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[1]

ENTRY INTO FORCE of Regulation No. 78 annexed to the above-mentioned Agreement of 20 March 1958

The said Regulation came into force on 15 October 1988 in respect of France and Italy, in accordance with article 1 (5) of the Agreement.

REGULATION No. 78

Uniform provisions concerning the approval of vehicles of category L with regard to braking

1. SCOPE

1.1. This Regulation applies to the braking of power-driven vehicles having two or three wheels of the types defined in paragraph 5.2.

1.2. This Regulation does not cover:

1.2.1. Vehicles with a maximum design speed not exceeding 25 km/h;

1.2.2. Vehicles fitted for invalid drivers.

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 power-driven vehicles which do not differ in such essential respects as:

2.2.1. The vehicle category, as defined in paragraph 5.2,

2.2.2. The maximum weight, as defined in paragraph 2.11,

2.2.3. The distribution of weight between the axles,

2.2.4. The maximum design speed,

2.2.5. The number and arrangement of the axles,

2.2.6. The engine type,

2.2.7. The number and ratios of gears,

2.2.8. The final drive ratios,

[1] United Nations, *Treaty Series*, vol. 335, p. 211; vol. 516, p. 378 (rectification of the authentic English and French texts of article 1 (8)); vol. 609, p. 290 (amendment to article 1 (1)); vol. 1059, p. 404 (rectification of the authentic French text of article 12 (2)); for subsequent actions, see references in Cumulative Indexes Nos. 4 to 15, as well as annex A in volumes 951, 955, 958, 960, 961, 963, 966, 973, 974, 978, 981, 982, 985, 986, 993, 995, 997, 1003, 1006, 1010, 1015, 1019, 1020, 1021, 1024, 1026, 1031, 1035, 1037, 1038, 1039, 1040, 1046, 1048, 1050, 1051, 1055, 1060, 1065, 1066, 1073, 1078, 1079, 1088, 1092, 1095, 1097, 1098, 1106, 1110, 1111, 1112, 1122, 1126, 1130, 1135, 1136, 1138, 1139, 1143, 1144, 1145, 1146, 1147, 1150, 1153, 1156, 1157, 1162, 1177, 1181, 1196, 1197, 1198, 1199, 1205, 1211, 1213, 1214, 1216, 1218, 1222, 1223, 1224, 1225, 1235, 1237, 1240, 1242, 1247, 1248, 1249, 1252, 1253, 1254, 1255, 1256, 1259, 1261, 1271, 1273, 1275, 1276, 1277, 1279, 1284, 1286, 1287, 1291, 1293, 1294, 1295, 1299, 1300, 1301, 1302, 1308, 1310, 1312, 1314, 1316, 1317, 1321, 1323, 1324, 1327, 1328, 1330, 1331, 1333, 1335, 1336, 1342, 1347, 1348, 1349, 1350, 1352, 1355, 1358, 1361, 1363, 1364, 1367, 1374, 1379, 1389, 1390, 1392, 1394, 1398, 1401, 1402, 1404, 1405, 1406, 1408, 1409, 1410, 1412, 1413, 1417, 1419, 1421, 1422, 1423, 1425, 1428, 1429, 1434, 1436, 1438, 1443, 1444, 1458, 1462, 1463, 1464, 1465, 1466, 1474, 1477, 1483, 1484, 1485, 1486, 1487, 1488, 1489, 1490, 1492, 1494, 1495, 1499, 1500, 1502, 1504, 1505, 1506, 1507, 1509, 1510, 1511, 1512, 1513 and 1514.

2.2.9. 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 to 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 to furnish to the transmission the energy required for braking or controlling it. This energy may be the muscular energy of the driver, or the energy from another source controlled by the driver, 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 parts 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 electro-magnetic 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. "Progressive and graduated braking" means braking during which, within the normal operation range of the device, and whether during application or during release of the brakes,

2.9.1. The driver can at any moment increase or decrease the braking force by acting on the control,

2.9.2. The braking force varies proportionally to the action on the control (monotonic function),

2.9.3. The braking force can be easily regulated with sufficient precision;

2.10. "Laden vehicle" means, except where otherwise stated, a vehicle so laden as to attain its "maximum weight";

2.11. "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 the engine type shall be specified;

3.2.2. A list of 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 responsible for conducting the approval tests.

4. APPROVAL

4.1. If the vehicle type submitted for approval pursuant to this 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. Its first two digits (at present 00 for the Regulation in its original form) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall 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 refusal or extension or withdrawal of approval or production definitely discontinued of a vehicle type pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply this Regulation by means of a form conforming to the model in annex 1 to this Regulation.

