



GHANA  
STANDARDS  
AUTHORITY

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**GHANA STANDARD**

**DGS 4051:2019**

**ECE 51R00:1983**

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**UNIFORM PROVISIONS CONCERNING  
THE APPROVAL OF MOTOR VEHICLES  
HAVING AT LEAST FOUR WHEELS WITH  
REGARD TO THEIR NOISE EMISSIONS  
(UNECE 51R00 Rev. 2 -11 January 1983)**

**This document is a Draft Ghana Standard. This document shall not be used or referred to as a Ghana Standard.**

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**ICS**

**Ref. No. DGS 4051:2019**

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## National Foreword

The Ghana Standards Authority is the National Statutory Body responsible for the development and promulgation of Ghana Standards.

The Ghana Standards Authority is a member of the African Organization for Standardization (ARSO), the International Organization for Standardization (ISO) and an affiliate member of the International Electrotechnical Commission (IEC).

This Ghana Standard is an identical adoption of the *UNECE 51R02 Rev. 2 – 29 NOVEMBER 2011 - Uniform provisions concerning the approval of motor vehicles having at least four wheels with regard to their noise emissions* and lays down the essential requirements to which such motor vehicles and their noise emissions must conform.

Throughout the text of this standard, read "...this UNECE Regulation..." to mean "...this Ghana Standard..."

The National Committee responsible for this standard (DGS 4051:2019) is the Technical Committee on Automobile Standards (GSA/TC 05).

This is the 1<sup>st</sup> edition.

Users of this standard should note that the standard undergoes revision from time to time and any references to it statutorily imply its latest edition.

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UNITED NATIONS

## 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

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*Addendum 50: Regulation No. 51*

Date of entry into force as an annex to the Agreement:  
15 July 1982

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF MOTOR VEHICLES  
HAVING AT LEAST FOUR WHEELS WITH REGARD TO THEIR NOISE EMISSIONS

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Regulation No. 51

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF MOTOR VEHICLES HAVING  
AT LEAST FOUR WHEELS WITH REGARD TO THEIR NOISE EMISSIONS

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Regulation No. 51

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF MOTOR  
VEHICLES HAVING AT LEAST FOUR WHEELS WITH REGARD TO  
THEIR NOISE EMISSIONS

1. SCOPE

This Regulation contains provisions relating to the noise emitted by motor vehicles having at least four wheels.

2. DEFINITIONS

For the purposes of this Regulation,

- 2.1. "Approval of a vehicle" means the approval of a vehicle type with regard to noise;
- 2.2. "Vehicle type" means a category of motor vehicles which do not differ in such essential respects as:
- 2.2.1. the lines and constituent materials of the body (more particularly the engine compartment and its soundproofing);
- 2.2.2. the length and width of the vehicle;
- 2.2.3. the type of engine (petrol or diesel; two-stroke or four-stroke); number and capacity of cylinders; number of carburettors; arrangement of valves; maximum horse-power and corresponding engine speed (rpm) etc.;
- 2.2.4. number and ratios of gears;
- 2.3. "Noise reduction system" means a complete set of components necessary for limiting the noise made by a motor vehicle and its exhaust;
- 2.4. "Noise reduction systems of different types" means noise reduction systems which differ in such essential respects as:
- 2.4.1. that their components bear different trade names or marks;
- 2.4.2. that the characteristics of the materials constituting a component are different or that the components differ in shape or size;
- 2.4.3. that the operating principles of at least one component are different;
- 2.4.4. that their components are assembled differently;
- 2.5. "Noise reduction system component"<sup>1/</sup> means one of the individual constituent parts whose assembly constitutes the noise reduction system;

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<sup>1/</sup> These components are, in particular, the exhaust manifold, the exhaust piping, the expansion chamber, the silencer proper, etc. If the engine intake is equipped with the air filter and the filter's presence is essential to ensure observance of the prescribed sound-level limits, the filter must be regarded as a component of the "noise reduction system" and bear the marking prescribed in paragraphs 3.2.2. and 4.1.

2.6. "Maximum weight" means the technically permissible maximum weight declared by the vehicle manufacturer (this weight may be greater than the maximum weight authorized by the national administration).

