system approval report

Approval Report No: ...

1. Identification
 - 1.1. Manufacturer of the anti-lock braking system (name and address):
 - 1.2. System name/model:
2. System(s) and installation(s) approved
 - 2.1. ABS configuration(s) approved (e.g. 2S/1M, 2S/2M etc.):
 - 2.2. Range of application (type of trailer and number of axles):...
 - 2.3. Methods of powering:
 - 2.4. Identification of approved sensor(s), controller(s) and modulator(s):
 - 2.5. Energy consumption — equivalent number of static brake applications and...
 - 2.6. Additional features e.g. retarder control, lift axle configuration etc:
3. Test data and results
 - 3.1. Test vehicle data:
 - 3.2. Test surface information:
 - 3.3. Test results:
 - 3.3.1. Utilisation of adhesion:
 - 3.3.2. Energy consumption:
 - 3.3.3. Split-friction test:
 - 3.3.4. Low speed performance:
 - 3.3.5. High speed performance:
 - 3.3.6. Additional checks:
 - 3.3.6.1. Transition from high to low-adhesion surfaces:
 - 3.3.6.2. Transition from low to high-adhesion surfaces:
 - 3.3.7. Failure mode simulation:
 - 3.3.8. Functional checks of optional power connections:
 - 3.3.9. Electro-magnetic compatibility:
4. Limitations of installation
 - 4.1. Relationship of tyre circumference to the resolution of the exciter:...
 - 4.2. Tolerance on tyre circumference between one axle and another fitted...
 - 4.3. Suspension type:
 - 4.4. Differential(s) in brake input torque within a trailer bogie:

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- 4.5. Wheelbase of full trailer:
- 4.6. Brake type:
- 4.7. Tube sizes and lengths:
- 4.8. Load sensing device application:
- 4.9. Warning lamp sequence:
- 4.10. Other recommendations/limitations (e.g. locations of sensors, modulator(s), lift axle(s), steering...
5. Date of test
Attachment:
(Manufacturer's information document).

Appendix 2

Symbols and definitions

ANNEX XV

EC type-approval of replacement brake lining assemblies as separate technical units

1. SCOPE
 - 1.1 This Annex applies to the type-approval as separate technical units...
 - 1.2 Approvals are only mandatory for those replacement brake lining assemblies...
2. DEFINITIONS
 - 2.1 'braking equipment' has the meaning assigned in point...
 - 2.2 'friction brake' means the part of the braking...
 - 2.3 'brake lining assembly' means a component of a...
 - 2.3.1 'shoe assembly' means a brake lining assembly of...
 - 2.3.1.1 'shoe' means a component of a shoe assembly...
 - 2.3.2 'pad assembly' means a brake lining assembly of...
 - 2.3.2.1 'backplate' means a component of a pad assembly...
 - 2.3.3 'brake lining' means the friction material component of...
 - 2.3.4 'friction material' means the product of a specified...
 - 2.4 'brake lining type' means a category of brake...
 - 2.5 'brake lining assembly type' means wheel sets of...
 - 2.6 'original brake lining' means a brake lining type...
 - 2.7 'original brake lining assembly' means a brake lining...
 - 2.8 'replacement brake lining assembly' means a brake lining...
 - 2.9 'manufacturer' means the organisation which can assume technical...
3. APPLICATION FOR EC TYPE-APPROVAL
 - 3.1 An application for EC type-approval pursuant to Article 3(4) of...
 - 3.2 An application may be submitted by the holder of (a)...
 - 3.3 A model for the information document is given in Annex...
 - 3.4 The following must be submitted to the technical service responsible...
 - 3.4.1 Brake lining assemblies of the type for which approval is...
 - 3.4.2 The suitable representative vehicle(s) and/or brake(s).
4. GRANTING OF EC TYPE-APPROVAL
 - 4.1 If the relevant requirements are satisfied, EC Type-Approval pursuant to...
 - 4.2 A model for the EC type-approval certificate is given in...
 - 4.3 An approval number in accordance with Annex VII to Directive...

