

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>

ENTRY INTO FORCE of Regulation No. 45 (*Uniform provisions concerning the approval of headlight cleaners for power-driven vehicles and the approval of vehicles with regard to headlight cleaners*)

The said Regulation came into force on 1 July 1981 in respect of Finland and Sweden, in accordance with article 1 (5) of the Agreement.

*Regulation No. 45*

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF HEADLAMP CLEANERS FOR POWER-DRIVEN VEHICLES AND THE APPROVAL OF VEHICLES WITH REGARD TO HEADLAMP CLEANERS

1. SCOPE

This regulation applies to:

- I. Headlamp cleaners for power-driven vehicles,
- II. Their installation on power-driven vehicles.

I. CLEANERS

2. DEFINITIONS

For the purposes of this Regulation:

- 2.1. "Headlamp cleaner" means a complete device with which all or part of the light emitting surface of a headlamp can be cleaned;
- 2.2. "Fluid container" means that part of the headlamp cleaner in which—in the appropriate cases—the cleaning fluid is stored;
- 2.3. "Cleaning period" means the period of time necessary for the requirements specified in paragraph 7 below to be met, including any pre-treatment period;
- 2.4. "Type of headlamp cleaner" means headlamp cleaners which do not differ in such essential respects as: \*
  - 2.4.1. the trade name or mark;
  - 2.4.2. the cleaning principle employed;

\* Headlamp cleaners shall not be considered as different in type because of differences in fluid consumption, cleaning period or the fitting of cleaning elements, provided that compliance with this Regulation is verified by the technical service responsible for the approval tests.

<sup>1</sup> United Nations, *Treaty Series*, vol. 335, p. 211; for subsequent actions, see references in Cumulative Indexes Nos. 4 to 14, as well as annex A in volumes 915, 917, 926, 932, 940, 943, 945, 950, 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, 1059, 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 and 1235.

- 2.4.3. the principle employed for actuating the cleaner;
- 2.4.4. different geometric dimensions of the headlamp, if this implies any modification of the components of the cleaner.

### 3. APPLICATION FOR APPROVAL

- 3.1. The application for approval of a type of headlamp cleaner shall be submitted by the holder of the trade name or mark or by his duly accredited representative. It shall specify either the type number or the approval number of the headlamp(s) for which the cleaner is intended.
- 3.2. The application shall be accompanied by the undermentioned documents, in triplicate, giving the following particulars:
  - 3.2.1. Drawings showing in sufficient detail the installation on the vehicle, the parts relevant to the headlamp, the position of the approval mark and the cleaning principle employed. Where appropriate, the part of the illuminating surface of the headlamp relevant to the cleaner shall also be shown,
  - 3.2.2. A brief technical description indicating the length of the cleaning period, the consumption of cleaning fluid and the minimum capacity of the container provided,
  - 3.2.3. If required by the technical service responsible for conducting the approval tests, technical documentation and further samples,
  - 3.2.4. Instructions for installation.
- 3.3. In addition, the following samples shall be submitted:
  - 3.3.1. A separate complete headlamp cleaning device;
  - 3.3.2. A sample, complete with the corresponding headlamp(s) installed as described in paragraph 3.2.1, either on a suitable test fixture or on a vehicle representative of the type to be approved, in such a manner as to allow regular operation of the cleaner.

### 4. MARKINGS

- 4.1. The cleaner submitted for approval shall bear the following marks clearly legible and indelible:
  - 4.1.1. The trade name or mark of the applicant;
  - 4.1.2. The type designation;
  - 4.1.3. In the case of electrically operated parts, the nominal voltage.
- 4.2. Every cleaner shall bear a space of sufficient size for the approval mark: this space shall be shown in the drawing referred to in paragraph 3.2.1.

### 5. APPROVAL

- 5.1. The approval of a type of headlamp cleaner shall extend only to the operating principle employed for the cleaning of the types of headlamps indicated in the application for approval.
- 5.2. If the type of headlamp cleaner submitted for approval pursuant to this Regulation meets the requirements of paragraphs 6 and 7 below, approval for that type of cleaner shall be granted.