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;(*)

4.4.2. The number of this Regulation, followed by the letter "R", a dash and the approval number to the right of the circle prescribed in paragraph 4.4.1.

4.5. If the vehicle conforms to a vehicle type approved, under one or more other Regulations annexed to the Agreement, in the country which has granted approval under this Regulation, the symbol prescribed in paragraph 4.4.1 need not be repeated; in such a case, the Regulation and approval numbers and the additional symbols of all the Regulations under which approval has been granted in the country which has granted approval under this Regulation shall be placed in vertical columns to the right of the symbol prescribed in paragraph 4.4.1.

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

(*) 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, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 for the German Democratic Republic, 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland, 21 for Portugal and 22 for the Union of Soviet Socialist Republics. Subsequent numbers shall be assigned to other countries in the chronological order in which they ratify or accede to the Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, and the numbers thus assigned shall be communicated by the Secretary-General of the United Nations to the Contracting Parties to the Agreement.

4.7. The approval mark shall be placed close to or on the vehicle data plate affixed by the manufacturer.

4.8. Annex 2 to this Regulation gives examples of arrangements of approval marks.

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 ageing 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 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 purpose 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 his driving seat.

5.2. *Classification of vehicles covered by this Regulation*

5.2.1. Category L_1. Two-wheeled vehicles with an engine cylinder capacity not exceeding 50 cc and a maximum design speed not exceeding 50 km/h.

5.2.2. Category L_2. Three-wheeled vehicles with an engine cylinder capacity not exceeding 50 cc and a maximum design speed not exceeding 50 km/h.

5.2.3. Category L_3. Two-wheeled vehicles with an engine cylinder capacity exceeding 50 cc or a design speed exceeding 50 km/h.

5.2.4. Category L_4. 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 50 km/h (motor cycles with sidecar).

5.2.5. Category L_5. 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 50 km/h.

5.3. *Characteristics of braking devices*

5.3.1. Every vehicle of categories L_1, L_2 and L_3 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.

5.3.2. Every vehicle of category L_4 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.

5.3.3. Every vehicle of category L_5 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.

5.3.4. 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.

5.3.5. 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_5, 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.

6. TESTS

Braking tests which the vehicles submitted for approval are required to undergo, and the braking performance required, are prescribed in annex 3 to this Regulation.

7. MODIFICATIONS OF VEHICLE TYPE OR BRAKING DEVICE AND EXTENSION OF APPROVAL

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 complies with the requirements; or

7.1.2. Require a further test report from the technical service responsible for conducting the tests.

7.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated, by the procedure specified in paragraph 4.3 above, to the Parties to the Agreement which apply this Regulation.

7.3. The competent authority issuing the extension of approval shall assign a series number to each communication form drawn up for such an extension.

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 ap-

proval 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 has failed to pass the checks prescribed 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 so notify the other Contracting Parties applying this Regulation, by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation "APPROVAL WITHDRAWN".

10. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a type of vehicle approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the Agreement applying this Regulation by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation "PRODUCTION DISCONTINUED".

11. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR 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 responsible for conducting approval tests and of administrative departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, issued in other countries, are to be sent.

ANNEX 1

(Maximum format: A4 (210 × 297 mm))

(1)

Communication concerning

— The approval
— The refusal of approval
— The extension of approval
— Withdrawal of approval
— Production definitely discontinued[2]

of a type of vehicle with regard to braking, pursuant to Regulation No. 78

Approval No. ..... Extension No. .....

1. Trade name or mark of the vehicle .....
2. Vehicle category .....
3. Vehicle type .....

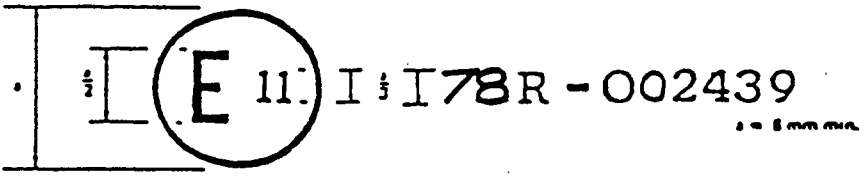
(1) Name of administration.
(2) Strike out what does not apply.