3. APPLICATION FOR APPROVAL

3.1. The application for approval of a vehicle type with regard to noise shall be submitted by its manufacturer or by his duly accredited representative.

3.2. It shall be accompanied by the undermentioned documents and the following particulars in triplicate:

3.2.1. a description of the vehicle type with regard to the items mentioned in paragraph 2.2. above. The numbers and/or symbols identifying the engine type and the vehicle type shall be specified;

3.2.2. a list of the components, duly identified, constituting the noise reduction system;

3.2.3. a drawing of the assembled noise reduction system and an indication of its position on the vehicle;

3.2.4. detailed drawings of each component to enable it to be easily located and identified, and a specification of the materials used.

3.3. At the request of the technical service conducting approval tests, the vehicle manufacturer shall, in addition, submit a sample of the noise reduction system.

3.4. A vehicle representative of the vehicle type to be approved shall be submitted to the technical service conducting approval tests.

4. MARKINGS

4.1. The components of the noise reduction system shall bear:

4.1.1. the trade name or mark of the manufacturer of the noise reduction system and of its components; and

4.1.2. the trade description given by the manufacturer.

4.2. Such markings shall be **clearly** legible and be indelible.

5. APPROVAL

5.1. If the vehicle type submitted for approval pursuant to this Regulation meets the requirements of paragraphs 6. and 7. below, approval of that vehicle type shall be granted.

5.2. 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 may not assign the same number to the same vehicle type equipped with another type of noise reduction system or to another vehicle type.

- 5.3. 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 this Regulation, by means of a form conforming to the model in annex 1 to this Regulation and of drawings of the silencing system supplied by the applicant for approval in a format not exceeding A 4 (210 x 297 mm), or folded to that format and on an appropriate scale.
- 5.4. 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:
- 5.4.1. a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval<sup>2/</sup>;
- 5.4.2. 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 5.4.1.
- 5.5. 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 5.4.1. 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 5.4.1.

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<sup>2/</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, 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 number thus assigned shall be communicated by the Secretary-General of the United Nations to the Contracting Parties to the Agreement.



- 5.6. The approval mark shall be clearly legible and be indelible.
- 5.7. The approval mark shall be placed close to or on the vehicle data plate affixed by the manufacturer.
- 5.8. Annex 2 to this Regulation gives examples of arrangements of the approval mark.
6. SPECIFICATIONS
- 6.1. General specifications
- 6.1.1. The vehicle, its engine and its noise reduction system shall be so designed, constructed and assembled 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.
- 6.1.2. The noise reduction system shall be so designed, constructed and assembled as to be able to resist the corrosive action to which it is exposed.
- 6.2. Specifications regarding sound levels
- 6.2.1. Methods of measurement
- 6.2.1.1. The noise made by the vehicle type submitted for approval shall be measured by the two methods described in annex 3 to this Regulation for the vehicle in motion and for the vehicle when stationary.<sup>3/</sup>
- 6.2.1.2. The two values measured in accordance with the provisions of paragraph 6.2.1.1. above shall be entered in the test report and on a form conforming to the model in annex 1 to this Regulation.
- 6.2.2. Sound level limits
- 6.2.2.1. The sound level measured by the method described in annex 3, paragraph 3.1. shall not exceed the limits stated below:
- |   |          |
|---|----------|
| 6.2.2.1.1. Vehicles of category M <sub>1</sub> <sup>4/</sup>  | 80 dB(A) |
| 6.2.2.1.2. Vehicles of category M <sub>2</sub> <sup>4/</sup><br>having a maximum<br>weight not exceeding 3.5 t: | 81 dB(A) |

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<sup>3/</sup> A test is made on a stationary vehicle in order to provide a reference value for administrations which use this method to check vehicles in use.

<sup>4/</sup> As defined in annex 4 "Classification of vehicles".

