

**COUNCIL DIRECTIVE****of 16 December 1980****on the approximation of the laws of the Member States relating to the engine power of motor vehicles****(80/1269/EEC)**

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

HAS ADOPTED THIS DIRECTIVE:

Having regard to the Treaty establishing the European Economic Community, and in particular Article 100 thereof,

*Article 1*

For the purposes of this Directive, 'vehicle' means any motor vehicle intended for use on the road, with or without bodywork, having at least four wheels and a maximum design speed exceeding 25 km/h, with the exception of vehicles which run on rails and of agricultural tractors and machinery.

Having regard to the proposal from the Commission <sup>(1)</sup>,

Having regard to the opinion of the European Parliament <sup>(2)</sup>,

Having regard to the opinion of the Economic and Social Committee <sup>(3)</sup>,

*Article 2*

Whereas the technical requirements which motor vehicles must satisfy pursuant to certain national laws relate *inter alia* to the method of measuring engine power which must be used to indicate the engine power of a vehicle type;

No Member State may refuse to grant EEC type-approval or national type-approval in respect of a vehicle, or refuse or prohibit the sale, registration, entry into service or use of a vehicle, on grounds relating to its engine power if this has been determined in accordance with Annexes I and II.

Whereas those requirements differ from one Member State to another; whereas this results in technical barriers to trade which must be eliminated by all Member States adopting the same requirements either in addition to or in place of their existing rules, in order in particular to allow the EEC type-approval procedure which was the subject of Council Directive 70/156/EEC of 6 February 1970 on the approximation of the laws of the Member States relating to the type-approval of motor vehicles and their trailers <sup>(4)</sup>, as last amended by Directive 80/1267/EEC <sup>(5)</sup>, to be introduced in respect of each type of vehicle,

*Article 3*

Any amendments necessary for adapting the requirements of the Annexes to take account of technical progress shall be adopted in accordance with the procedure laid down in Article 13 of Directive 70/156/EEC.

*Article 4*

1. Member States shall bring into force the provisions necessary in order to comply with this Directive within 18 months of its notification. They shall forthwith inform the Commission thereof.

<sup>(1)</sup> OJ No C 104, 28. 4. 1980, p. 9.

<sup>(2)</sup> OJ No C 265, 13.10. 1980, p. 76.

<sup>(3)</sup> OJ No C 182, 21. 7. 1980, p. 3.

<sup>(4)</sup> OJ No L 42, 23. 2. 1970, p. 1.

<sup>(5)</sup> See page 34 of this Official Journal.

2. Member States shall ensure that the texts of the main provisions of national law which they adopt in the field covered by this Directive are communicated to the Commission.

*Article 5*

This Directive is addressed to the Member States.

Done at Brussels, 16 December 1980.

*For the Council*  
*The President*  
Colette FLESCH

*ANNEX I***DETERMINATION OF ENGINE POWER****1. EEC TYPE-APPROVAL****1.1. Application for EEC type-approval**

The application for EEC type-approval for a vehicle type in respect of the engine power is submitted by the vehicle manufacturer or his authorized representative.

**1.1.1. It must be accompanied by three copies of the document mentioned below and of the following:****1.1.1.1. Information sheet duly completed,****1.1.1.2. Information required in Appendix 1 or 2.****1.1.2. If the technical service responsible for the type-approval tests carries out the tests itself, a vehicle representative of the vehicle type to be approved must be provided.****1.2. Documents**

Where an application within the meaning of 1.1 is accepted, the competent authority must prepare the document, the model for which is contained in Annex II. In order to draw up this document, the competent authority of the Member State conducting the EEC type-approval tests may use the report prepared by an approved or recognized laboratory pursuant to the provisions of this Directive.