- 5.3. An approval number shall be assigned to each type approved. Its first two digits 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 this number to another type of headlamp cleaner.
- 5.4. Notice of approval or of refusal of approval of a type of headlamp cleaner pursuant to this Regulation shall be communicated to the Parties to the Agreement applying this Regulation, by means of a form conforming to the model in annex I to this Regulation, and of drawings and photographs of the cleaner supplied by the applicant for approval, in a format not exceeding A4 (210 × 297 mm), or folded to that format, and on an appropriate scale.
- 5.5. There shall be affixed conspicuously and in a readily accessible place specified on the approval form to every headlamp cleaner conforming to a type approved under this Regulation, an international approval mark consisting of:
  - 5.5.1. a circle surrounding the letter “E” followed by the distinguishing number of the country granting approval; \*
  - 5.5.2. an approval number.
- 5.6. The approval mark shall be clearly legible and be indelible.
- 5.7. Annex 3, section I, to this Regulation gives an example of the arrangement of the approval mark.

#### 6. GENERAL SPECIFICATIONS

- 6.1. The headlamp cleaner shall be designed and constructed to clean those parts of the light-emitting surface of the headlamp which distribute the passing beam and the driving beam so that at least the cleaning effect specified in paragraph 7 below is achieved.
- 6.2. The headlamp cleaner shall be furthermore so designed that:
  - 6.2.1. When parts of the headlamp cleaner in the rest position(s) are on the headlamps' illuminating surface, the photometric values of the headlamps, as submitted to the test, measured at the points listed in the appropriate headlamp Regulation for which minimum values are specified, shall not be reduced by more than 5 per cent in any normal rest position(s) of those parts, with respect to those measured before installation of the cleaner device; in no case, shall these values be less than the values prescribed in the Regulation in question;
    - 6.2.1.1. Paragraph 6.2.1 is not applicable when the headlamp and the parts of the headlamp cleaner referred to in paragraph 6.2.1 form a complete assembly during the approval of the headlamp;
  - 6.2.2. In all operating conditions, except in rest position, not more than 10 per cent of the effective light-emitting surface of the headlamps are covered by mechanical parts;

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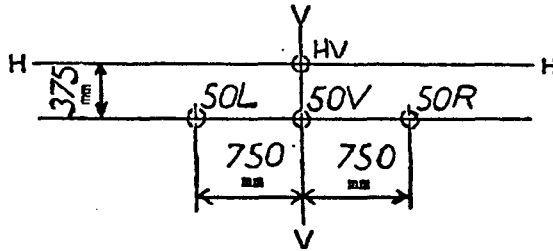
\* 1 for the Federal Republic of Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for Czechoslovakia, 9 for Spain, 10 for Yugoslavia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 for the German Democratic Republic, 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland and 21 for Portugal. 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.

- 6.2.3. It is able to operate satisfactorily at all temperatures between  $-10^{\circ}\text{C}$  and  $+35^{\circ}\text{C}$  and at speeds between 0 and 130 km/h (or the maximum speed of the vehicle if it is below 130 km/h); this shall not apply, however, if the cleaner is blocked by snow or ice; the headlamp cleaner shall remain undamaged if exposed to a temperature of  $-35^{\circ}\text{C}$  and of  $+80^{\circ}\text{C}$  respectively for a period of one hour;
- 6.2.4. In normal use, despite the vibration to which it may be subjected, its satisfactory operation continues to be ensured;
- 6.2.5. It will not be functionally damaged due to water, ice or snow accumulating on it during normal operation of the vehicle, not even if the cleaning liquid is frozen;
- A temporary failure due to freezing or the deposit of snow shall not be considered as damage, provided that the device can be made to work again by simple means;
- 6.2.6. If a fluid container is provided, it shall contain sufficient liquid for at least 50 cleaning periods;
- 6.2.7. If a fluid is used, the device can be operated without damage for test purposes with a mixture consisting of 50 per cent methyl alcohol or isopropyl alcohol and 50 per cent water;
- 6.2.8. Its parts do not hinder the adjustment of the headlamps or the inserting or changing of filament lamps; if necessary, the cleaner or parts of it may be detachable, if their removal can be made with simple tools.
- 6.3. Parts of the headlamp cleaner which, in the rest position(s) and/or during operation, form part of the external surface of the vehicle, shall meet the following requirements;
- 6.3.1. The parts shall not exhibit, directed outwards, any pointed or sharp parts or any projections of such shape, dimensions, direction or hardness as to be likely to increase the risk or seriousness of bodily injury to a person hit or brushed by the bodywork;
- 6.3.2. No protruding part on the external surface shall have a radius of curvature of less than 2.5 mm; this requirement shall not apply to parts of a hardness not exceeding 60 shore A;
- 6.3.3. In cases where the cleaner comprises a wiper, paragraph 6.3.2 above shall not apply to the wiper blades or to any supporting members. However, these units shall be so made as to have no sharp angles or pointed or cutting parts of a non-functional nature. Any wiper shaft shall be furnished with a protective casing having a radius of curvature of not less than 2.5 mm and a surface of not less than  $50\text{ mm}^2$ .
- 6.3.4. The provisions of paragraphs 6.3.1, 6.3.2 and 6.3.3 above shall not apply to those parts of the headlamp cleaner which are located so that, in static conditions, they cannot be contacted by a sphere 100 mm in diameter.
- 6.4. The conformity with specifications of paragraphs 6.2.3, 6.2.4, 6.2.5 and 6.2.7 shall be certified by the applicant. In the case of doubt, the technical service responsible for conducting the approval tests can verify that these requirements have been met.