4. Manufacturer's name and address .....
5. If applicable, name and address of manufacturer's representative .....
6. Maximum mass of vehicle .....
7. Distribution of mass of each axle (max. value) .....
8. Make and type of brake linings .....
9. *Engine and transmission*
9.1. Engine type .....
9.2. Number and ratios of gears .....
9.3. Final drive ratio(s) .....
9.4. If applicable, mass of trailer which may be coupled .....
10. Tyre dimensions .....
11. Number and arrangement of axles .....
12. Brief description of braking device .....
13. Vehicle is/is not [1] equipped to tow trailer with electric service brakes .....
14. Vehicle submitted for approval on .....
15. Technical service responsible for conducting approval tests .....
16. Date of report issued by that service .....
17. Number of report issued by that service .....
18. Approval granted/refused/extended/withdrawn[1] .....
19. Place .....
20. Signature .....
21. The summary referred to in paragraph 4.3 of this Regulation is available upon request and consists of .....

ANNEX 2. ARRANGEMENTS OF APPROVAL MARKS

Model A

(see paragraph 4.4 of this Regulation)

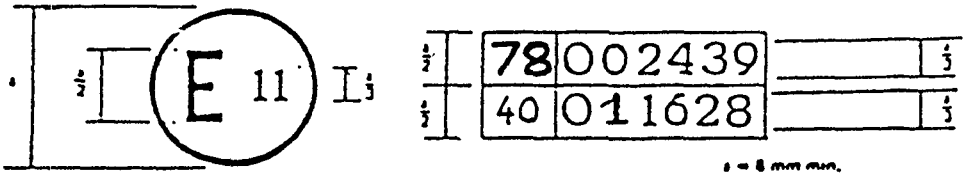


The above approval mark affixed to a vehicle shows that the vehicle type concerned has, with regard to braking, been approved in the United Kingdom (E 11) pursuant to Regulation No. 78 under approval number 002439. The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of the Regulation in its original form.

[1] Strike out what does not apply.

Model B

(see paragraph 4.5 of this Regulation)



The above approval mark affixed to a vehicle shows that the vehicle type concerned has been approved in the United Kingdom (E 11) pursuant to Regulations Nos. 78 and 40.(*). The first two digits of the approval numbers indicate that, at the dates when the respective approvals were granted, Regulation No. 78 had not been modified, and Regulation No. 40 already included the 01 series of amendments.

ANNEX 3. BRAKING TESTS AND PERFORMANCE

1. 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 the 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 prescribed 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. 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.

(*) This latter number is given as an example only.

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. The tests must be conducted in the conditions specified in this annex.

1.4.1.3. The limits prescribed for minimum performance, whether for tests with vehicle unladen or laden, shall be those laid down below for each subcategory of vehicles.

1.4.1.4. 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 connection being subject to a certain margin of tolerance. The minimum performance prescribed for each category must be attained.

1.4.3. *Type-O with engine connected*

Tests must also be carried out at various speeds, the lowest being equal to 30% of the maximum speed of the vehicle and the highest being equal to 80% of that speed. The performance figures measured and the behaviour of the vehicle must be recorded in the test report.

1.4.4. *Special type-O test with engine disconnected (brakes subject to wetting)*

This test will be carried out on vehicles of categories L_1, L_2, L_3 and L_4.

The test procedure is identical to the type-O test except for the provisions for wetting the brakes as described in paragraph 2.1.4 of this annex.

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

1.5.1. *With repeated braking*

1.5.1.1. The service brakes of category L_3, L_4 and L_5 vehicles, 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. The test is carried out for each of both brakes individually. If a brake acts on two or more wheels, it will be sufficient to subject this brake to the type-I test.

Category of vehicles	*Conditions*	V_1 *km/h*	V_2 *km/h*	Δt *sec*	*n*
L_3		80% V_{max} $\leq$ 120	1/2 V_1	35	10
L_4, L_5		80% V_{max} $\leq$ 120	1/2 V_1	45	10

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,

Δt = 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 Δ t, the duration may be increased; in any event, in addition to the time necessary for braking and accelerating the vehicle, a period of five 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 m/sec² 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 continously 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. *Residual performance*

At the end of the type-I test (test described in paragraph 1.5.1 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 60% of the figure recorded in the reference test prescribed in paragraphs 2.4.4, 2.5.3 and 2.6.3 respectively of this annex.

2. PERFORMANCE OF BRAKING DEVICES

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 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.

2.1.4. *Provisions relating to type-O tests with brakes subject to wetting*

2.1.4.1. The test with brakes subject to wetting shall be carried out under the same conditions as the test with dry brakes. There shall be no alteration or adjustment of the brake system other than fitting the equipment to allow brake wetting. In the case of vehicles of category L_3 where the front and rear brakes can be applied separately, the brakes shall be tested independently.