- 4.4. MARKING
 - 4.4.1. Every replacement brake lining conforming to the type approved under...
 - 4.4.2. This mark shall consist of a rectangle surrounding the letter...
 - 4.4.3. The approval mark referred to in point 4.4.2 above shall...
 - 4.4.4. Appendix 1 to this Annex gives examples of arrangements of...
- 5. SPECIFICATIONS AND TESTS
 - 5.1. General
 - 5.2. Replacement brake lining assemblies conforming to the type specified in...
 - 5.3. Performance requirements
 - 5.3.1. Replacement brake lining assemblies for vehicles of categories M 1...
 - 5.3.2. Replacement brake lining assemblies for vehicles of categories O 1...
 - 5.4. Mechanical characteristics
 - 5.4.1. Replacement brake lining assemblies of the type for which approval...
 - 5.4.2. Replacement brake lining assemblies of the type for which approval...
- 6. PACKAGING AND MARKING
 - 6.1. Replacement brake lining assemblies conforming to a type approved in...
 - 6.2. Each axle set shall be contained in a sealed package...
 - 6.3. Each package shall display the following information:
 - 6.3.1. the quantity of replacement brake lining assemblies in the package;...
 - 6.3.2. manufacturer's name or trade mark;
 - 6.3.3. make and type of replacement brake-lining assemblies;
 - 6.3.4. sufficient for the customer to identify the vehicles/axles/brakes for which...
 - 6.3.5. the approval mark.
 - 6.4. Each package shall contain fitting instructions:
 - 6.4.1. with particular reference to ancillary parts;
 - 6.4.2. stating that replacement brake lining assemblies should be replaced in...
 - 6.5. Each replacement brake lining assembly shall display permanently one set...
 - 6.5.1. the approval mark;
 - 6.5.2. the date of manufacture, at least month and year;
 - 6.5.3. make and type of brake lining.
- 7. MODIFICATIONS OF THE TYPE AND AMENDMENTS TO APPROVALS
 - 7.1. In the case of modifications of the type approved pursuant...
- 8. CONFORMITY OF PRODUCTION
 - 8.1. As a general rule measures to ensure the conformity of...
 - 8.2. Original brake lining assemblies being the subject of an application...
 - 8.3. The tests referred to in point 2.3.5 of Annex 10...
 - 8.4. The normal frequency of inspections authorised by the competent authority...

Appendix 1

Arrangements of the approval mark and approval data

The above approval mark shows that the item concerned has...

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Example of pad assembly marking

Example of the shoe assembly marking

Note:

Appendix 2

Requirements for replacement brake lining assemblies for vehicles of categories M 1 , M 2 and N 1

1. CONFORMANCE WITH THIS DIRECTIVE
 - 1.1. Test vehicle
 - 1.2. The braking system of the vehicle shall be tested according...
 - 1.2.1. Service braking system
 - 1.2.1.1. Type 0 test with engine disconnected, vehicle laden
 - 1.2.1.2. Type 0 test with engine connected, vehicle unladen and laden,...
 - 1.2.1.3. Type I test
 - 1.2.2. Secondary braking system
 - 1.2.2.1. Type 0 test with engine disconnected, vehicle laden (this test...
 - 1.2.3. Parking braking system
 - 1.2.3.1. Downhill test at 18 % gradient, vehicle laden.
 - 1.3. The vehicle must satisfy all the relevant requirements stated in...
2. ADDITIONAL REQUIREMENTS
 - 2.1. Vehicle test (split axle test)
 - 2.1.1. Cold performance equivalence test
 - 2.1.1.1. Make a minimum of six brake applications at spaced increments...
 - 2.1.1.2. Note and plot pedal force or line pressure and mean...
 - 2.1.1.3. The replacement brake lining assembly shall be considered to show...
 - 2.1.2. Speed sensitivity test
 - 2.1.2.1. Using the pedal force derived from item 2.1.1.2 of this...
 - 2.1.2.2. Average the results for each group of three applications and...
 - 2.1.2.3. Mean fully developed decelerations recorded for the higher speeds shall...
 - 2.2. Inertia dynamometer test
 - 2.2.1. Test equipment
 - 2.2.2. Test conditions
 - 2.2.2.1. The rotational mass of the dynamometer shall correspond to half...
 - 2.2.2.2. The initial dynamometer rotational speed shall correspond to the linear...
 - 2.2.2.3. Brake linings submitted for test shall be fitted to the...
 - 2.2.2.4. If cooling air is used, the speed of the airflow...
 - 2.2.3. Cold performance equivalence test
 - 2.2.3.1. From the initial speed of 80 km/h for M 1 and...
 - 2.2.3.2. Note and plot line pressure and mean fully developed deceleration...

