

No. 4789. AGREEMENT CONCERNING THE ADOPTION OF UNIFORM CONDITIONS OF APPROVAL AND RECIPROCAL RECOGNITION OF APPROVAL FOR MOTOR VEHICLE EQUIPMENT AND PARTS, DONE AT GENEVA ON 20 MARCH 1958<sup>1</sup>

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ENTRY INTO FORCE OF REGULATION No. 13 [UNIFORM PROVISIONS CONCERNING THE APPROVAL OF VEHICLES WITH REGARD TO BRAKING] AS AN ANNEX TO THE ABOVE-MENTIONED AGREEMENT

The said Regulation came into force on 1 June 1970 in respect of Italy and the Netherlands, in accordance with article 1, paragraph 5, of the above-mentioned Agreement.

*Authentic texts of the Regulation: English and French.*

*Registered ex officio on 1 June 1970.*

1. SCOPE

- 1.1. This Regulation applies to the braking of motor vehicles individually and of trailers individually. The term "trailer" includes semi-trailers except where otherwise indicated.
- 1.2. This Regulation does not cover:
  - 1.2.1. vehicles with a design speed not exceeding 25 km/h;
  - 1.2.2. trailers which may not be coupled to motor vehicles with a design speed exceeding 25 km/h;
  - 1.2.3. vehicles fitted for invalid drivers.
- 1.3. Subject to the applicable provisions of this Regulation, the devices, methods and conditions enumerated in annex 1 are not covered by this Regulation.

2. DEFINITIONS

For the purposes of this Regulation,

- 2.1. "*approval of a vehicle*" means the approval of a vehicle type with regard to braking;
- 2.2. "*vehicle type*" means a category of vehicles which do not differ in such essential respects as:

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<sup>1</sup> United Nations, *Treaty Series*, vol. 335, p. 211; for subsequent actions, see references in Cumulative Indexes Nos. 4 to 8, as well as annex A in volumes 601, 606, 607, 609, 630, 631, 652, 656, 659, 667, 669, 672, 673, 680, 683, 686, 696 and 723.

- 2.2.1. in the case of motor vehicles,
  - 2.2.1.1. the vehicle category, as defined in paragraph 5.2.;
  - 2.2.1.2. the maximum weight, as defined in paragraph 2.14.;
  - 2.2.1.3. the distribution of weight among the axles;
  - 2.2.1.4. the maximum design speed;
  - 2.2.1.5. a different type of braking device, with more particular reference to the presence or otherwise of equipment for braking a trailer;
  - 2.2.1.6. the number and arrangement of the axles;
  - 2.2.1.7. the engine type;
  - 2.2.1.8. the number and ratios of gears;
  - 2.2.1.9. the final drive ratios;
  - 2.2.1.10. the tyre dimensions;
- 2.2.2. in the case of trailers,
  - 2.2.2.1. the vehicle category, as defined in paragraph 5.2.;
  - 2.2.2.2. the maximum weight, as defined in paragraph 2.14.;
  - 2.2.2.3. the distribution of weight among the axles;
  - 2.2.2.4. a different type of braking device;
  - 2.2.2.5. the number and arrangement of the axles;
  - 2.2.2.6. the tyre dimensions;
- 2.3. “*braking device*” means the combination of parts whose function is progressively to reduce the speed of a moving vehicle or bring it to a halt, or to keep it stationary if it is already halted; these functions are specified in paragraph 5.1.2. below. The device consists of the control, the transmission, and the brake proper;
- 2.4. “*control*” means the part actuated directly by the driver (or, in the case of some trailers, by an assistant) to furnish to the transmission the energy required for braking or controlling it. This energy may be the muscular energy of the driver, or energy from another source controlled by the driver, or in appropriate cases the kinetic energy of a trailer, or a combination of these various kinds of energy;
- 2.5. “*transmission*” means the combination of components comprised between the control and the brake and linking them functionally. The transmission may be mechanical, hydraulic, pneumatic, electrical or mixed. Where the braking power is derived from or assisted by a source of energy independent of the driver but controlled by him, the reserve of energy in the device is likewise part of the transmission;
- 2.6. “*brake*” means the part in which the forces opposing the movement of the vehicle develop. It may be a friction brake (when the forces are generated by friction between two parts of the vehicle moving relatively to one another); an electrical brake (when the forces are generated by electromagnetic action between two parts of the vehicle moving relatively to but

not in contact with one another); a fluid brake (when the forces are generated by the action of a fluid situated between two parts of the vehicle moving relatively to one another); or an engine brake (when the forces are derived from an artificial increase in the braking action, transmitted to the wheels, of the engine;

2.7. “*different types of braking devices*” means devices which differ in such essential respects as:

2.7.1. components having different characteristics;

2.7.2. a component made of materials having different characteristics, or a component differing in shape or size;

2.7.3. a different assembly of the components;

2.8. “*component of a braking device*” means one of the individual parts which when assembled, constitute the braking device;

2.9. “*continuous braking*” means the braking of combinations of vehicles through an installation having the following characteristics:

2.9.1. a single control which the driver actuates progressively, by a single movement, from his driving seat;

2.9.2. the energy used for braking the vehicles constituting the combination is furnished by the same source (which may be the muscular energy of the driver);

2.9.3. the braking installation ensures simultaneous or suitably-phased braking of each of the constituent vehicles of the combination, whatever their relative positions;

2.10. “*semi-continuous braking*” means the braking of combinations of vehicles through an installation having the following characteristics:

2.10.1. a single control which the driver actuates progressively, by a single movement, from his driving seat;

2.10.2. the energy used for braking the vehicles constituting the combination is furnished by two different sources (one of which may be the muscular energy of the driver);

2.10.3. the braking installation ensures simultaneous or suitably-phased braking of each of the constituent vehicles of the combination, whatever their relative positions;

2.11. “*automatic braking*” means braking of the trailer or trailers occurring automatically in the event of separation of components of the combination of coupled vehicles, including such separation through the breakage of a coupling, the effectiveness of the braking of the remainder of the combination not being thereby destroyed;

2.12. “*inertia (or “overrun”) braking*” means braking by utilizing the forces generated by the trailer’s moving up on the drawing vehicle;

- 2.13. "*laden vehicle*" means, except where otherwise stated, a vehicle so laden as to attain its "maximum weight";
- 2.14. "*maximum weight*" means the maximum weight stated by the vehicle manufacturer to be technically permissible (this weight may be higher than the "permissible maximum weight" laid down by the national administration).

### 3. APPLICATION FOR APPROVAL

- 3.1. The application for approval of a vehicle type with regard to braking shall be submitted by the vehicle manufacturer or by his duly accredited representative.
- 3.2. It shall be accompanied by the undermentioned documents in triplicate and by the following particulars:
  - 3.2.1. a description of the vehicle type with regard to the items specified in paragraph 2.2. above. The numbers and/or symbols identifying the vehicle type and, in the case of motor vehicles, the engine type shall be specified;
  - 3.2.2. a list of the components, duly identified, constituting the braking device;
  - 3.2.3. a diagram of the assembled braking device and an indication of the position of its components on the vehicle;
  - 3.2.4. detailed drawings of each component to enable it to be easily located and identified.
- 3.3. A vehicle, representative of the vehicle type to be approved, shall be submitted to the technical service conducting the approval tests.