**2. SCOPE****2.1. This method applies to internal combustion engines used for the propulsion of category M and N vehicles as defined in Annex I to Directive 70/156/EEC, belonging to either of the following types.****2.1.1. Internal combustion piston engines (positive ignition or diesel), excluding free-piston engines;****2.1.2. Rotary piston engines.****2.2. This method applies to naturally aspirated or supercharged engines.****3. DEFINITIONS**

For the purposes of this Directive,

**3.1. 'Net power' means the power obtained on the test-bed at the end of the crankshaft or its equivalent at the corresponding engine speed with the auxiliaries listed in Table 1. If the power measurement can be carried out with a mounted gearbox only, the efficiency of the gearbox is to be taken into account.****3.2. 'Maximum net power' means the maximum value of the net power measured at full engine load.****3.3. 'Standard-production equipment' means equipment provided by the manufacturer for a particular application.**

**4. ACCURACY OF THE MEASUREMENTS OF FULL LOAD POWER****4.1. Torque**

4.1.1. Subject to 4.1.2, the capacity of the dynamometer must be such that the first quarter of its scale is not used. The measuring system must be accurate to within  $\pm 0.5\%$  of the maximum scale value (excluding the first quarter).

4.1.2. The scale region between one sixth and one quarter of the maximum scale may however be used if the system accuracy at one sixth of the scale is within  $\pm 0.25\%$  of the maximum scale value.

**4.2. Engine speed**

The measurement must be accurate to within  $\pm 0.5\%$ . Engine speed must be measured preferably with an automatically synchronized revolution counter and chronometer (or counter-timer).

**4.3. Fuel consumption**

$\pm 1\%$  overall for the apparatus used.

**4.4. Engine inlet air temperature  $\pm 2^\circ\text{C}$ .****4.5. Barometric pressure  $\pm 2$  mbar.****4.6. Pressure in test-bed exhaust extraction duct (see note 1 to Table 1)****4.7. Pressure in inlet manifold:  $\pm 0.5$  mbar.****4.8. Pressure in vehicle exhaust pipe:  $\pm 2$  mbar.****5. NET POWER OF THE ENGINE****5.1. Tests****5.1.1. *Auxiliary equipment***

During the test, the auxiliary equipment to be fitted as specified below must be installed on the engine, as far as possible in the same position as that in which it would be for the particular use in question.

**5.1.1.1. Auxiliary equipment to be fitted**

The auxiliary equipment to be fitted during the test for determination of the net power of the engine is listed in Table 1 below.

**5.1.1.2. Auxiliary equipment to be removed**

Certain auxiliary equipment which is necessary only for the operation of the vehicle and which may be mounted on the engine must be removed for the test. The following non-exhaustive list is given by way of example:

- air compressor for brakes,
- power steering compressor,
- suspension compressor,
- air-conditioning system,
- cooling equipment for hydraulic transmission and/or gearbox oil.

Where accessories cannot be removed, the power absorbed by them in the unloaded condition may be determined and added to the engine power measured.

TABLE 1

**Auxiliary equipment to be included for the test to determine net power of engine**

No	Auxiliary equipment	If fitted for net power test
1	<b>Intake system</b> Intake manifold Air filter Intake silencer Crankcase emission control system Speed limiting device	Yes, standard-production equipment <sup>(1)</sup>
2	<b>Induction heating device</b> (if possible it shall be set in the most favourable position)	Yes, standard-production equipment
3	<b>Exhaust system</b> Exhaust purifier Manifold Connecting pipes Silencer Tail pipe Exhaust brake <sup>(2)</sup>	Yes, standard-production equipment <sup>(1)</sup>
4	Fuel supply pump <sup>(3)</sup>	Yes, standard-production equipment
5	Carburettor	Yes, standard-production equipment
6	<b>Fuel injection equipment (petrol and diesel)</b> Prefilter Filter Pump High pressure pipe Injector Air intake valve, if fitted <sup>(4)</sup> Governor/control system Automatic full-load stop for the control rack depending on atmospheric conditions	Yes, standard-production equipment
7	<b>Liquid cooling equipment</b> Engine bonnet Bonnet air outlet  Radiator Fan <sup>(6)</sup> Fan cowl Water pump Thermostat <sup>(7)</sup>	No  Yes, standard-production equipment <sup>(5)</sup>
8	<b>Air cooling</b> Cowl Blower <sup>(5)</sup> <sup>(6)</sup>  Temperature regulating device	Yes, standard-production equipment  Yes, standard-production equipment