- 6.2.2.1.3. Vehicles of category  $M_2^{4/}$   
having a maximum  
weight exceeding 3.5 t and  
vehicles of category  $M_3^{4/}$  82 dB(A)
- 6.2.2.1.4. Vehicles of categories  $M_2^{4/}$   
and  $M_3^{4/}$  having an  
engine power of 147 kW(ECE)  
or more 85 dB(A)
- 6.2.2.1.5. Vehicles of category  $N_1^{4/}$  81 dB(A)
- 6.2.2.1.6. Vehicles of categories  $N_2^{4/}$   
and  $N_3^{4/}$ : 86 dB(A)
- 6.2.2.1.7. Vehicles of category  $N_3^{4/}$   
having an engine power  
of 147 kW(ECE) or more: 88 dB(A)
7. MODIFICATIONS OF THE VEHICLE TYPE OR OF THE TYPE OF NOISE REDUCTION SYSTEM
- 7.1. Every modification of the vehicle type or of the noise reduction system shall be notified to the administrative department which approved the vehicle type. The department may then either:
- 7.1.1. consider that the modifications made are unlikely to have appreciable adverse effects; 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 5.3. 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 noise reduction system with which it was approved and satisfy the requirements of paragraph 6. 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. Production shall be deemed to conform to the requirements of this Regulation if the levels measured by the method described in annex 3, paragraph 3.1. do not exceed by more than 3 dB(A) the value measured during type approval nor by more than 1 dB(A) the limits prescribed in paragraph 6.2.2.

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<sup>4/</sup> As defined in annex 4 "Classification of vehicles".

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 the vehicle has failed to pass the tests provided for in paragraph 8.2. 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 to the Agreement which apply 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 production of a 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. TRANSITIONAL PROVISIONS

- 11.1. For vehicle types described in paragraphs 6.2.2.1.1., 6.2.2.1.2., 6.2.2.1.5., 6.2.2.1.6. and 6.2.2.1.7., the provisions of this Regulation shall be applicable to approvals granted on or after 1 October 1982.
- 11.2. For vehicle types described in paragraphs 6.2.2.1.3., and 6.2.2.1.4., the provisions of this Regulation shall be applicable to approvals granted on or after 1 October 1983.
- 11.3. For vehicle types described in paragraph 6.2.2.1.1. and fitted with a manually-operated gearbox having more than four forward gears, the provision in annex 3, paragraph 3.1.2.3.2.2. of this Regulation shall be applicable to approvals granted on or after 1 October 1983. Until that date, these types of vehicles, notwithstanding annex 3, paragraph 3.1.2.3.2.2., may be tested in third gear.

11.4. Approvals granted before 1 October 1983, in application of paragraph 11.3. above shall cease to be valid as from 1 January 1985.

11.5. At the request of the manufacturer, approvals may be granted in application of this Regulation before the dates mentioned in paragraphs 11.1. to 11.3. above.

12. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS

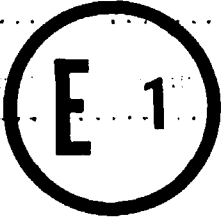
The Parties to the Agreement which apply this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or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

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Annex 1

(Maximum format: A 4 (210 x 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 its noise emission pursuant to Regulation No. 51

Approval No. ....

1. Trade name or mark of the vehicle .....
2. Vehicle type .....
3. Manufacturer's name and address .....
4. If applicable, name and address of manufacturer's representative .....
5. Kind of engine: e.g., positive-ignition, compression ignition, etc. 1/ .....
6. Cycles: two-stroke or four-stroke (if applicable) .....
7. Cylinder capacity (if applicable) .....
8. Engine power (state how measured) .....
9. Speed at which maximum power is developed (rpm) .....
10. Number of gears .....
11. Gears used .....
12. Final drive ratio(s) .....
13. Type and dimensions of tyres (by axle) .....
14. Maximum permissible weight including semi-trailer (where applicable) ...

1/ If a non-conventional engine is used, this should be stated.

15. Brief description of the noise reduction system .....
16. Load conditions of vehicles during test .....
17. For stationary vehicle test: location and orientation of the microphone (by reference to diagrams in appendix to annex 3) .....
18. Sound levels:
  - Vehicle in motion ..... dB(A) at steady speed  
before acceleration of ..... km/h
  - Vehicle stationary ..... dB(A) with engine running  
at ..... rpm.
19. Deviations in calibration of sound level meter .....
20. Vehicle submitted for approval on .....
21. Technical service responsible for conducting approval tests .....
22. Date of report issued by that service .....
23. Number of report issued by that service .....
24. Approval granted/refused \*/ .....
25. Position of approval mark on the vehicle .....
26. Place .....
27. Date .....
28. Signature .....
29. The following documents, bearing the approval number shown above, are annexed to this communication:
  - ... drawings, diagrams and plans of the engine and of the noise reduction system;
  - ... photographs of the engine and of the noise reduction system;
  - ... list of components, duly identified constituting the noise reduction system.