### 4. APPROVAL

- 4.1. If the vehicle type submitted for approval pursuant to the Regulation meets the requirements of paragraphs 5 and 6 below, approval of that vehicle type shall be granted.
- 4.2. An approval number shall be assigned to each type approved. The same Contracting Party may not assign the same number to the same vehicle type equipped with another type of braking device, or to another vehicle type.
- 4.3. Notice of approval or of refusal of approval of a vehicle type pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply to this Regulation by means of a form conforming to the model in annex 2 to the Regulation and of a summary of the information contained in the documents referred to in paragraphs 3.2.2., 3.2.3.

and 3.2.4., the drawings supplied by the applicant for approval being in a format not exceeding A 4 (210 × 297 mm), or folded to that format, and on an appropriate scale.

4.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a vehicle type approved under this Regulation, an international approval mark consisting of:

4.4.1. a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval ;<sup>1</sup>

4.4.2. the number of this Regulation, followed by the letter "R", a dash and the approval number, below the circle. However, if a vehicle of categories M<sub>2</sub> M<sub>3</sub> has been approved pursuant to the provisions of annex 5 to this Regulation, the inscription affixed below the circle shall consist of the number of this Regulation followed by the letter R, a dash, the letter M, a second dash and the approval number.

4.5. The approval mark shall be clearly legible and be indelible.

4.6. Annex 3 to this Regulation gives an example of the arrangement of the approval mark.

## 5. SPECIFICATIONS

### 5.1. General

#### 5.1.1. Braking device.

5.1.1.1. The braking device shall be so designed, constructed and fitted as to enable the vehicle in normal use, despite the vibration to which it may be subjected, to comply with the provisions of this Regulation.

5.1.1.2. In particular, the braking device shall be so designed, constructed and fitted as to be able to resist the corroding and aging phenomena to which it is exposed.

#### 5.1.2. Functions of the braking device

The braking device defined in paragraph 2.3. above must fulfil the following functions:

##### 5.1.2.1. Service braking

*The service braking must make it possible to control the movement of the*

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<sup>1</sup> 1 for the Federal Republic of Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for Czechoslovakia, 9 for Spain, 10 for Yugoslavia and 11 for the United Kingdom; subsequent numbers shall be assigned to other countries in the chronological order in which they ratify the Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, or in which they accede to that Agreement, and the numbers thus assigned shall be communicated by the Secretary-General of the United Nations to the Contracting Parties to the Agreement.

vehicle and to halt it safely, speedily and effectively, whatever its speed and load, on any up or down gradient. It must be possible to graduate this braking action. The driver must be able to achieve this braking action from his driving seat without removing his hands from the steering control.

#### 5.1.2.2. Secondary (emergency) braking

The secondary (emergency) braking must make it possible to halt the vehicle within a reasonable distance in the event of failure of the service braking. It must be possible to graduate this braking action. The driver must be able to obtain this braking action from his driving seat while keeping at least one hand on the steering control. For the purposes of these provisions it is assumed that not more than one failure of the service braking can occur at one time.

#### 5.1.2.3. Parking braking

The parking braking must make it possible to hold the vehicle stationary on an up or down gradient even in the absence of the driver, the working parts being then held in the locked position by a purely mechanical device. The driver must be able to achieve this braking action from this driving seat, subject, in the case of a trailer, to the provisions of paragraph 5.3.3.10 below.

### 5.2. Classification of vehicles

#### 5.2.1. Category L: *Motor vehicles with less than four wheels*

- 5.2.1.1. Category L<sub>1</sub> Two-wheeled vehicles with an engine cylinder capacity not exceeding 50 cc and a maximum design speed not exceeding 40 km/h.
- 5.2.1.2. Category L<sub>2</sub> Three-wheeled vehicles with an engine cylinder capacity not exceeding 50 cc and a maximum design speed not exceeding 40 km/h.
- 5.2.1.3. Category L<sub>3</sub> Two-wheeled vehicles with an engine cylinder capacity exceeding 50 cc or a design speed exceeding 40 km/h.
- 5.2.1.4. Category L<sub>4</sub> Vehicles with three wheels asymmetrically arranged in relation to the longitudinal median axis, with an engine cylinder capacity exceeding 50 cc or a design speed exceeding 40 km/h (motor cycles with sidecar).
- 5.2.1.5. Category L<sub>5</sub> Vehicles with three wheels symmetrically arranged in relation to the longitudinal median axis, with a maximum weight not exceeding 1,000 kg and either an engine cylinder capacity exceeding 50 cc or a design speed exceeding 40 km/h.

- 5.2.2. *Category M*: *Motor vehicles having at least four wheels or having three wheels when the maximum weight exceeds 1 metric ton, and used for the carriage of passengers*<sup>1</sup>
- 5.2.2.1. *Category M<sub>1</sub>* Vehicles used for the carriage of passengers and comprising not more than eight seats in addition to the driver's seat.
- 5.2.2.2. *Category M<sub>2</sub>* Vehicles used for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum weight not exceeding 5 metric tons.
- 5.2.2.3. *Category M<sub>3</sub>* Vehicles used for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum weight exceeding 5 metric tons.
- 5.2.3. *Category N*: *Motor vehicles having at least four wheels or having three wheels when the maximum weight exceeds 1 metric ton, and used for the carriage of goods*
- 5.2.3.1. *Category N<sub>1</sub>* Vehicles used for the carriage of goods and having a maximum weight not exceeding 3.5 metric tons.
- 5.2.3.2. *Category N<sub>2</sub>* Vehicles used for the carriage of goods and having a maximum weight exceeding 3.5 but not exceeding 12 metric tons.
- 5.2.3.3. *Category N<sub>3</sub>* Vehicles used for the carriage of goods and having a maximum weight exceeding 12 metric tons.
- 5.2.4. *Category O*: *Trailers (including semi-trailers)*
- 5.2.4.1. *Category O<sub>1</sub>* Trailers with a maximum weight not exceeding 0.75 metric tons.
- 5.2.4.2. *Category O<sub>2</sub>* Trailers with a maximum weight exceeding 0.75 metric ton but not exceeding 3.5 metric tons.
- 5.2.4.3. *Category O<sub>3</sub>* Trailers with a maximum weight exceeding 3.5 but not exceeding 10 metric tons.
- 5.2.4.4. *Category O<sub>4</sub>* Trailers with a maximum weight exceeding 10 metric tons.
- 5.2.5. *Remarks*
- 5.2.5.1. With regard to categories M and N
- 5.2.5.1.1. In the case of a drawing vehicle designed to be coupled to a semi-trailer, the maximum weight to be considered for classifying the vehicle is the weight of the drawing vehicle in running trim, increased by the maximum weight transferred to the drawing vehicle by the semi-trailer and, where applicable, by the maximum weight of the drawing vehicle's own load.
- 5.2.5.1.2. The equipment and installations carried on certain special-purpose vehicles not designed for the carriage of passengers (crane vehicles,

<sup>1</sup> Articulated vehicles comprising two non-separable but articulated units shall be considered as single vehicles.

workshop vehicles, publicity vehicles, etc.) are assimilated to goods for the purposes of paragraph 5.2.3. above.