## 7. CLEANING EFFICIENCY VERIFICATION

- 7.1. The efficiency of the cleaner shall be tested in accordance with the requirements of annex 4 to this Regulation, the intensity of illumination at the points on the measuring screen which are specified below shall, after every cleaning period amount to at least 70 per cent of the values measured with the sample when clean.

*Diagram of Measuring Points on a Screen*



### 7.2. Measuring points for the passing light

- 7.2.1. Headlamps approved in respect of the passing beam only (marking C or HC).  
Measuring points: 50 R (L) and 50 V.\*
- 7.2.2. Headlamps approved in respect of the passing beam and the driving beam (marking CR, HCR, C + R, C + HR, HC + R or HC + HR).  
Measuring points: 50 R (L) (and 50 V if in the same headlamps, different optic systems for the driving light and the passing light are provided).

### 7.3. Measuring point for the driving light

Measuring point: HV.

- 7.4. The measuring points shall be located as shown in the above sketch, on a screen situated 25 m from the headlamp and perpendicular to its axis.

## 8. MODIFICATION OF THE TYPE

- 8.1. Every modification of the type of headlamp cleaner shall be notified to the administrative department which approved the type. The department may then either:
- 8.1.1. Consider that the modifications introduced are unlikely to have an appreciable adverse effect and that in any case the cleaner still complies with the requirements; or
- 8.1.2. Require a further test report from the technical service responsible for conducting the tests.
- 8.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 5.4 above to the Parties to the Agreement applying this Regulation.

\* R refers to right-hand driving.  
L refers to left-hand driving.

## 9. CONFORMITY OF PRODUCTION

- 9.1. Every headlamp cleaner bearing an approval mark as prescribed under this Regulation shall conform to the type approved and satisfy the requirements of paragraphs 6 and 7 of this Regulation.
- 9.2. In order to verify conformity as prescribed in paragraph 9.1 above, a sample bearing the approval mark pursuant to this Regulation shall be taken from the production run.

## 10. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

- 10.1. The approval granted in respect of a type of headlamp cleaner pursuant to this Regulation may be withdrawn if the requirements laid down in paragraph 9.1 above are not complied with or if the cleaner taken fails to pass the tests prescribed in paragraph 9.2 above.
- 10.2. If a Party to the Agreement applying 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".

## 11. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a type of headlamp cleaner under 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".

## II. INSTALLATION ON VEHICLES

### 12. DEFINITIONS

For the purposes of this Regulation:

- 12.1. "Approval of the vehicle" means approval of a vehicle type with regard to the installation of headlamp cleaners;
- 12.2. "Vehicle type" means vehicles which do not differ in such essential respects as:
  - 12.2.1. The type of headlamp cleaner;
  - 12.2.2. The geometric arrangements of the headlamp cleaning equipment, if this implies any modification of its operation.