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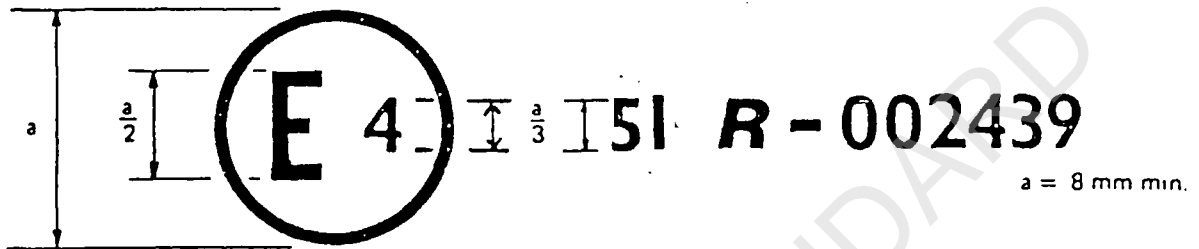
\*/ Strike out what does not apply.

Annex 2

ARRANGEMENTS OF THE APPROVAL MARK

Model A

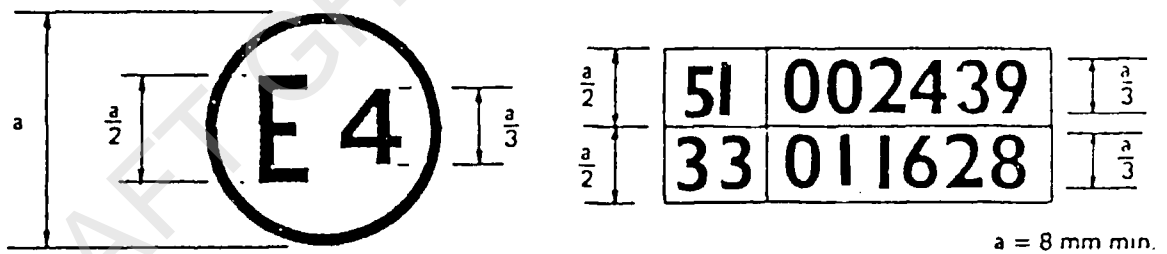
(See paragraph 5.4. of this Regulation)



The above approval mark affixed to a vehicle shows that the vehicle type concerned has, with regard to its noise emission, been approved in the Netherlands (E 4) pursuant to Regulation No. 51 under approval No.002439. The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of Regulation No.51 in its original form.

Model B

(See paragraph 5.5. of this Regulation)



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.51 and 33. <sup>1/</sup> The approval numbers indicate that, at the dates when the respective approvals were given, Regulation No.51 had not been modified, but Regulation No.33 included the 01 series of amendments.

<sup>1/</sup> The latter number is given as an example only.

Annex 3

METHODS AND INSTRUMENTS FOR MEASURING THE NOISE  
MADE BY MOTOR VEHICLES.

1. MEASURING INSTRUMENTS

- 1.1. A sound level meter of high-precision complying at least with the specifications of the Publication No.651 (1979) "Precision sound level meters" of the International Electrotechnical Commission (IEC) concerning the characteristics of sound level meters shall be used. Measurement shall be carried out with a weighting network and a time constant conforming to curve A and the "fast response" time.
- 1.2. The sound level meter shall be calibrated against a standard noise source immediately before and after each series of test runs. If the meter reading obtained from either of these calibrations deviates by more than 1 dB from the corresponding reading taken at the time of the last free-field calibration (i.e. the annual calibration) the test shall be considered invalid. The actual deviation shall be stated in the approval document (annex 1).
- 1.3. The rotational speed of the engine shall be measured by an independent tachometer whose accuracy is within 3 per cent of the actual speed of rotation.