5.2.5.2. With regard to category O

- 5.2.5.2.1. In the case of a semi-trailer, the maximum weight to be considered for classifying the vehicle is the weight transmitted to the ground by the axle or axles of the semi-trailer when the latter is coupled to the drawing vehicle and carrying its maximum load.

5.3. *Characteristics of braking devices*

5.3.1. *Vehicles of category L*

- 5.3.1.1. Every vehicle of categories L<sub>1</sub>, L<sub>2</sub> and L<sub>3</sub> shall be equipped with two independent braking devices with independent controls, one device acting on the front wheel or wheels and the other on the rear wheel or wheels; a parking braking device is not compulsory.
- 5.3.1.2. Every vehicle of category L<sub>4</sub> shall be equipped with the braking devices which would be required if it had no sidecar; if these devices enable the required level of performance to be achieved in tests of the vehicle with sidecar, a brake on the sidecar wheel shall not be required; a parking braking device is not compulsory.
- 5.3.1.3. Every vehicle of category L<sub>5</sub> shall be equipped with two independent braking devices which together actuate the brakes on all the wheels; in addition, there shall be parking-brake action on the wheel or wheels of at least one axle, and the parking braking device, which may be one of the two devices mentioned above, must be independent of the device acting on the other axle or axles.
- 5.3.1.4. At least one of the braking devices shall act on braking surfaces attached to the wheels either rigidly or through components not liable to failure.
- 5.3.1.5. Wear on the brakes must be capable of being easily taken up by means of a manual or automatic system of adjustment; in addition, in the case of vehicles of category L<sub>5</sub>, the control and the components of the transmission system and of the brakes acting on the rear axle must possess a reserve of travel such that, when the brakes have become heated and the brake-linings have reached a certain degree of wear, braking is ensured without immediate adjustment being necessary.

5.3.2. *Vehicles of categories M and N*

- 5.3.2.1. The set of braking devices with which a vehicle is equipped must satisfy the requirements laid down for the service, emergency and parking brakes.
- 5.3.2.2. The devices providing service, secondary (emergency) and parking braking may have common components so long as they fulfil the following conditions;
- 5.3.2.2.1. there must be at least two controls, independent of each other and readily



accessible to the driver from the driving seat; this requirement must be met even when the driver is wearing a safety belt;

- 5.3.2.2.2. the control of the service braking device must be independent of the control of the parking braking device;
- 5.3.2.2.3. if the service braking device and the secondary (emergency) braking device have the same control, the effectiveness of the linkage between that control and the different components of the transmission systems must not be liable to diminish after a certain period of use;
- 5.3.2.2.4. if the service braking device and the secondary (emergency) braking device have the same control, the parking braking device must be so designed that it can be actuated when the vehicle is in motion;
- 5.3.2.2.5. in the event of breakage of any component other than the brakes (as defined in paragraph 2.6.) or the components referred to in paragraph 5.3.2.2.7. below, or of any other failure of the service braking device (malfunction, partial or total exhaustion of an energy reserve), the secondary (emergency) braking device or that part of the service braking device which is not affected by the failure, must be able to bring the vehicle to a halt in the conditions prescribed for emergency braking;
- 5.3.2.2.6. in particular, where the emergency braking device and the service braking device have a common control and a common transmission:
  - 5.3.2.2.6.1. if service braking is ensured by the action of the driver's muscular energy assisted by one or more energy reserves, secondary (emergency) braking must, in the event of failure of that assistance, be capable of being ensured by the driver's muscular energy assisted by the energy reserves, if any, which are unaffected by the failure, the force applied to the control not exceeding the prescribed maxima;
  - 5.3.2.2.6.2. if the service braking force and transmission depend exclusively on the use, controlled by the driver, of an energy reserve, there must be at least two completely independent energy reserves each provided with its own transmission likewise independent; each of them may act on the brakes of only two or more wheels so selected as to be capable of ensuring by themselves the prescribed degree of secondary (emergency) braking without endangering the stability of the vehicle during braking; in addition, each of the aforesaid energy reserves must be equipped with an alarm device as defined in paragraph 5.3.2.13. below;
  - 5.3.2.2.6.3. the failure of a part of a hydraulic transmission system must be signalled to the driver by a device comprising a red tell-tale lamp lighting up not later than on actuation of the control. The tell-tale lamp must be visible even by daylight; the satisfactory condition of the lamp must be easily verifiable by the driver. The failure of a component of the device must

not entail total loss of the braking device's effectiveness;

- 5.3.2.2.7. for the purposes of paragraph 5.3.2.2.5. above, certain parts, such as the pedal and its bearing, the master cylinder and its piston or pistons (hydraulic systems), the control valve (pneumatic systems), the linkage between the pedal and the master cylinder or the control valve, the brake cylinders and their pistons (hydraulic and/or pneumatic systems), and the lever-and-cam assemblies of brakes, shall not be regarded as liable to breakage if they are amply dimensioned, are readily accessible for maintenance, and exhibit safety characteristics at least equal to those prescribed for other essential components (such as the steering linkage) of the vehicle. Any such part as aforesaid whose failure would make it impossible to brake the vehicle with a degree of effectiveness at least equal to that prescribed for emergency braking must be made of metal or of a material with equivalent characteristics and must not undergo notable distortion in normal operation of the braking devices.
- 5.3.2.3. Where there are separate controls for the service braking device and the secondary (emergency) braking device, simultaneous actuation of the two controls must not render both the service braking device and the emergency (secondary) braking device inoperative, either when both braking devices are in good working order or when one of them is faulty.
- 5.3.2.4. In the case of vehicles of categories M<sub>3</sub> and N<sub>3</sub> the service braking device must, whether or not it is combined with the emergency braking device, be such that in the event of failure in a part of its transmission a sufficient number of wheels are still braked by actuation of the service brake control; these wheels must be so selected that the residual performance of the service braking device is equal to not less than 30 per cent of the performance prescribed for the category to which the vehicle belongs. However, these provisions shall not apply to drawing vehicles for semi-trailers when the transmission of the semi-trailer's service braking device is independent of that of the drawing vehicle's service braking device.
- 5.3.2.5. Where use is made of energy other than the muscular energy of the driver, there need not be more than one source of such other energy (hydraulic pump, air compressor, etc.), but the means by which the device constituting that source is driven must be completely reliable. In the event of failure in any part of a braking-device transmission system, the feed to the part not affected by the failure must continue to be ensured if required for the purpose of halting the vehicle with the degree of effectiveness prescribed for secondary (emergency) braking. This condi-

tion must be met by means of devices which can be easily actuated when the vehicle is stationary, or by automatic means.