### 13. APPLICATION FOR APPROVAL

- 13.1. The application for approval of a vehicle type with regard to the installation of headlamp cleaners shall be submitted by the vehicle manufacturer or by his duly accredited representative. It shall specify either the type number of the approval number of the headlamp(s) for which the cleaner is intended.
- 13.2. The application shall be accompanied by the undermentioned documents, in triplicate, giving the following particulars:

- 13.2.1. drawings showing in sufficient detail the installation on the vehicle, the parts relevant to the headlamp, the position of the approval mark and the cleaning principle employed. Where appropriate, the part of the illuminating surface of the headlamp relevant to the cleaner shall also be shown;
- 13.2.2. a brief technical description indicating the length of the cleaning period, the consumption of cleaning fluid and the minimum capacity of the container provided;
- 13.2.3. a sample, complete with the corresponding headlamp(s), installed as described in paragraph 13.2.1. on a vehicle representative of the type to be approved, in such a manner as to allow regular operation of the cleaner ;
- 13.2.4. if required by the technical service responsible for conducting approval tests, technical documentation and further samples.

#### 14. MARKING

- 14.1. The vehicle submitted for approval shall bear a space of sufficient size for the approval mark, in accordance with annex 3 to this Regulation.

#### 15. APPROVAL

- 15.1. The approval of a vehicle type with regard to the fitting of a headlamp cleaner shall extend to the installation of a specific type of cleaner on that type of vehicle.
- 15.2. If the vehicle type submitted for approval pursuant to this Regulation meets the requirements of paragraph 16 below, approval for that type of vehicle shall be granted.
- 15.3. An approval number shall be assigned to each type approved. Its first two digits 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 may not assign the same number to another vehicle type.
- 15.4. 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 applying this Regulation by means of a form conforming to the model in annex 2 to this Regulation and of drawings supplied by the applicant for approval, in a format not exceeding A4 (210 × 297 mm), or folded to this format, and on an appropriate scale.
- 15.5. 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:
  - 15.5.1. A circle surrounding the letter "E" followed by the distinguishing number of the country granting approval; \*
  - 15.5.2. 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 15.5.1.
- 15.6. 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 15.5 need

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\* See paragraph 5.5.1, footnote\*.

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 15.5.

- 15.7. The approval mark shall be clearly legible and be indelible.
- 15.8. The approval mark shall be placed close to or on the plate affixed by the manufacturer showing the characteristics of the vehicle.
- 15.9. Annex 3, section II, to this Regulation gives examples of arrangements of approval marks.

#### 16. GENERAL SPECIFICATIONS

- 16.1. The cleaner shall be of a type approved under this Regulation.
  - 16.1.1. Cleaning of all passing headlamps shall be compulsory. If there are more than two driving headlamps, the cleaning of one pair of these headlamps shall be sufficient.
  - 16.2. The cleaner shall be designed to retain its efficiency despite the vibrations to which it may be subjected on the vehicle.
  - 16.3. If the cleaner has a fluid container this may be combined with the fluid container for the windscreen washers and shall satisfy the following requirements:
    - 16.3.1. The capacity of the fluid container shall be sufficient for at least 50 cleaning periods; if the container feeds both the windscreen washer and the headlamp cleaner, this value shall be increased by one litre;
    - 16.3.2. It shall be easy to check the level of the fluid, and the opening for filling shall be readily accessible.
  - 16.4. Neither the cleaner nor any part of it shall prevent the adjustment of the headlamp and the replacement of the filament lamp. In case of need, the cleaner or part of it shall be removable with simple tools. No other prescribed or permissible lighting installations shall be impaired in their effectiveness either by parts or by the operation of the headlamp cleaner, except during the cleaning period; it must above all not systematically deposit any dirt when in normal service, on the light-emitting surfaces of other lighting installations.

#### 17. MODIFICATIONS OF VEHICLE TYPE

- 17.1. Every modification of the vehicle type shall be notified to the administrative department which approved the vehicle type. The department may then either:
  - 17.1.1. Consider that the modifications introduced are unlikely to have an appreciable adverse effect and that in any case the vehicle still complies with the requirements; or
  - 17.1.2. Require a further test report from the technical service responsible for conducting the tests.
- 17.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 15.4 above to the Parties to the Agreement applying this Regulation.