2. CONDITIONS OF MEASUREMENT

2.1. Site

- 2.1.1. The measurements shall be made at an open site where the ambient and wind noise levels are at least 10 dB(A) below the noise level being measured. The above-mentioned area may take the form of an open space of 50 m radius having a central part of at least 10 m radius, practically level, consisting of concrete, asphalt or similar material and not covered with powdery snow, tall grass, loose soil, ashes or the like. During the test no one shall be in the measurement area, except the observer and the driver, whose presence must have no influence on the meter reading.
- 2.1.2. The surface of the test track used to measure the noise of vehicles in motion shall be such as not to cause excessive tyre noise.



- 2.1.3. Measurements shall not be made under adverse weather conditions. Any sound peak which appears to be unrelated to the characteristics of the general sound level of the vehicle shall be ignored in taking the readings. If a wind guard is used, its influence on the sensitivity and the directional characteristics of the microphone shall be taken into account.
- 2.2. Vehicle
- 2.2.1. Measurements shall be made on unladen vehicles and, except in the case of non-separable vehicles, without trailer or semi-trailer.
- 2.2.2. The tyres of the vehicle shall be of the correct size and shall be inflated to the correct pressure(s) for the vehicle in its unladen condition.
- 2.2.3. Before the measurements are started, the engine shall be brought to its normal operating conditions as regards:
- 2.2.3.1. temperatures
- 2.2.3.2. tuning
- 2.2.3.3. fuel
- 2.2.3.4. sparking plugs, carburettor(s), etc., (as appropriate).
- 2.2.4. If the vehicle is fitted with more than two-wheel drive, it shall be tested in the drive which is intended for normal road use.
- 2.2.5. If the vehicle is equipped with devices which are not necessary for its propulsion, but which are used whilst the vehicle is in normal service on the road, those devices shall be in operation in accordance with the specifications of the manufacturer.
3. METHODS OF TESTING
- 3.1. Measurement of noise of vehicles in motion
- 3.1.1. General conditions of test (see appendix, fig.1)
- 3.1.1.1. At least two measurements shall be made on each side of the vehicle. Preliminary measurements may be made for adjustment purposes, but shall be disregarded.
- 3.1.1.2. The microphone shall be situated  $1.2 \text{ m} \pm 0.1 \text{ m}$  above ground level at a distance of  $7.5 \text{ m} \pm 0.2 \text{ m}$  from the path of the vehicle's centre line, measured along the perpendicular (PP') to that line.

- 3.1.1.3. Two lines, AA' and BB', parallel to line PP' and situated respectively 10 m forward and 10 m rearward of that line shall be marked out on the test runway. The vehicle shall approach line AA' at a steady speed as specified below. When the front of the vehicle reaches the line AA', the throttle shall be fully opened as rapidly as practicable and held in the fully-opened position until the rear of the vehicle crosses line BB'; the throttle shall then be closed again as rapidly as possible.
- 3.1.1.4. In the case of articulated vehicles consisting of two non-separable units regarded as a single vehicle, the semi-trailer shall be disregarded in determining when line BB' is crossed.
- 3.1.1.5. The maximum value recorded at each measurement shall constitute the result of the measurement.
- 3.1.2. Determination of the approach speed
- 3.1.2.1. Symbols used
- The letter symbols used in this paragraph have the following meaning:
- S: engine rotation speed as indicated under item 9 of annex 1.  
 $N_A$ : uniform engine rotational speed at the approach of line AA'.  
 $V_A$ : uniform vehicle speed at the approach of line AA'.
- 3.1.2.2. Vehicle with no gearbox
- For vehicles with no gearbox or with no transmission controls, the uniform speed at the approach of line AA' will be such that either:
- $N_A = 3/4 S$  and  $V_A \leq 50$  km/h  
or:  
 $V_A = 50$  km/h.
- 3.1.2.3. Vehicle with a manually-operated gearbox
- 3.1.2.3.1. Approach speed
- The vehicle will approach the line AA' with uniform speed such that either:
- $N_A = 3/4 S$  and  $V_A \leq 50$  km/h  
or:  
 $V_A = 50$  km/h.
- 3.1.2.3.2. Choice of the gear ratio
- 3.1.2.3.2.1. Vehicles of categories  $M_1$  and  $N_1^{1/}$  fitted with a gearbox having four or less forward gears shall be tested in second gear.