- 5.3.2.6. The requirements of paragraphs 5.3.2.2., 5.3.2.4. and 5.3.2.5. above must be met without the use of any automatic device of a kind such that its ineffectiveness might pass unnoticed through the fact that parts normally in a position of rest come into action only in the event of failure by the braking device.
- 5.3.2.7. The service braking device must act on all the wheels of the vehicle.
- 5.3.2.8. The action of the service braking device must be appropriately distributed among the axles.
- 5.3.2.9. The action of the service braking device must be distributed between the wheels of one and the same axle symmetrically in relation to the longitudinal median plane of the vehicle.
- 5.3.2.10. The service braking device and the parking braking device must act on braking surfaces permanently connected to the wheels through components of adequate strength. No braking surface shall be capable of being disconnected from the wheels; however, in the case of the service braking device and the emergency braking device such disconnexion of some braking surfaces shall be permitted on condition that it is only momentary, as during a change of gear, and that service braking or emergency braking with the prescribed degree of effectiveness continues to be possible. In addition, disconnexion as aforesaid shall be permitted in the case of the parking braking device on condition that it is controlled exclusively by the driver from his driving seat by a system incapable of being brought into action by a leak.
- 5.3.2.11. Wear on the brakes must be capable of being easily taken up by means of a system of manual or automatic adjustment. In addition, the control and the components of the transmission and of the brakes must possess a reserve of travel such that, when the brakes become heated or the brake-linings have reached a certain degree of wear, effective braking is ensured without immediate adjustment being necessary.
- 5.3.2.12. In hydraulic-transmission braking devices, the filling ports of the fluid reservoirs must be readily accessible; in addition, the receptacles containing the reserve fluid must be so designed and constructed that the level of the reserve fluid can be easily checked without the receptacles having to be opened.
- 5.3.2.13. Every vehicle equipped with a brake actuated from an energy storage device (energy accumulator) must, where braking with the prescribed performance is impossible without the use of the stored energy, be equipped with an alarm device, in addition to the pressure gauge, giving an optical or acoustical signal when the energy, in any part of the instal-

lation preceding the control valve, falls to or below 65 per cent of its normal value. This device must be directly and permanently connected to the circuit.

- 5.3.2.14. Without prejudice to the requirements of paragraph 5.1.2.3. above, where an auxiliary source of energy is essential to the functioning of a braking device, the reserve of energy must be such as to ensure that, if the engine stops, the braking performance remains adequate to bring the vehicle to a halt in the prescribed conditions. In addition, if the muscular effort applied by the driver to the parking braking device is reinforced by a servo device, the actuation of parking braking must be ensured in the event of a failure of the servo device, if necessary by using a reserve of energy independent of that normally supplying the servo device. This reserve of energy may be that intended for the service braking system. The expression "actuation" also includes the action of releasing.
- 5.3.2.15. In the case of a motor vehicle to which the coupling of a trailer equipped with a brake controlled by the driver of the drawing vehicle is authorized, the service braking device of the drawing vehicle must be equipped with a device so designed that in the event of failure of the trailer's braking device, or in the event of an interruption in the air supply pipe (or of such other type of connexion as may be adopted) between the drawing vehicle and its trailer, it shall still be possible to brake the drawing vehicle with the effectiveness prescribed for secondary (emergency) braking; it is accordingly prescribed, in particular, that this device shall be situated on the drawing vehicle.
- 5.3.2.16. The auxiliary equipment must be supplied with energy in such a way that, even in the event of damage to the source of energy, its operation cannot cause the reserves of energy feeding the braking devices to fall below the level indicated in paragraph 5.3.2.13. above.
- 5.3.2.17. If the trailer is of category O<sub>3</sub> or O<sub>4</sub>, the service braking device must be of the continuous or semi-continuous type.
- 5.3.2.18. In the case of a vehicle authorized to draw a trailer of category O<sub>3</sub> or O<sub>4</sub>, its braking devices must satisfy the following conditions:
- 5.3.2.18.1. when the drawing vehicle's secondary (emergency) braking device comes into action, there must also be a graduated braking action in the trailer;
- 5.3.2.18.2. in the event of failure of the drawing vehicle's service braking device, where that device consists of at least two independent parts, the part or parts not affected by the failure must be capable of partially or fully actuating the brakes of the trailer. It must be possible to graduate this braking action;

5.3.2.18.3. in the event of a breakage of or leak in one of the air supply pipes (or of in such other type of connexion as may be adopted), it must nevertheless be possible for the driver fully or partially to actuate the brakes of the trailer by means either of the service brake control or of the secondary (emergency) brake control or of a separate control, unless the breakage or leak automatically causes the trailer to be braked.

### 5.3.3. *Vehicles of category O*

- 5.3.3.1. Trailers of category  $O_1$  need not be equipped with a service braking device; however, where the coupling of such a trailer to a drawing vehicle of category  $M_1$  or having an unladen weight lower than twice the maximum weight of the trailer is authorized, the trailer must satisfy the same requirements as a trailer of category  $O_2$ .
- 5.3.3.2. Every trailer of category  $O_2$  must be equipped with a service braking device either of the continuous or semi-continuous or of the inertia (overrun) type. The latter type shall be authorized only for trailers other than semi-trailers and on condition that the permissible maximum weight of the trailer does not exceed 75 per cent of the permissible maximum weight of the drawing vehicle.
- 5.3.3.3. Every trailer of category  $O_3$  or  $O_4$  must be equipped with a service braking device of the continuous or semi-continuous type.
- 5.3.3.4. The service braking device must act on all the wheels of the trailer.
- 5.3.3.5. The action of the service braking device must be appropriately distributed among the axles.
- 5.3.3.6. The action of every braking device must be distributed between the wheels of one and the same axle symmetrically in relation to the longitudinal median plane of the vehicle.
- 5.3.3.7. The braking surfaces required to attain the prescribed degree of effectiveness must be in constant connexion with the wheels, either rigidly or through components not liable to failure.
- 5.3.3.8. Wear on the brakes must be capable of being easily taken up by means of a manual or automatic system of adjustment. In addition, the control and the components of the transmission system and of the brakes must possess a reserve of travel such that, when the brakes become heated or the brake linings have reached a certain degree of wear, braking is ensured without immediate adjustment being necessary.
- 5.3.3.9. The braking devices must be such that the trailer is stopped automatically if the coupling breaks while the trailer is in motion. However, this provision shall not apply to single-axled trailers with a maximum weight not exceeding 1.5 metric tons on condition that the trailers are equipped

with, in addition to the coupling device, a secondary coupling (chain, wire rope, etc.) capable, in the event of breakage of the main coupling, of preventing the drawbar from touching the ground and provide some residual steering action on the trailer.

- 5.3.3.10. On every trailer which is required to be equipped with a service braking device, parking braking must be ensured even when the trailer is separated from the drawing vehicle. The parking braking device must be capable of being actuated by a person standing on the ground; however, in the case of a trailer used for the carriage of passengers, this brake must be capable of being actuated from inside the trailer. The expression "actuation" also covers the action of releasing.
- 5.3.3.11. If the trailer is fitted with a device enabling compressed-air actuation of the braking device to be cut out, the first-mentioned device must be so designed and constructed that it is positively restored to the position of rest not later than on resumption of the supply of compressed air to the trailer.

## 6. TESTS

Braking tests which the vehicles submitted for approval are required to undergo, and the braking performance required, are described in annex 4 to this Regulation.

## 7. MODIFICATIONS OF VEHICLE TYPE OR BRAKING DEVICE

- 7.1. Every modification of the vehicle type or of its braking device shall be communicated to the administrative department which approved the vehicle type. That department may then either:
  - 7.1.1. consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the vehicle still meets the requirements; or
  - 7.1.2. require a further report from the technical service responsible for carrying out the tests.
- 7.2. Notice of confirmation of approval or of refusal of approval, accompanied by particulars of the modifications, shall be communicated, by the procedure specified in paragraph 4.3. above, to the Parties to the Agreement which apply this Regulation.