No	Auxiliary equipment	If fitted for net power test
9	Electrical equipment	Yes, standard-production equipment <sup>(8)</sup>
10	Supercharging equipment Compressor driven either directly or indirectly by the engine, and/or by the exhaust gases Intercooler <sup>(9)</sup> Coolant pump or fan (engine-driven) Coolant flow control device	Yes, standard-production equipment
11	Anti-pollution device	Yes, standard-production equipment

- (1) The complete standard exhaust and intake systems provided for the vehicle must be used in cases where they may have an appreciable effect on the power of the engine (two-stroke engine, positive-ignition engine, etc.) or when the manufacturer so requests. In other cases a check must be made during the test merely to verify that the back pressure at the outlet of the exhaust manifold does not differ by more than 10 mbar from the maximum back pressure specified by the manufacturer and that the pressure in the intake manifold does not differ by more than 1 mbar from the limit specified by the manufacturer for a clean air filter. These conditions may also be created with the test-bed equipment.  
When the complete exhaust system is used in the test laboratory, the exhaust extraction system must not, with the engine in operation, create in the exhaust extraction duct, at the point where it is connected with the exhaust system of the vehicle, a pressure differing from the atmospheric pressure by more than 10 mbar, unless the manufacturer has accepted a higher back pressure prior to the test.
- (2) If an exhaust brake is incorporated in the engine, the throttle valve must be fixed in the fully open position.
- (3) The fuel feed pressure may be adjusted, if necessary, to reproduce pressures existing in the particular engine application (especially when a 'fuel return' system is used).
- (4) The air intake valve is the control valve for the pneumatic governor of the injection pump. The governor or the fuel injection equipment may contain other devices which may affect the amount of fuel injected.
- (5) The radiator, the fan, the fan cowl, the water pump and thermostat must be located in the same relative positions as on the vehicle. The cooling-liquid circulation must be operated by the engine water pump only. Cooling of the liquid may be produced either by the engine radiator or by an external circuit, provided that the pressure loss of this circuit and the pressure at the pump inlet remain substantially the same as those of the engine cooling system. The radiator shutter, if incorporated, must be in the open position.  
Where the fan, radiator and cowl system cannot conveniently be fitted to the engine, the power absorbed by the fan when separately mounted in its correct position in relation to the radiator and cowl (if there is one), must be determined at the speeds corresponding to the engine speeds used for measurement of the engine power either by calculation from standard characteristics or by practical tests. This power, corrected to the standard atmospheric conditions defined in 5.2.2, must be deducted from the corrected power.
- (6) Where a disconnectable fan or blower is incorporated, the test must be carried out with the fan (or blower) connected.
- (7) The thermostat may be fixed in the fully open position.
- (8) Minimum power of the generator: the power of the generator must be limited to that strictly necessary for operating the accessories which are indispensable for the operation of the engine (including electrically driven cooling fan). If the connection of a battery is necessary, a fully charged battery in good order must be used.
- (9) The temperature of the air at the inlet manifold must not exceed that recommended by the engine manufacturer, if it is specified.  
Charge air cooler:  
Cooling of the charge air may be performed either by the engine charge air cooler or by an external cooling system, provided that the pressure and temperature of the air at the charge air cooler outlet are the same as when the original system specified by the engine manufacturer is used.

- 5.1.1.3. **Auxiliary equipment for starting diesel engines**  
For the auxiliary equipment used in starting diesel engines, the two following cases must be considered:
- 5.1.1.3.1. **Electrical starting:** The generator is fitted and it supplies, where necessary, the auxiliary equipment essential for the operation of the engine.
- 5.1.1.3.2. **Starting other than electrical:** If there are any electrically operated accessories essential for the operation of the engine, the generator is fitted and supplies these accessories. Otherwise, it is removed. In either case, the system for producing and accumulating the energy necessary for starting is fitted and operates in the unloaded condition.
- 5.1.2. **Setting conditions**  
The setting conditions for the test to determine net power are indicated in Table 2.