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<sup>1/</sup> As defined in annex 4.

3.1.2.3.2.2. Vehicles of categories  $M_1$  and  $N_1$ <sup>1/</sup> fitted with a gearbox having more than four forward gears shall be tested successively in second and third gear. The average value of the sound levels recorded for these two conditions shall be calculated.

3.1.2.3.2.3. Vehicles of categories other than  $M_1$  and  $N_1$ <sup>1/</sup> whose number of forward gears is X (including those obtained by way of an auxiliary transmission or a multi-gear axle) will be tested successively with the gear selection equal to or higher than  $X/2$ <sup>2/</sup>. Only the condition giving the highest noise level shall be reported.

3.1.2.4. Automatic transmission<sup>3/</sup>

3.1.2.4.1. Vehicles without a manual selector

3.1.2.4.1.1. Approach speed

The vehicle shall approach the line AA' at various uniform speeds of 30, 40, 50 km/h or at 3/4 of the maximum on-road speed if this value is lower. The condition giving the highest noise level shall be retained.

3.1.2.4.2. Vehicles equipped with a manual selector with X positions

3.1.2.4.2.1. Approach speed

The vehicle shall approach the line AA' at a uniform speed corresponding to

either:  $N_A = 3/4 S$  and  $V_A \leq 50$  km/h

or:  $V_A = 50$  km/h and  $N_A < 3/4 S$ .

Nevertheless, if there is a down-shift to first gear during the test, the vehicle speed ( $V_A = 50$  km/h) can be increased up to a maximum of 60 km/h in order to avoid the down-shift.

3.1.2.4.2.2. Position of the manual selector

If a manual selector with X forward positions is fitted to the vehicle, the test shall be performed with the selector in the position X; external down-shifting (for example, kick-down) shall be excluded. If an automatic down-shift occurs after the line AA', the test will be repeated using the position X-1 and X-2 as necessary, until the selector is placed in the highest position allowing the test to be performed without automatic down-shift (without using kick-down).

<sup>2/</sup> If the ratio  $X/2$  is not an integer, the higher gear shall be selected.

<sup>3/</sup> All vehicles equipped with automatic transmission.

3.1.2.4.2.3. Auxiliary gears

If the vehicle is fitted with an auxiliary manual transmission or a multi-gear axle, the position used for normal urban driving shall be used. In all cases, the special selector's positions for slow movements, parking, or braking shall be excluded.

3.2. Measurement of noise emitted by stationary vehicles

3.2.1. Test site - local conditions

3.2.1.1. Measurements should be made on a stationary vehicle in an area which does not present a great deal of disturbance to the sound field.

3.2.1.2. Every open space will be considered as a suitable test site which consists of a flat area made of concrete, asphalt or hard material having a high reflective capacity, excluding compressed or other earth surfaces, in which one can trace a rectangle whose sides are at least three metres from the extremities of the vehicle, inside which there is no noticeable obstacle, and in particular the vehicle shall not be positioned at a distance less than 1 m from a pavement edge when the exhaust noise is measured.

3.2.1.3. During the test nobody shall be in the measurement area, except the observer and the driver, whose presence must have no influence on the meter reading.

3.2.2. Disturbance noise and wind interference

The ambient noise levels at each measuring point shall be at least 10 dB(A) below the levels measured during the tests in the same points.

3.2.3. Measuring method

3.2.3.1. Number of measurements

At least three measurements shall be carried out at each measuring point. The measurements should only be considered as valid if the difference between the recordings of three measurements made immediately one after the other is not greater than 2 dB(A). The highest value given by these three measurements will constitute the result.

3.2.3.2. Positioning and preparation of the vehicle

The vehicle shall be located in the centre part of the test area with the gear lever in neutral position and the clutch engaged.

If the design of the vehicle does not allow this, the vehicle shall be tested in conformity with the manufacturer's prescriptions for stationary engine testing. Before each series of measurements, the engine must be brought to its normal operating condition, as specified by the manufacturer.