## 8. CONFORMITY OF PRODUCTION

- 8.1. Every vehicle bearing an approval mark as prescribed under this Regulation shall conform to the vehicle type approved, be fitted with the braking device with which it was approved, and satisfy the requirements of paragraph 5 above.

- 8.2. In order to verify conformity as prescribed in paragraph 8.1. above, a vehicle bearing the approval mark required by this Regulation shall be taken from the series.
- 8.3. As a general rule, the conformity of the braking device of the vehicle with the approved type shall be checked on the basis of the description given in the approval form and its annexes; furthermore a vehicle of this type shall be subjected to the tests, or to certain of them, referred to in paragraph 6, above.

#### 9. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

- 9.1. The approval granted in respect of a vehicle type pursuant to this Regulation may be withdrawn if the requirements laid down in paragraph 8.1. above are not complied with, or if a vehicle of this type fails to pass the checks provided for in paragraph 8.3. above.
- 9.2. If a Party to the Agreement which applies this Regulation withdraws an approval it has previously granted, it shall forthwith notify the other Contracting Parties applying this Regulation thereof by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation "APPROVAL WITHDRAWN".

#### 10. NAMES AND ADDRESSES OF THE TECHNICAL SERVICES CONDUCTING APPROVAL TESTS AND OF ADMINISTRATIVE DEPARTMENTS

The Parties to the Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or refusal or withdrawal of approval, issued in other countries, are to be sent.

## ANNEX 1

### BRAKING DEVICES, METHODS AND CONDITIONS NOT COVERED BY THIS REGULATION

1. Method of measuring reaction ("response") times
2. Provisions relating to energy sources and energy storage devices ("energy accumulators")
3. Conditions of compatibility between drawing vehicles and trailers
4. Specific conditions for spring brakes or locking brakes
5. Load-sensitive braking governor; wheel-lock preventer
6. Retarders
7. Supplementary provisions concerning inertia (overrun) brakes

ANNEX 2

(Maximum format: A4 (210 × 297 mm))



NAME OF  
ADMINISTRATION

*Communication concerning the approval  
(or refusal or withdrawal of approval)  
of a vehicle type with regard to braking,  
pursuant to Regulation No. 13*

Approval No. ....

- 1. Trade name or mark of the vehicle.....
- 2. Vehicle category .....
- 3. Vehicle type.....
- 4. Manufacturer's name and address .....
- 5. If applicable, name and address of manufacturer's representative.....  
.....
- 6. Maximum weight of vehicle .....
- 7. Distribution of weight of each axle (maximum value).....
- 8. Make and type of brake linings .....
- 9. In the case of a motor vehicle,
  - 9.1. engine type .....
  - 9.2. number and ratios of gears .....
  - 9.3. final drive ratio(s) .....
  - 9.4. if applicable, weight of trailer which may be coupled .....
- 10. Tyre dimensions .....
- 11. Number and arrangement of axles .....
- 12. Brief description of braking device .....



13. Weight of vehicle when tested:

	<i>unladen (kg)</i>	<i>laden (kg)</i>
axle No. 1 <sup>1</sup> *	.....	.....
axle No. 2	.....	.....
axle No. 3	.....	.....
axle No. 4	.....	.....
Total:	.....	.....

14. Result of the tests:

- 14.1. Type-O tests, engine disconnected  
service braking  
emergency braking
- 14.2. Type-O tests, engine connected  
service braking  
emergency braking
- 14.3. Type-I tests  
with repeated braking <sup>2</sup>  
with continuous braking <sup>3</sup>
- 14.4. Type-II or II bis <sup>4</sup> tests, as appropriate  
service braking

	<i>Test speed km/h</i>	<i>Measured performance</i>	<i>Measured force applied to control (kg)</i>
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

- 14.5. Was the emergency braking device used during the type II/II bis <sup>4</sup> test?  
Yes/No. <sup>4</sup>
- 14.6. Reaction time - ..... seconds
- 15. Vehicle submitted for approval on .....
- 16. Technical service conducting approval tests .....
- 17. Date of report issued by that service .....
- 18. Number of report issued by that service .....
- 19. Approval granted/refused <sup>4</sup>

\* For notes, see end of annex.

- 20. Place.....
- 21. Date .....
- 22. Signature .....
- 23. The summary referred to in paragraph 4.3. of this Regulation is annexed to this communication.

<sup>1</sup> In the case of a semi-trailer, enter the weight of the load on the coupling bolster.

<sup>2</sup> Applies only to vehicles of categories M<sub>1</sub>, M<sub>2</sub>, M<sub>3</sub>, N<sub>1</sub>, N<sub>2</sub> and N<sub>3</sub>.

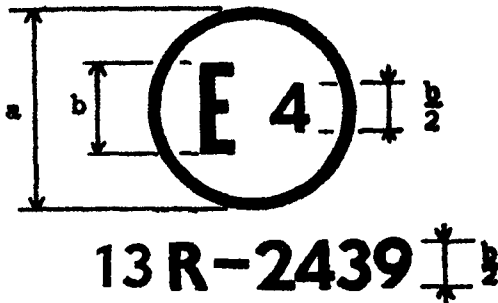
<sup>3</sup> Applies only to vehicles of categories O<sub>3</sub> and O<sub>4</sub>.

<sup>4</sup> Strike out whichever does not apply.

<sup>5</sup> As long as no uniform method of measurement has been determined, the method used shall be stated.

ANNEX 3

1. ARRANGEMENT OF THE APPROVAL MARK



	a	b
Minimum dimensions	12	5.6

(millimetres)

The above approval mark affixed to a vehicle shows that, pursuant to Regulation No. 13, the vehicle type concerned has, with regard to braking, been approved in the Netherlands (E4) under approval number 2439. For vehicles of categories M<sub>2</sub> and M<sub>3</sub>, this mark means that that type of vehicle has undergone type-II test.

2. ARRANGEMENT OF THE APPROVAL MARK FOR VEHICLES OF CATEGORIES M<sub>2</sub> AND M<sub>3</sub> WHICH HAVE UNDERGONE TYPE-II bis TEST



13 R-M-2439

The above approval mark affixed to a vehicle of categories M<sub>2</sub> and M<sub>3</sub> shows that, pursuant to Regulation No. 13, the vehicle type concerned has with regard to braking, been approved in the Netherlands (E4) under approval number 2439 and that it has undergone the type-II *bis* test.

## ANNEX 4

### BRAKING TESTS AND PERFORMANCE

#### BRAKING TESTS

##### 1.1. *General*

- 1.1.1. The performance prescribed for braking devices is based on the stopping distance. The performance of a braking device is determined either by measuring the stopping distance in relation to the initial speed or by measuring the reaction time of the device and the mean deceleration in normal operation.
- 1.1.2. The stopping distance is the distance covered by the vehicle from the moment when the driver begins to actuate the control of the device until the moment when the vehicle stops. The initial speed is the speed at the moment when the driver begins to actuate the control of the device. In the formulae given below, for the measurement of braking performance,

V = initial speed in km/h; and  
S = stopping distance in metres.