- 2.2.3.3. The replacement brake lining assembly shall be considered to show...
- 2.2.4. Speed sensitivity test
 - 2.2.4.1. Using the line pressure derived from point 2.2.3.2. and with...
 - 2.2.4.2. Average the results for each group of three applications and...
 - 2.2.4.3. Mean fully developed decelerations recorded for the higher speeds shall...

Appendix 3

Requirements for replacement brake lining assemblies for vehicles of categories O 1 and O 2

- 1. GENERAL
- 2. TEST EQUIPMENT
 - 2.1. Test conditions
 - 2.1.1. The rotational mass of the dynamometer shall correspond to half...
 - 2.1.2. The initial dynamometer rotational speed shall correspond to the linear...
 - 2.1.3. Brake lining assemblies submitted for the test shall be fitted...
 - 2.1.4. If cooling air is used the speed of the airflow...
 - 2.1.5. The actuation device fitted to the brake must correspond to...
- 3. TESTS AND REQUIREMENTS
 - 3.1. Test 0 test
 - 3.2. Type I test
 - 3.2.1. Heating procedure
 - 3.2.2. Hot performance
 - 3.3. Cold performance equivalence test
 - 3.3.1. The Type 0 test as prescribed in point 3.1. shall...
 - 3.3.2. The replacement brake lining assembly shall be considered to show...

Appendix 4

Determination of friction behaviour by machine testing

- 1. INTRODUCTION
 - 1.1. Samples of a replacement brake lining assembly type shall be...
 - 1.2. Test results shall be evaluated to determine sample friction behaviour...
 - 1.3. The friction behaviour of samples shall be compared to assess...
- 2. EQUIPMENT
 - 2.1. The machine shall be designed to accept and operate a...
 - 2.2. The disc or drum rotational speed shall be 660 ± 10 min⁻¹...
 - 2.3. The test cycles and brake applications during the cycles shall...
 - 2.4. Output torque or brake pressure (constant torque method) and working...
 - 2.5. Provisions shall be made to direct cooling air across the...
- 3. TEST PROCEDURE
 - 3.1. Sample preparation
 - 3.2. Test schedule
 - 3.2.1. Test schedule with constant pressure

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- 3.2.1.1. Pad assemblies
- 3.2.1.2. Shoe assemblies
- 3.2.2. Test schedule with constant torque
- 3.3. Evaluation of test results
 - 3.3.1. Pad assemblies
 - 3.3.1.1. The operational coefficient of friction (μ_{op}) is the...
 - 3.3.1.2. The maximum coefficient of friction (μ_{max}) is the...
 - 3.3.1.3. The minimum coefficient of friction (μ_{min}) is the...
 - 3.3.2. Shoe assemblies
 - 3.3.2.1. The mean torque (M_{mean}) is the average of...
 - 3.3.2.2. The hot torque (M_{hot}) is the minimum brake...
- 3.4. Acceptance criteria
 - 3.4.1. With each application for approval of a brake lining assembly...
 - 3.4.1.1. for pad assemblies, values for (μ_{op}), (μ_{min})...
 - 3.4.1.2. for shoe assemblies, values for M_{mean} and M_{hot} ...
 - 3.4.2. During production of an approved brake lining assembly type, test...
 - 3.4.2.1. for disc brake pads:
 - 3.4.2.2. for simplex drum brake linings:

ANNEX XVI

MODEI(maximum format: A4 (210 × 297 mm))

Addendum

ANNEX XVII

ANNEX XVIII

INFORMATION DOCUMENT No ...

The following information, if applicable, shall be supplied in triplicate...

If the systems, components or separate technical units have electronic...