3.2.3.3. Measuring of noise in proximity to the exhaust (see appendix, fig.2)

3.2.3.3.1. Positions of the microphone

3.2.3.3.1.1. The height of the microphone above the ground should be equal to that of the outlet pipe of the exhaust gases, but in any event shall be limited to a minimum value of 0.2 m.

3.2.3.3.1.2. The microphone must be pointed towards the orifice of the gas flow and located at a distance of 0.5 m from the latter.

3.2.3.3.1.3. Its axis of maximum sensitivity must be parallel to the ground and must make an angle of  $45^\circ \pm 10^\circ$  with the vertical plane containing the direction of the gas flow. The instructions of the manufacturer of the sound level meter with regard to this axis must be respected. In relation to this plane, the microphone shall be placed in such a way as to obtain the maximum distance from the longitudinal median plane of the vehicle; in case of doubt, the position which gives the maximum distance from the contour of the vehicle shall be selected.

3.2.3.3.1.4. In the case of an exhaust provided with two or more outlets spaced less than 0.3 m apart, only one measurement is made; the microphone position is related to the outlet nearest to one extreme edge of the vehicle or, when such outlet does not exist, to the outlet which is the highest above the ground.

3.2.3.3.1.5. For vehicles with a vertical exhaust (e.g. commercial vehicles) the microphone should be placed at the height of the exhaust outlet. Its axis should be vertical and oriented upwards. It should be placed at a distance of 0.5 m from the side of the vehicle nearest to the exhaust.

3.2.3.3.1.6. For vehicles having an exhaust provided with outlets spaced more than 0.3 m apart, one measurement is made for each outlet as if it were the only one, and the highest level is noted.

3.2.3.3.2. Operating conditions of the engine

3.2.3.3.2.1. The engine is operated at a constant speed having the following value:  $3/4$  S for both controlled ignition engines and for diesel engines.

3.2.3.3.2.2. When constant engine speed is reached, the throttle shall be returned swiftly to the idle position. The sound level shall be measured during a period of operation consisting of a brief maintenance of constant engine speed and throughout the deceleration period, the maximum deflection of the needle being taken as the test value.

3.2.3.3.3. Measurement of noise levels

The noise level is measured according to the conditions stated in paragraph 3.2.3.3.2. above. The highest noise level measured will be noted and retained.

4. INTERPRETATION OF RESULTS

4.1. The measurements of noise emitted by the vehicle in motion shall be considered valid if the difference between the two consecutive measurements on the same side of the vehicle is not more than 2 dB(A).

4.2. The figure recorded shall be that corresponding to the highest sound level. Should that figure exceed by more than 1 dB(A) the maximum sound level authorized for the category of vehicle tested, a second series of two measurements shall be made. Three out of the four results so obtained must fall within the prescribed limits.

4.3. To allow for lack of precision in the measuring instrument the figures read from it during measurement shall each be reduced by 1 dB(A).

Annex 3 - Appendix

Measuring positions for vehicles in motion

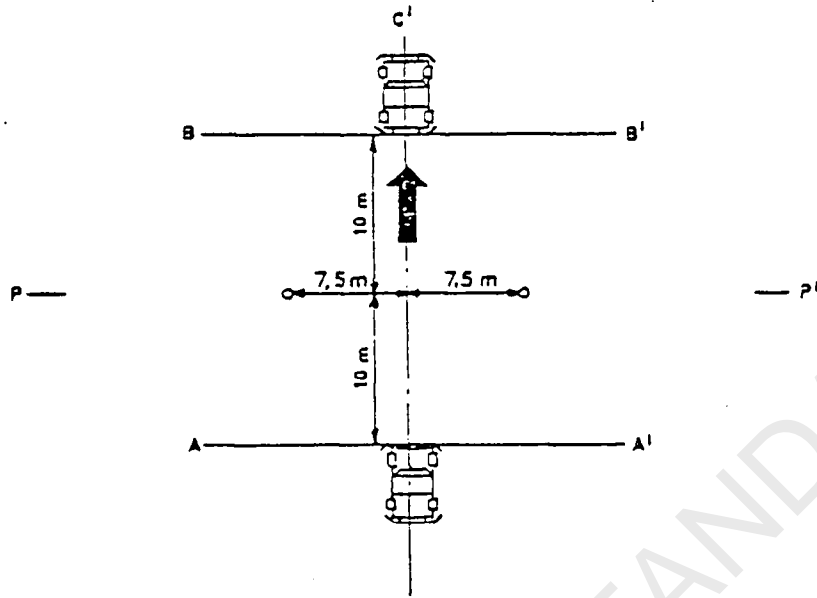
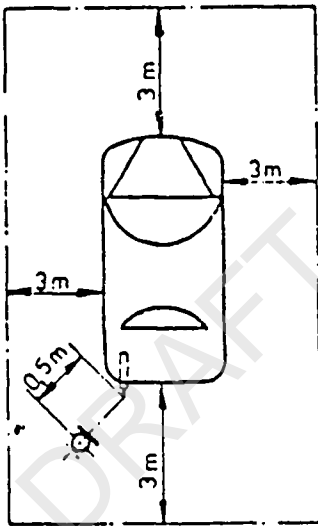