- 1.2. For the approval of any motor vehicle, the braking performance shall be measured during road tests conducted in the following conditions:
  - 1.2.1. the vehicle's condition as regards weight must be as prescribed for each type of test and be specified in the test report;
  - 1.2.2. the test must be carried out at the speeds prescribed for each type of test; if the maximum design speed of a vehicle is lower than the speed recommended for a test, the test shall be performed at the vehicle's maximum speed;
  - 1.2.3. during the tests the force applied to the brake control in order to obtain the prescribed performance must not exceed the maximum laid down for the test vehicle's category;
  - 1.2.4. the road must have a surface affording good adhesion;
  - 1.2.5. the tests must be performed when there is no wind liable to affect the results;

- 1.2.6. at the start of the tests the tyres must be cold and at the pressure prescribed for the load actually borne by the wheels when the vehicle is stationary;
- 1.2.7. in motor-cycle tests the driver must be seated in the saddle as for normal driving;
- 1.2.8. the prescribed performance must be obtained without locking of the wheels, without deviation of the vehicle from its course, and without abnormal vibration.

1.3. *Behaviour of the vehicle during braking*

In braking tests, and in particular in those at high speed, the general behaviour of the vehicle during braking must be checked.

1.4. *Type-O test (ordinary performance test with brakes cold)*

1.4.1. *General*

- 1.4.1.1. The brakes must be cold; a brake is deemed to be cold when the temperature measured on the disc or on the outside of the drum is below 100°C.
- 1.4.1.2. Subject to the special provisions laid down in paragraphs 2.2., 2.3., 2.4., 2.5. and 2.6. of this annex for certain motor vehicles with less than four wheels, the test must be conducted in the following conditions:
  - 1.4.1.2.1. the vehicle must be laden, the distribution of its weight among the axles being that stated by the maker; where provision is made for several arrangements of the load on the axles the distribution of the maximum weight among the axles must be such that the load on each axle is proportional to the maximum permissible load for each axle;
  - 1.4.1.2.2. in the case of a motor vehicle, every test must be repeated on the unladen vehicle carrying only the driver and, possibly, a person—preferably sitting on the front seat—responsible for noting the results of the test;
  - 1.4.1.2.3. the limits prescribed for minimum performance, both for tests with the vehicle unladen and for tests with the vehicle laden, shall be those laid down hereunder for each category of vehicles;
  - 1.4.1.2.4. the road must be level.

1.4.2. *Type-O test with engine disconnected*

The test must be carried out at the speed prescribed for the category to which the vehicle belongs, the figures prescribed in this connexion being subject to a certain margin of tolerance. The minimum performance prescribed for each category must be attained.

1.4.3. *Type-O test with engine connected*

Tests must also be carried out at various speeds, the lowest being equal to 30 per cent of the maximum speed of the vehicle and the highest being

equal to 80 per cent of that speed. The performance figures measured and the behaviour of the vehicle must be recorded in the test report.

### 1.5. Type-I test (fade test)

#### 1.5.1. With repeated braking

- 1.5.1.1. The service brakes of all motor vehicles, except those of categories  $L_1$  to  $L_5$  must be tested by successively applying and releasing the brakes a number of times, the vehicle being laden, in the conditions shown in the table below:

Category of vehicles \ Conditions	$V_1$ km/h	$V_2$ km/h	$\Delta t$ sec.	n
$M_1$	80% V max $\leq 120$	$\frac{1}{2} V_1$	45	15
$M_2$	80% V max $\leq 100$	$\frac{1}{2} V_1$	55	15
$N_1$	80% V max $\leq 120$	$\frac{1}{2} V_1$	55	15
$M_3, N_2, N_3$	80% V max $\leq 60$	$\frac{1}{2} V_1$	60	20

in which the symbols have the following meanings:

$V_1$  = initial speed, at beginning of braking

$V_2$  = speed at end of braking

V max = maximum speed of vehicle

n = number of brake applications

$\Delta t$  = duration of a braking cycle; time elapsing between the initiation of one brake application and the initiation of the next.

- 1.5.1.2. If the characteristics of the vehicle make it impossible to abide by the duration prescribed for  $\Delta t$ , the duration may be increased; in any event, in addition to the time necessary for braking and accelerating the vehicle, a period of 10 seconds must be allowed in each cycle for stabilizing the speed  $V_1$

- 1.5.1.3. In these tests, the force applied to the control must be so adjusted as to attain a mean deceleration of  $3 \text{ m/sec}^2$  at the first brake application; this force must remain constant throughout the succeeding brake applications.

- 1.5.1.4. During brake applications the highest gear ratio (excluding overdrive, etc.) must be continuously engaged.
- 1.5.1.5. For regaining speed after braking, the gearbox must be used in such a way as to attain the speed  $V_1$  in the shortest possible time (maximum acceleration allowed by the engine and gearbox).
- 1.5.2. *With continuous braking*
- 1.5.2.1. The service brakes of trailers of categories  $O_3$  and  $O_4$  must be tested in such a manner that, the vehicle being laden, the energy input to the brakes is equivalent to that recorded in the same period of time with a laden vehicle driven at a steady speed of 40 km/h on a 7 per cent down-gradient for a distance of 1.7 km.
- 1.5.2.2. The test may be carried out on a level road, the trailer being drawn by a motor vehicle; during the test, the force applied to the control must be adjusted so as to keep the resistance of the trailer constant (7 per cent of the weight of the trailer). If the power available for hauling is insufficient, the test can be conducted at a lower speed but over a greater distance as shown in the table below:

<i>Speed in km/h</i>	<i>Distance metres</i>
40	1700
30	1950
20	2500
15	3100

1.5.3. *Residual performance*

At the end of the type-I test (test described in paragraph 1.5.1. or test described in paragraph 1.5.2. of this annex) the residual performance of the service braking device must be measured in the same conditions as for the type-O test with the engine disconnected (the temperature conditions may be different). This residual performance must not be less than 80 per cent of that prescribed for the category in question nor less than 60 per cent of the figure recorded in the type-O test with the engine disconnected.

1.6. *Type-II test* (downhill behaviour test)

- 1.6.1. Laden vehicles must be tested in such a manner that the energy input is equivalent to that recorded in the same period of time with a laden vehicle driven at an average speed of 30 km/h on a 6 per cent down-gradient for a distance of 6 km, with the appropriate gear engaged (if the vehicle is a motor vehicle) and the retarder, if the vehicle is equipped with one, being used. The gear engaged must be such that the r.p.m. of the engine does not exceed the maximum value prescribed by the manufacturer.

- 1.6.2. For vehicles in which the energy is absorbed by the braking action of the engine alone, a tolerance of  $\pm 5$  km/h on the average speed shall be permitted, and the gear enabling the speed to be stabilized at the value closest to 30 km/h on the 6 per cent down gradient shall be engaged. If the performance of the braking action of the engine alone is determined by a measurement of deceleration, it shall be sufficient if the mean deceleration measured is at least  $0.5 \text{ m/sec}^2$ .
- 1.6.3. At the end of the test, the residual performance of the service braking device must be measured in the same conditions as for the type-O test with the engine disconnected (the temperature conditions, of course, may be different). This residual performance must be not less than 75 per cent of that prescribed for the type-O test with the engine disconnected.
- 1.6.4. For vehicles of categories  $M_2$  and  $M_3$  operated in mountainous regions, the authorities may require the replacement of type-II test by type-II bis test described in annex 5 to this Regulation. A Contracting Party taking advantage of this option must inform the other Contracting Parties.