2.1.4.2. The test equipment shall continuously wet the brakes for each test run at a flow rate of 15 l/hr for each brake. Two disc brakes on one wheel will be considered as two brakes.

2.1.4.3. For exposed or partly exposed disc brakes, the prescribed amount of water shall be directed on to the rotating disc in such a manner that it is equally distributed on the surface or surfaces of the disc swept by the friction pad or pads.

2.1.4.3.1. For fully exposed disc brakes, the water shall be directed on to the surface(s) of the disc one quarter of a revolution in advance of the friction pad(s).

2.1.4.3.2. For partly exposed disc brakes, the water shall be directed on to the surface(s) of the disc one quarter of a revolution in advance of the shield or baffle.

2.1.4.3.3. The water shall be directed on to the surface(s) of the disc(s) in a continuous jet, in a direction perpendicular to the surface of the disc, from single jet nozzles so positioned as to be between the inner extremity and a point two-thirds of the distance from the outer extremity of the part of the disc swept by the friction pad(s) (see figures in appendix).

2.1.4.4. For fully enclosed disc brakes, the water shall be directed onto both sides of the shield or baffle at a point and in a manner corresponding with that described in paragraphs 2.1.4.3.1 and 2.1.4.3.3 of this annex. Where the nozzle would be coincident with a ventilation or inspection port, the water shall be applied one quarter of a revolution in advance of the said port.

2.1.4.5. Where, in the preceding paragraphs 2.1.4.3 and 2.1.4.4 it is not possible to apply the water in the position specified owing to the presence of some fixed part of the vehicle, the water shall be applied at the first point, exceeding one quarter of a revolution, where uninterrupted application is possible.

2.1.4.6. To ensure correct wetting of the brakes, the vehicle shall be driven with the wetting equipment operating for a distance of not less than 1.0 km at the test speed prior to the application of the brakes being tested.

2.1.4.7. For drum brakes, the prescribed amount of water shall be distributed equally on either side of the braking device (that is, on the stationary back plate and the rotating drum) from nozzles so positioned as to be two-thirds of the distance from the outer circumference of the rotating drum to the wheel hub.

2.1.4.8. Subject to the requirements of the preceding subparagraph and to the requirements that no nozzle shall be within 15° of or coincident with a ventilation or inspection port on the stationary black plate, the test equipment for drum brakes shall be so positioned as to obtain the optimum uninterrupted application of water.

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,

$S \leq V^2/55$ (corresponding to a mean deceleration of 2.1 m/sec²);

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

$S \leq V^2/75$ (corresponding to a mean deceleration of 2.9 m/sec²),

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

The stopping distance *S* must be:

$S \leq V^2/110$ (corresponding to a mean deceleration of 4.2 m/sec²).

2.2.4. Force applied to:

Hand control: ≤ 20 kgf;
Foot control: ≤ 40 kgf.

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,

$S \leq V^2/110$ (corresponding to a mean deceleration of 4.2 m/sec²),

And in the case of a vehicle with the wheels asymmetrically arranged,

$S \leq V^2/100$ (corresponding to a mean deceleration of 3.9 m/sec²),

The stopping distance achieved with either brake operated alone being required to be $S \leq V^2/45$.

2.3.3. Force applied to:

Hand control: ≤ 20 kgf;
Foot control: ≤ 40 kgf.

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: 80 km/h;

2.4.1.2. Test with one brake only: 60 km/h.

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

2.4.2.1. Braking with the front brake only:

$S \leq V^2/100$ (corresponding to a mean deceleration of 3.9 m/sec²).

2.4.2.2. Braking with the rear brake only:

$S \leq V^2/80$ (corresponding to a mean deceleration of 3.1 m/sec²).

2.4.2.3. Braking with both brakes together:

$S \leq V^2/150$ (corresponding to a mean deceleration of 5.8 m/sec²).

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

Braking with both brakes together:

$S \leq V^2/130$ (corresponding to a mean deceleration of 5.0 m/sec²).

2.4.4. *Test with vehicle laden (type-I reference test)*

2.4.4.1. Where the vehicle is equipped so that each of both brakes can only be operated individually, the vehicle shall be tested with each of the brakes individually using the control forces applied for the type-O test in accordance with paragraphs 2.4.2.1 and 2.4.2.2 of this annex.