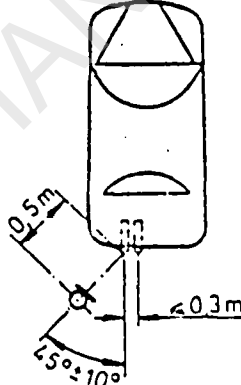
Fig.1

Measuring positions for stationary vehicles  
 (examples)

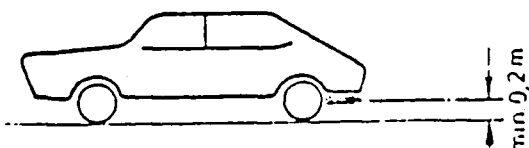
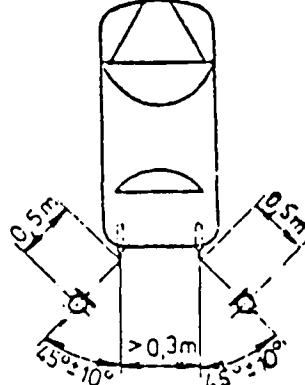
(1)



(2)

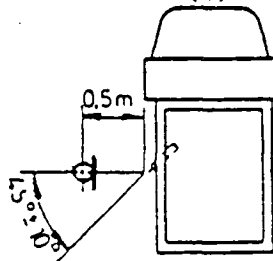


(3)

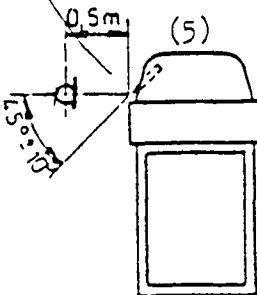


Height of exhaust pipe centre-line

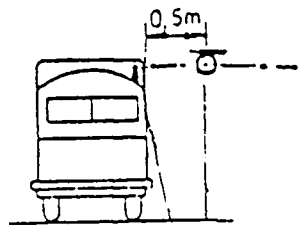
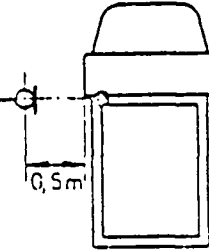
(4)



(5)



(6)



Exhaust pipe to top

Fig.2

Annex 4

CLASSIFICATION OF VEHICLES<sup>1/</sup>

1. Category M: Power-driven 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>2/</sup>
- 1.1. 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.
- 1.2. 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.
- 1.3. 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.
2. Category N: Power-driven 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
- 2.1. Category N<sub>1</sub> Vehicles used for the carriage of goods and having a maximum weight not exceeding 3.5 metric tons.
- 2.2. 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.
- 2.3. Category N<sub>3</sub> Vehicles used for the carriage of goods and having a maximum weight exceeding 12 metric tons.
3. Remarks
- 3.1. 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.
- 3.2. The equipment and installations carried on certain special-purpose vehicles not designed for the carriage of passengers (crane vehicles, workshop vehicles, publicity vehicles, etc.) are assimilated to goods for the purposes of paragraph 2. above.

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<sup>1/</sup> In conformity with Regulation No.13 (E/ECE/324-E/ECE/TRANS/505/Rev.1/Add.12/Rev.2), paragraph 5.2.

<sup>2/</sup> Articulated vehicles comprising two non-separable but articulated units shall be considered as single vehicles.