## 2. Performance of braking devices of vehicles of category L

### 2.1. General provisions relating to tests.

- 2.1.1. The type-O test must be carried out on all vehicles.
- 2.1.2. The type-O test with the engine connected must be carried out only with the two brakes together.
- 2.1.3. Tests with the engine connected and with the engine disconnected on vehicles with the automatic gear change must be carried out in the normal conditions of operation of this device.

### 2.2. Provisions relating to tests of vehicles of category $L_1$ :

#### 2.2.1. Test speed $V = 40$ km/h.

#### 2.2.2. Braking with the rear brake only

The stopping distance  $S$  must be:

- when the vehicle is ridden by the driver alone,

$$S \leq \frac{V^2}{55} \text{ (corresponding to a mean deceleration of } 2.1 \text{ m/sec}^2\text{);}$$

- in the case of vehicles designed for the transport of a passenger, when the vehicle carries the driver and one passenger,

$$S \leq \frac{V^2}{75} \text{ (corresponding to a mean deceleration of } 2.9 \text{ m/sec}^2\text{).}$$

#### 2.2.3. Braking with both brakes together, the vehicle being ridden by the driver alone.

The stopping distance  $S$  must be:

$$S \leq \frac{V^2}{110} \text{ (corresponding to a mean deceleration of } 4.2 \text{ m/sec}^2\text{).}$$

2.2.4. Force applied to:

hand control:  $\leq 20$  kp;

foot control:  $\leq 40$  kp.

2.3. Provisions relating to tests of vehicles of category  $L_2$ :

2.3.1. Test speed  $V = 40$  km/h.

2.3.2. Braking with both brakes together.

2.3.2.1. The test must be carried out with the vehicle (ridden by the driver alone) first unladen and then laden.

2.3.2.2. The stopping distance  $S$  must be:

— in the case of a vehicle with the wheels symmetrically arranged,

$$S \leq \frac{V^2}{110} \text{ (corresponding to a mean deceleration of } 4.2 \text{ m/sec}^2\text{), and in}$$

— the case of a vehicle with the wheels symmetrically arranged,

$$S \leq \frac{V^2}{100} \text{ (corresponding to a mean deceleration of } 3.9 \text{ m/sec}^2\text{),}$$

the stopping distance achieved with either brake operated alone being required to be  $S \leq \frac{V^2}{45}$ .

2.3.3. Force applied to:

hand control:  $\leq 20$  kp;

foot control:  $\leq 40$  kp.

2.4. Provisions relating to tests of vehicles of category  $L_3$ :

2.4.1. Test speed  $V$ :

2.4.1.1. test with both brakes together: 60 km/h;

2.4.1.2. test with one brake only: 40 km/h.

2.4.2. Test with the vehicle ridden by the driver alone:

2.4.2.1. Braking with the front brake only:

$$S \leq \frac{V}{100} \text{ (corresponding to a mean deceleration of } 3.9 \text{ m/sec}^2\text{).}$$

2.4.2.2. Braking with the rear brake only:

$$S \leq \frac{V^2}{80} \text{ (corresponding to a mean deceleration of } 3.1 \text{ m/sec}^2\text{).}$$

2.4.2.3. Braking with both brakes together:

$$S \leq \frac{V^2}{130} \text{ (corresponding to a mean deceleration of } 5 \text{ m/sec}^2\text{).}$$

2.4.3. Test with the vehicle carrying the driver and one passenger:



Braking with the rear brake only:

$$S \leq \frac{V^2}{95} \text{ (corresponding to a mean deceleration of } 3.7 \text{ m/sec}^2\text{).}$$

2.4.4. Force applied to:

hand control:  $\leq 20$  kp;

foot control:  $\leq 50$  kp.

2.5. Provisions relating to tests of vehicles of category  $L_4$ :

2.5.1. Test speed:  $V = 60$  km/h.

2.5.2. Braking with both brakes together.

2.5.2.1. The test must be carried out with the vehicle (ridden by the driver alone) first unladen and then laden.

2.5.2.2. The stopping distance  $S$  must be:

$$S \leq \frac{V^2}{120} \text{ (corresponding to a mean deceleration of } 4.6 \text{ m/sec}^2\text{).}$$

2.5.3. Force applied to:

hand control:  $\leq 20$  kp;

foot control:  $\leq 50$  kp.

2.6. Provisions relating to tests of vehicles of category  $L_3$ :

2.6.1. Test speed:  $V = 60$  km/h.

2.6.2. Braking with both brakes together (front brake plus rear brake or brake acting on all wheels simultaneously).

2.6.2.1. The test must be carried out with the vehicle (ridden by the driver alone) first unladen and then laden.

2.6.2.2. The stopping distance  $S$  must be:

$$S \leq \frac{V^2}{120} \text{ (corresponding to a mean deceleration of } 4.6 \text{ m/sec}^2\text{),}$$

the stopping distance achieved with either brake operated alone, from a test speed of 40 km/h, being required to be

$$S \leq \frac{V^2}{50} \text{ (corresponding to a mean deceleration of } 1.9 \text{ m/sec}^2\text{).}$$

2.6.3. The parking braking device, must, even if it is combined with one of the other braking devices, be capable of holding the laden vehicle stationary on a 16 per cent up or down gradient.

2.6.4. Force applied to hand control:  $\leq 20$  kp, to foot control (even where this control actuates both the front and the rear brake):  $\leq 50$  kp.

### 3. Performance of braking devices of vehicles of categories $M$ and $N$

3.1. Service braking devices.

3.1.1. General provision relating to tests:

the type-O test must be carried out on all vehicles.

3.1.2. Provisions relating to tests of vehicles of category  $M_1$ :

3.1.2.1. Test speed  $V = 80$  km/h.

3.1.2.2. Stopping distance  $S$ :

$S \leq 0.1 V + \frac{V^2}{150}$  (the second term corresponding to a mean braking deceleration, at normal engine speed, of  $5.8$  m/sec<sup>2</sup>).

3.1.2.3. Force applied to foot control:  $\leq 50$  kp.

3.1.2.4. The vehicle must also pass the type-I test.

3.1.3. Provisions relating to tests of vehicles of category  $M_2$ :

3.1.3.1. Test speed  $V = 60$  km/h.

3.1.3.2. Stopping distance  $S$ :

$S \leq 0.15 V + \frac{V^2}{130}$  (the second term corresponding to a mean braking deceleration, at normal engine speed, of  $5$  m/sec<sup>2</sup>).

3.1.3.3. Force applied to foot control:  $\leq 70$  kp.

3.1.3.4. The vehicle must also pass the type-I test.

3.1.4. Provisions relating to tests of vehicles of category  $M_3$ :

3.1.4.1. Test speed  $V = 60$  km/h.

3.1.4.2. Stopping distance  $S$ :

$S \leq 0.15 V + \frac{V^2}{130}$  (the second term corresponding to a mean braking deceleration, at normal engine speed, of  $5$  m/sec<sup>2</sup>).