- 0. GENERAL
 - 0.1. Make (trade name of manufacturer):
 - 0.2. Type:
 - 0.3. Means of identification of type, if marked on the vehicle...
 - 0.3.1. Location of that marking:
 - 0.4. Category of vehicle (c):
 - 0.5. Name and address of manufacturer:
 - 0.8. Address(es) of assembly plant(s):
- 1. GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE.
 - 1.1. Photographs and/or drawings of a representative vehicle:
 - 1.3. Number of axles and wheels:
 - 1.3.1. Number and position of axles with double wheels:

- 1.3.3. Powered axles (number, position, interconnection):
- 1.8. Hand of drive: left/right (1)
- 2. MASSES AND DIMENSIONS (e) (in kg and mm)...
- 2.1. Wheelbase(s) (fully loaded) (f):
- 2.3.1. Track of each steered axle (i):
- 2.6. Mass of the vehicle with bodywork, and with coupling device...
 - 2.6.1. Distribution of this mass among the axles and, in the...
- 2.7. Minimum mass of the completed vehicle as stated by the...
 - 2.7.1. Distribution of this mass among the axles and, in the...
- 2.8. Technically permissible maximum laden mass stated by the manufacturer (maximum...
 - 2.8.1. Distribution of this mass among the axles and, in the...
- 2.9. Technically permissible maximum load/mass on each axle:
- 2.10. Technically permissible maximum/mass on each axle group:
- 2.11. Technically permissible maximum towable mass of the motor vehicle in...
 - 2.11.1. Full trailer:
 - 2.11.2. Semi-trailer:
 - 2.11.3. Centre-axle trailer:
 - 2.11.3.1. Maximum ratio of the coupling overhang (p) to...
 - 2.11.4. Technically permissible maximum mass of the combination:
 - 2.11.6. Maximum mass of unbraked trailer:
- 2.12. Technically permissible maximum static vertical load/mass on the vehicle's coupling...
 - 2.12.1. of the motor vehicle:
- 3. POWER PLANT (q)
- 3.1. Manufacturer:
 - 3.1.1. Manufacturer's engine code (as marked on the engine, or other...
- 3.2. Internal combustion engine
 - 3.2.1.1. Working principle: positive ignition/compression ignition, four stroke/two stroke (1...
 - 3.2.1.9. Maximum permitted engine speed as prescribed by the manufacturer:
 -
 - 3.2.5. Electrical system
 - 3.2.5.1. Rated voltage: ... V positive/negative ground (1)
 - 3.2.5.2. Generator:
 - 3.2.5.2.1. Type:
 - 3.2.5.2.2. Nominal output: ... VA
- 3.3. Electric motor
 - 3.3.1. Type (winding, excitation):
 - 3.3.1.1. Maximum hourly output: ... kW
 - 3.3.1.2. Operating voltage: ... V
 - 3.3.2. Battery
 - 3.3.2.2. Mass: ... kg
- 3.4. Other engines or motors or combinations thereof (particulars regarding the...
- 4. TRANSMISSION
- 4.1. Drawing of the transmission :
- 4.2. Type (mechanical, hydraulic, electric, etc.):
- 4.6. Gear ratios
- 4.7. Maximum vehicle speed (in km/h) (w):

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5. AXLES
 - 5.4. Position of retractable axle(s):

6. SUSPENSION
 - 6.1. Drawing of the suspension arrangements :
 - 6.2. Type and design of the suspension of each axle or...
 - 6.6. Tyres and wheels
 - 6.6.1. Tyre/wheel combination(s) (for tyres indicate size designation, minimum load-capacity index,...)
 - 6.6.1.1. AXLES
 - 6.6.1.1.1Axle 1:
 - 6.6.1.1.2Axle 2:
 - 6.6.1.1.3Axle 3:
 - 6.6.1.1.4Axle 4:
 - 6.6.2. Upper and lower limit of rolling radii:
 - 6.6.2.1. Axle 1:
 - 6.6.2.2. Axle 2:
 - 6.6.2.3. Axle 3:
 - 6.6.2.4. Axle 4:
 - 6.6.3. Tyre pressure(s) as recommended by the vehicle manufacturer:
 - 6.6.5. Brief description of temporary-use spare unit, if any:

8. BRAKES
 - 8.1. Type and characteristics of the brakes (as defined in Annex...
 - 8.2. Operating diagram, description and/or drawing of the following braking systems...
 - 8.2.1. Service braking system:
 - 8.2.2. Secondary braking system:
 - 8.2.3. Parking braking system:
 - 8.2.4. Any additional braking system:
 - 8.3. Control and transmission of trailer braking systems in vehicles designed...
 - 8.4. Vehicle is equipped to tow a trailer with electric/pneumatic/hydraulic (...)
 - 8.5. Anti-lock braking system: Yes/No/Optional (1)
 - 8.5.1. For vehicles with anti-lock braking systems, description of system operation...
 - 8.6. Calculation and curves according to the Appendix to point 1.1.4.2....
 - 8.7. Description and/or drawing of the energy supply (also to be...
 - 8.7.1. In the case of compressed air systems, working pressure p...
 - 8.7.2. In the case of vacuum braking systems, the initial energy...
 - 8.8. Calculation of the braking system; determination of the ratio between...
 - 8.9. Brief description of the braking systems (according to point 1.6....)
 - 8.10. If claiming exemptions from the Type I and/or Type II...