2.4.4.2. Where the vehicle is equipped with a brake operating on both wheels together, the vehicle shall be tested with only the brake which operates on both wheels, using the control forces applied for the type-O test in accordance with paragraph 2.4.2.3 of this annex.

2.4.4.3. The stopping distances or mean decelerations shall be recorded.

2.4.5. Force applied to:

Hand control: ≤ 20 kgf;
Foot control: ≤ 50 kgf.

2.5. *Provisions relating to tests of vehicles of category L_4*

2.5.1. *Test speed V = 80 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:

$S \leq V^2/130$ (corresponding to a mean deceleration of 5.0 m/sec²).

2.5.3. *Test with vehicle laden (type-I reference test)*

2.5.3.1. Where the vehicle is equipped so that each of both brakes can only be operated individually, the vehicle shall be tested with each of the brakes individually

using the control forces applied for the type-O test in accordance with paragraph 2.5.2 of this annex (vehicle laden).

2.5.3.2. Where the vehicle is equipped with a brake operating on all wheels together, the vehicle shall be tested with only the brake which operates on all wheels, using the control forces applied for the type-O test in accordance with the conditions prescribed in paragraph 2.5.2. of this annex (vehicle laden).

2.5.3.3. The stopping distances or mean decelerations shall be recorded.

2.5.4. Force applied to:

Hand control: ≤ 20 kgf;
Foot control: ≤ 50 kgf.

2.6. *Provisions relating to tests of vehicles of category L_5*

2.6.1. *Test speed V = 80 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:

$S \leq V^2/130$ (corresponding to a mean deceleration of 5.0 m/sec²),

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

$S \leq V^2/50$ (corresponding to a mean deceleration of 1.9 m/sec²).

2.6.3. *Test with vehicle laden (type-I reference test)*

2.6.3.1. Where the vehicle is equipped so that each of both brakes can only be operated individually, the vehicle shall be tested with each of the brakes individually using the control forces applied for the type-O test in accordance with paragraph 2.6.2.2 of this annex (vehicle laden).

2.6.3.2. Where the vehicle is equipped with a brake operating on all wheels together, the vehicle shall be tested with only the brake which operates on all wheels, using the control forces applied for the type-O test in accordance with the conditions prescribed in paragraph 2.6.2.2 of this annex (vehicle laden).

2.6.3.3. The stopping distances or mean decelerations shall be recorded.

2.6.4. 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 an 18% up or down gradient.

2.6.5. Force applied to:

Hand control: ≤ 20 kgf;
Foot control: (even where this control actuates both the front and the rear brake): ≤ 50 kgf.

2.7. *Performance levels attained with brakes subject to wetting*

The mean deceleration to be attained with wet brake(s) between 0.5 and 1.0 second after application shall be at least 60% of that attained with dry brake(s) when the same control force is applied.

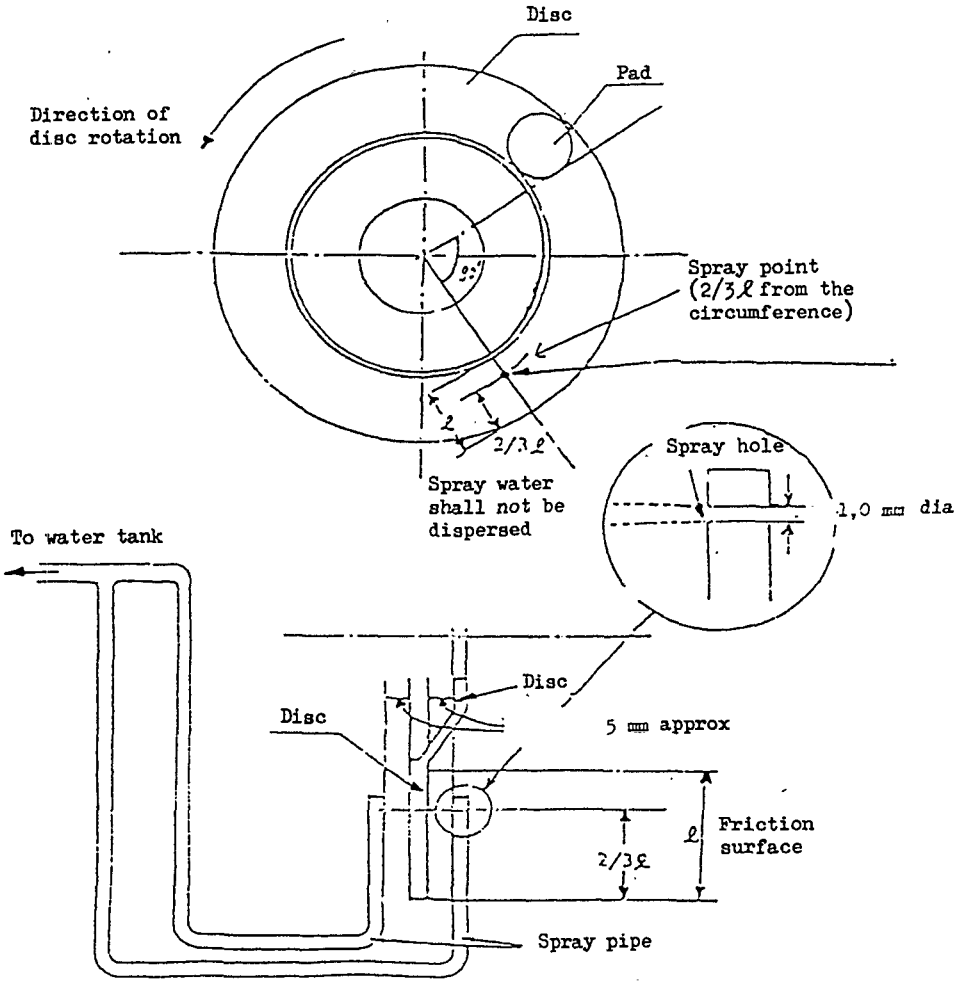
The control force used, which must be applied as quickly as possible, shall be equivalent to that required to attain deceleration of 3 m/s² with dry brake(s).