#### 18. CONFORMITY OF PRODUCTION

- 18.1. Every vehicle bearing an approval mark as prescribed under this Regulation shall conform to the vehicle type approved and satisfy the requirements of paragraph 16 above.
- 18.2. In order to verify conformity as prescribed in paragraph 18.1 above, a vehicle bearing the approval mark pursuant to this Regulation shall be taken from the production run.

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

- 19.1. The approval granted in respect of vehicle type pursuant to this Regulation may be withdrawn if the requirements laid down in paragraph 18.1 above are not complied with or if the vehicle taken fails to pass the tests prescribed in paragraph 18.2 above.
- 19.2. If a Party to the Agreement applying 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".

#### 20. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a type of vehicle under 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".

#### 21. NAMES AND ADDRESSES OF THE 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 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

(Maximum format: A4 (210 x 297 mm))

NAME  
OF ADMINISTRATION



*Communication concerning the approval (or refusal or withdrawal of approval or production definitely discontinued) of a type of headlamp cleaner, pursuant to Regulation No. 45*

Approval No. . . . .

- 1. Headlamp cleaner
  - 1.1. Type . . . . .
  - 1.2. Approved for fitting to the following vehicle types . . . . .
  - 1.3. Approved for the following types of headlamp . . . . .
- 2. Trade name or mark . . . . .
- 3. Manufacturer's name and address . . . . .
- 4. If applicable, name and address of manufacturer's representative . . . . .
- 5. Brief description of cleaner . . . . .
- 6. Submitted for approval on . . . . .
- 7. Technical service responsible for conducting approval tests . . . . .
- 8. Date of report issued by that service . . . . .
- 9. Number of report issued by that service . . . . .
- 10. Approval granted/refused\* . . . . .
- 11. Position of the approval mark on the headlamp cleaner . . . . .
- 12. Place . . . . .
- 13. Date . . . . .
- 14. Signature . . . . .
- 15. The following documents bearing the approval number shown above are annexed to this communication:
  - . . . drawings, diagrams and plans of the cleaner;
  - . . . photographs.

\* Strike out what does not apply.

ANNEX 2

(Maximum format: A4 (210 × 297 mm))

NAME  
OF ADMINISTRATION



*Communication concerning the approval (or refusal or withdrawal of approval or production definitely discontinued) of a vehicle type with regard to the installation of headlamp cleaners, pursuant to Regulation No. 45*

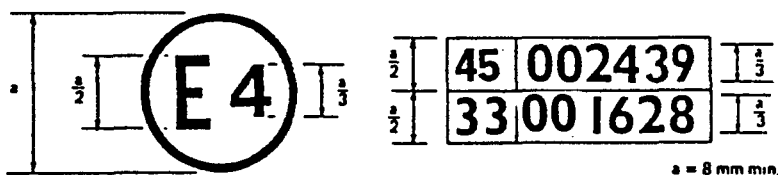
Approval No. . . . .

- 1. Installation of a headlamp cleaner
- 1.1. Type . . . . .
- 1.2. Approval on the following vehicle types . . . . .
- 2. Trade name or mark of the vehicle . . . . .
- 3. Manufacturer's name and address . . . . .
- 4. If applicable, name and address of manufacturer's representative . . . . .
- 5. Vehicle submitted for approval on . . . . .
- 6. Technical service responsible for conducting approval tests . . . . .
- 7. Date of report issued by that service . . . . .
- 8. Number of report issued by that service . . . . .
- 9. Approval granted/refused\* . . . . .
- 10. Position of the approval mark on the vehicle . . . . .
- 11. Place . . . . .
- 12. Date . . . . .
- 13. Signature . . . . .
- 14. The following documents are annexed to this communication:
  - . . . drawing showing the installation of the headlamp cleaner;
  - . . . drawing showing headlamps on the vehicle type for which this approval is valid.

\* Strike out what does not apply.