ANNEX XIX

INFORMATION DOCUMENT No ...

The following information, if applicable, shall be supplied in triplicate...

If the systems, components or separate technical units have electronic...

0. GENERAL
 - 0.1. Make (trade name of manufacturer):
 - 0.2. Type:
 - 0.3. Means of identification of type, if marked on the vehicle...
 - 0.3.1. Location of that marking:
 - 0.4. Category of vehicle (c):
 - 0.5. Name and address of manufacturer:
 - 0.8. Address(es) of assembly plant(s):
1. GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE
 - 1.1. Photographs and/or drawings of a representative vehicle:
 - 1.3. Number of axles and wheels:
 - 1.3.1. Number and position of axles with double wheels:
2. MASSES AND DIMENSIONS (e) (in kg and mm)...
 - 2.1. Wheelbase(s) (fully loaded) (f):
 - 2.3.1. Track of each steered axle (i):
 - 2.6. Mass of the vehicle with bodywork, and with coupling device...
 - 2.6.1. Distribution of this mass among the axles and, in the...
 - 2.7. Minimum mass of the completed vehicle as stated by the...
 - 2.7.1. Distribution of this mass among the axles and, in the...
 - 2.8. Technically permissible maximum laden mass stated by the manufacturer (...
 - 2.8.1. Distribution of this mass among the axles and, in the...
 - 2.9. Technically permissible maximum load/mass on each axle:
 - 2.10. Technically permissible maximum load/mass on each axle group:
 - 2.12. Technically permissible maximum static vertical load/mass on the vehicle's coupling...
 - 2.12.2. of the semi-trailer or centre-axle trailer:
5. AXLES
 - 5.4. Position of retractable axle(s):
6. SUSPENSION
 - 6.1. Drawing of the suspension arrangements :
 - 6.2. Type and design of the suspension of each axle or...
 - 6.6. Tyres and wheels
 - 6.6.1. Tyre/wheel combination(s) (for tyres indicate size designation, minimum load-capacity index,...
 - 6.6.1.1. AXLES
 - 6.6.1.1.1Axle 1:
 - 6.6.1.1.2Axle 2:
 - 6.6.1.1.3Axle 3:
 - 6.6.1.1.4Axle 4:
 - 6.6.2. Upper and lower limit or rolling radii:
 - 6.6.2.1. Axle 1:
 - 6.6.2.2. Axle 2:
 - 6.6.2.3. Axle 3:
 - 6.6.2.4. Axle 4:
 - 6.6.3. Tyre pressure(s) as recommended by the vehicle manufacturer: ... kPa...
8. BRAKES
 - 8.1. Type and characteristics of the brakes (as defined in Annex...

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- 8.2. Operating diagram, description and/or drawing of the following braking systems...
 - 8.2.1. Service braking system:
 - 8.2.3. Parking braking system:
 - 8.2.4. Any additional braking system:
 - 8.2.5. Break-away braking system
- 8.5. Anti-lock braking system: Yes/No/Optional (1)
 - 8.5.1 For vehicles with anti-lock braking systems, description of system operation...
- 8.6. Calculation and curves according to the Appendix to point 1.1.4.2....
- 8.7. Description and/or drawing of the energy supply (also to be...
 - 8.7.1. In the case of compressed air braking systems, working pressure...
 - 8.7.2. In the case of vacuum braking systems, the initial energy...
- 8.8. Calculation of the braking system; determination of the ratio between...
- 8.9. Brief description of the braking systems (according to point 1.6....
- 8.10. If claiming exemptions from the Type I and/or Type II...

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- (1) OJ No C 160, 18.12.1969, p. 7.
- (2) OJ No C 100, 1.8.1969, p. 13.
- (3) OJ No L 42, 23.2.1970, p. 1.