At no time during the wet brake test shall the deceleration exceed 120% of that attained with dry brakes.

(*) Vehicles of category L_5 of which the maximum speed "V_{max}" does not exceed 80 km/h are to be tested at a speed of 0.9 V_{max}.

ANNEX 3. — *Appendix*

METHOD OF WATER APPLICATION



Authentic texts of the Regulation: English and French.

Registered ex officio *on 15 October 1988.*

PROCÈS-VERBAL CONCERNING MODIFICATIONS TO REGULATION NO. 15, AS REVISED[1], ANNEXED TO THE AGREEMENT[2] OF 20 MARCH 1958 CONCERNING THE ADOPTION OF UNIFORM CONDITIONS OF APPROVAL AND RECIPROCAL RECOGNITION OF APPROVAL FOR MOTOR VEHICLE EQUIPMENT AND PARTS

The text of the modifications reads as follows:

Annex 7, add the following table:

"Reference fuel No. 2: CEC RF 08-A-85

Type: Premium petrol, lead-free

	Limits and units min.	max.	ASTM method
Research octane number	95.0		D 2699
Motor octane number	85.0		D 2700
Density at 15° C	0.748	0.762	D 1298
Reid vapour pressure	0.56 bar	0.64 bar	D 323
Distillation			
initial boiling point	24° C	40° C	D 86
10 vol. percent point	42° C	58° C	D 86
50 vol. percent point	90° C	110° C	D 86
90 vol. percent point	155° C	180° C	D 86
final boiling point	190° C	215° C	D 86
Residue		2 %	D 86
Hydrocarbon analysis			
alkenes		20 vol. %	D 1319
aromatics	(including 5 vol. % max. benzole*)	45 vol. %	D 1319 *D 3606/D 2267
alkanes	balance		D 1319
Ratio hydrocarbon/ hydrogen	ratio		
Oxidation stability	480 min.		D 525
Existent gum		4 mg/100 ml	D 381
Sulphur content		0.04 % mass	D 1266/D 2622/ D 2785
Copper corrosion at 50° C		1	D 130
Lead content		0.005 g/l	D 3237
Phosphorus content		0.0013 g/l	D 3231

Addition of oxygen-containing components prohibited".

[1] United Nations, *Treaty Series*, vol. 740, p. 365; vol. 955, p. 446; vol. 1037, p. 403; vol. 1078, p. 351; vol. 1253, p. 277, and vol. 1358, p. 295.

[2] The Group of Experts on the Construction of Vehicles of the Inland Transport Committee of the Economic Commission for Europe, at its eighty-third session from 20 to 23 October 1987, found it necessary to make modifications to Regulation No. 15, as revised. The Secretary-General of the United Nations, acting in his capacity as depositary, has established the corresponding procès-verbal, which applies to the copies of the final text of the Regulation, as revised, which were transmitted to the Contracting Parties to the Agreement, and has caused the modifications to be effected in the English and French texts of the Agreement. The text of the modifications is published for information by the Secretariat.