*Model B*  
(See paragraph 15.6)



The above approval mark affixed to a vehicle shows that the vehicle type concerned has been approved in the Netherlands (E 4) pursuant to Regulations Nos. 45 and 33.\* The approval numbers indicate that, at the dates when the respective approvals were given, Regulations No. 45 and 33 were still in their original form.

## ANNEX 4

### PROCEDURE FOR TESTING THE PERFORMANCE OF HEADLAMP CLEANERS

#### *General comment*

The tests shall be carried out in still air at an ambient temperature of  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ .

During the various phases of the test, precautions shall be taken to avoid a thermal shock to the headlamp glass.

#### 1. *Test equipment*

- 1.1. A mixture of water and dirt to be applied to the headlamp shall consist of nine parts by weight of silica sand with a particle size of 0–100  $\mu\text{m}$  corresponding to distribution reproduced in the following table, one part by weight of vegetable carbon dust with a particle size of 0–100  $\mu\text{m}$ , 0.2 parts by weight of NaCMC \*\* and an appropriate quantity of distilled water with a conductivity of  $\leq 10 \mu\text{S/cm}$  for the application. The mixture shall not be more than fourteen days old.

Particle size (in $\mu\text{m}$ )	Particle size distribution %
0 to 5	$12 \pm 2$
5 to 10	$12 \pm 3$
10 to 20	$14 \pm 3$
20 to 40	$23 \pm 3$
40 to 80	$30 \pm 3$
80 to 100	$9 \pm 3$

- 1.2. The photometric measuring equipment shall be equivalent to that used in connection with the approval of headlamps.

\* The latter number is given merely as an example.

\*\* NaCMC represents the sodium salt of carboxymethylcellulose, customarily referred to as CMC. The NaCMC used in the dirt mixture shall have a degree of substitution (DS) of 0.6–0.7 and a viscosity of 200–300 cP for a 2 per cent solution at  $20^{\circ}\text{C}$ .

1.3. If not tested on the vehicle, the headlamp(s) and the cleaner shall be mounted on a test fixture which reproduces the installation on the vehicle and permits normal operation of both cleaner and headlamp(s).

2. *Photometric measurements of the headlamp when clean*

The light-emitting surface of the headlamp shall be clean and the headlamp cleaner shall be in the stationary position. The photometric measurements shall be made in compliance with the specifications of the relevant Regulation, as well as the measurements prescribed in paragraph 3 below. The illumination shall then be measured at the measuring points specified in paragraph 7 of this Regulation.

3. *Evaluation of cleaning efficiency*

3.1. The mixture shall be applied evenly to the entire light-emitting surface of the headlamp and shall then be allowed to dry. This procedure shall be repeated, if necessary, until the luminous intensity has been reduced to a value of between 15 and 20 per cent of the values measured according to paragraph 2 of this annex.

3.1.1. Not later than two hours after the dirt has dried the headlamps shall be switched on and the headlamp cleaner shall be operated for the cleaning period specified by the manufacturer. This cleaning period shall not exceed 10 sec.

3.1.2. For the purpose of the test on electrical operated devices the voltage for the electrically operated parts of the headlamp cleaner shall be 13.0 V in the case of 12 V systems and 27.0 V in the case of 24 V systems. As far as the measurements of illumination are concerned, they shall be carried out on the basis of the approval tests for the headlamps.

3.2. If a cleaning fluid is used for the cleaning operation, the test shall be performed with distilled water with a conductivity of not more than 10  $\mu\text{S}/\text{cm}$ .

3.3. If the cleaner is designed to be manually operated, the cleaning shall be accomplished with a maximum of five operations within the time limit specified in paragraph 3.1.1 above.

3.4. Where the cleaner is not electrically operated, the operating conditions for the test shall be specified by the technical service in accordance with the manufacturer.

3.5. After the cleaning operation the headlamp shall be allowed to dry. The illumination at the measuring points shall be measured again as required in paragraph 2 of this annex and the values thus obtained shall comply with the requirements specified in paragraph 7 of this Regulation.

3.6. If the result of the measurements does not meet the requirements according to paragraph 3.5 above it is permitted, in the case of a headlamp cleaner operated with a cleaning fluid, to try to achieve better results by adjusting the jet of the fluid.

*Authentic texts: English and French.*

*Registered ex officio on 1 July 1981.*