3.1.4.3. Force applied to foot control:  $\leq 70$  kp.

3.1.4.4. The vehicle must also pass the type-I and type-II tests.

3.1.5. Provisions relating to tests of vehicles of category  $N_1$ :

3.1.5.1. Test speed  $V = 70$  km/h.

3.1.5.2. Stopping distance  $S$ :

$S \leq 0.15 V + \frac{V^2}{115}$  (the second term corresponding to a mean braking deceleration, at normal engine speed, of  $4.4$  m/sec<sup>2</sup>).

3.1.5.3. Force applied to foot control:  $\leq 70$  kp.

3.1.5.4. The vehicle must also pass the type-I test.

3.1.6. Provisions relating to tests of vehicles of category  $N_2$ :

3.1.6.1. Test speed  $V = 50$  km/h.

3.1.6.2. Stopping distance  $S$ :

$S \leq 0.15 V + \frac{V^2}{115}$  (the second term corresponding to a mean braking deceleration, at normal engine speed, of  $4.4$  m/sec<sup>2</sup>).

3.1.6.3. Force applied to foot control:  $\leq 70$  kp.

3.1.6.4. The vehicle must also pass the type-I test.

3.1.7. Provisions relating to tests of vehicles of category  $N_3$ :

3.1.7.1. Test speed  $V = 40$  km/h.

3.1.7.2. Stopping distance  $S$ :

$$S \leq 0.15 V + \frac{V^2}{115} \quad (\text{the second term corresponding to a mean braking deceleration, at normal engine speed, of } 4.4 \text{ m/sec}^2).$$

3.1.7.3. Force applied to foot control:  $\leq 70$  kp.

3.1.7.4. The vehicle must also pass the type-I and type-II tests.

3.2. Secondary (emergency) braking devices:

3.2.1. The secondary (emergency) brake, even if the device which actuates it is also used for other braking functions, must give a stopping distance not exceeding the first term plus twice the second term of the binomial expression giving the service-brake stopping distance for the category in question.

3.2.2. If the secondary (emergency) braking control is manual, the prescribed performance must be obtained by applying to the control a force not exceeding 40 kp in the case of vehicles of category  $M_1$  and 60 kp in the case of other vehicles, and the control must be so placed that it can be easily and quickly grasped by the driver.

3.2.3. If the secondary (emergency) braking control is a foot control, the prescribed performance must be obtained by applying to the control a force not exceeding 50 kp in the case of vehicles of category  $M$ , and 70 kp in the case of other vehicles, and the control must be so placed that it can be easily and quickly actuated by the driver.

3.2.4. The performance of the secondary (emergency) braking system must be checked by the type-O test.

3.3. Parking braking devices.

3.3.1. The parking braking device must, even if it is combined with one of the other braking devices, be capable of holding the laden vehicles stationary on a 16 per cent up or down gradient.

3.3.2. On vehicles to which the coupling of a trailer is authorized, the parking braking device of the drawing vehicle must be capable of holding the combination of vehicles stationary on a 12 per cent gradient.

3.3.3. If the control is manual, the force applied to it must not exceed 40 kp in the case of vehicles of category  $M_1$  and 60 kp in the case of all other vehicles.

3.3.4. If it is a foot control, the force exerted on the control must not exceed

50 kp in the case of vehicles of category  $M_1$  and 70 kp in the case of all other vehicles.

- 3.3.5. A parking brake device which has to be actuated several times before it attains to the prescribed performance is admissible.

#### 4. Performance of braking devices of vehicles of category O

##### 4.1. Service braking devices.

###### 4.1.1. Provision relating to tests of vehicles of category $O_1$ :

Where the provision of a service braking device is mandatory, the performance of the device must meet the requirements laid down for category  $O_2$ .

###### 4.1.2. Provisions relating to tests of vehicles of category $O_2$ .

- 4.1.2.1. If the service braking device of the trailer is of the continuous or semi-continuous type, it must comply with the following requirements: the sum of the forces exerted on the periphery of the braked wheels must be equal to not less than 45 per cent of the maximum weight borne by the wheels when the vehicle is stationary;

- 4.1.2.2. If the braking device is of the inertia (overrun) type, it must comply with the following requirements:

- 4.1.2.2.1. with a thrust exerted by the trailer on its coupling not exceeding 6 per cent of the sum of the maximum loads on the trailer's axles, the sum of forces exerted on the periphery of the wheels must be equal to not less than 45 per cent of the maximum weight borne by the wheels themselves.

- 4.1.2.2.2. the inertia (overrun) brake must in no circumstances be brought into action by the slight decelerations occurring when the vehicle is being driven normally without use of the service braking device.

###### 4.1.3. Provisions relating to tests of vehicles of category $O_3$ :

- 4.1.3.1. The same requirements apply as apply to category  $O_2$ ; in addition, vehicles must undergo the type-I test.

- 4.1.3.2. In the type-I test of a semi-trailer, the weight braked by the latter's axles must be that corresponding to the load on the axle (or axles) of the semi-trailer when the latter is carrying its maximum load.

###### 4.1.4. Provisions relating to tests of vehicles of category $O_4$ : —

- 4.1.4.1. The same requirements apply as apply to category  $O_2$ ; in addition, vehicles must undergo the type-I and type-II tests.

- 4.1.4.2. In the type-I and type-II tests of a semi-trailer, the weight braked by the latter's axles must be that corresponding to the load on the axle (or axles) of the semi-trailer when the latter is carrying its maximum load.

#### 4.2. Parking braking devices.

The parking brake with which the trailer or semi-trailer is equipped must be capable of holding the laden trailer or semi-trailer stationary, when separated from the drawing vehicle, on a 16 per cent up or down gradient. The force applied to the control must not exceed 60 kp.

#### 5. Reaction time

Where a vehicle is equipped with a service braking device totally or partially dependent on a source of energy other than the muscular effort of the driver, the following requirements must be satisfied: in an emergency manoeuvre, the time elapsing between the moment when the control begins to be actuated and the moment when the braking force on the least favourably placed axle reaches the level corresponding to the prescribed performance must not exceed 0.6 sec.

### ANNEX 5

TYPE-II *bis* TEST WHICH MAY BE PRESCRIBED  
IN PLACE OF TYPE-II TEST FOR VEHICLES OF  
CATEGORIES M<sub>2</sub> AND M<sub>3</sub> OPERATED IN MOUNTAINOUS REGIONS

1. Laden vehicles must be tested in such a manner that the energy input is equivalent to that recorded in the same period of time with a laden vehicle driven at an average speed of 30 km/h on a 7 per-cent down-gradient for a distance of 6 km. During the test, the service, secondary (emergency) and parking braking devices must not be engaged. The gear engaged must be of such a kind that the engine's RPM does not exceed the maximum value prescribed by the manufacturer.

2. For vehicles whose energy input depends on the braking action of the engine alone, a tolerance of  $\pm 5$  km/h above or below the average speed shall be permitted and the gear engaged shall be one which permits the speed to be stabilized at a value as close as possible to 30 km/h on a 7 per cent gradient. If the braking action of the engine is determined by measuring the deceleration, it will be sufficient if the mean deceleration measured is at least 0.6 m/sec<sup>2</sup>.