TABLE 2  
Setting conditions

1	Setting of carburetor(s)	Set in accordance with the manufacturer's production specifications and used without further alteration for the particular application
2	Setting of injection pump delivery system	Set in accordance with the manufacturer's production specifications and used without further alteration for the particular application
3	Ignition of injection timing	Standard-production, timing curve specified by the manufacturer and used without further alteration for the particular application
4	Setting of governor	Set in accordance with the manufacturer's production specifications and used without further alteration for the particular application

- 5.1.3. **Net power tests**
- 5.1.3.1. The net power test must consist of a run at full throttle for positive ignition engines and at fixed full load injection-pump setting for diesel engines, the engine being equipped as specified in Table 1.
- 5.1.3.2. Performance data must be obtained under stabilized operating conditions, with an adequate fresh-air supply to the engine. The engine must have been run in accordance with the manufacturer's recommendations. Combustion chambers may contain deposits, but in limited quantity.  
Test conditions such as inlet air temperature must be selected as near to reference conditions (see 5.2) as possible in order to minimize the magnitude of the correction factor.
- 5.1.3.3. The temperature of the inlet air to the engine must be measured within 0.15 m upstream from the point of entry to the air cleaner, or, if no air cleaner is used, within 0.15 m of the air inlet horn. The thermometer or thermocouple shall be shielded from radiant heat and placed directly in the air stream. It must also be shielded from fuel spray-back. A sufficient number of locations must be used to give a representative average inlet temperature. The air flow must not be disturbed by the measuring device.

- 5.1.3.4. No data must be taken until torque, speed and temperature have remained substantially constant for at least one minute.
- 5.1.3.5. The engine speed during a measurement run must not deviate from the selected speed while readings are taken by more than  $\pm 1\%$  or  $\pm 10$  rev/min, whichever is the greater.
- 5.1.3.6. Brake load, fuel consumption and inlet air temperature readings must be taken simultaneously; the reading adopted for measurement purposes must be the average of two stabilized values differing by less than 2% for brake load and fuel consumption.
- 5.1.3.7. A measurement time of not less than 60 seconds must be used when measuring speed or fuel consumption with a manually operated device.
- 5.1.3.8. Fuel
- 5.1.3.8.1. In the case of diesel engines, the fuel used must be as specified in Annex V to Council Directive 72/306/EEC of 21 August 1972 on the approximation of the laws of the Member States relating to the measures to be taken against the emission of pollutants from diesel engines for use in engines <sup>(1)</sup>, with the addition, if necessary, of a commercial liquid or gaseous fuel recommended by the manufacturer. The fuel must not contain any smoke-suppressant additives.
- 5.1.3.8.2. In the case of positive ignition engines, the fuel used must be a commercial fuel, without any supplementary additive. The fuel described in Annex VI to Council Directive 70/220/EEC of 20 March 1970 on the approximation of the laws of the Member States relating to measures to be taken against air pollution by gases from positive-ignition engines of motor vehicles <sup>(2)</sup> as last amended by Directive 78/665/EEC <sup>(3)</sup>, may also be used.
- 5.1.3.9. Cooling of the engine
- 5.1.3.9.1. Liquid-cooled engines  
The temperature of the coolant at the outlet from the engine must be kept within  $\pm 5^\circ\text{C}$  from the upper thermostatically controlled temperature specified by the manufacturer. If no temperature is specified by the manufacturer, the temperature must be  $80 \pm 5^\circ\text{C}$ .
- 5.1.3.9.2. Air cooled engines  
For air-cooled engines, the temperature at a point indicated by the manufacturer must be kept between the maximum value  $T_M$  specified by the manufacturer and  $T_M - 20^\circ\text{C}$ .
- 5.1.3.10. The fuel temperature at the inlet of the injection pump or carburettor must be maintained within the limits set by the manufacturer.
- 5.1.3.11. The temperature of the lubricating oil measured in the oil sump or at the outlet from the oil cooler, if fitted, must be within the limits set by the manufacturer.
- 5.1.3.12. The exhaust gas temperature must be measured at a point in the exhaust pipe(s) adjacent to the outlet flange(s) of the exhaust manifold(s). It must not exceed the value specified by the manufacturer.
- 5.1.3.13. Auxiliary cooling system  
An auxiliary cooling system may be used if necessary to maintain the temperatures within the limits specified in 5.1.3.9. to 5.1.3.12.

(1) OJ No L 190, 20. 8. 1972, p. 1.

(2) OJ No L 76, 6. 4. 1970, p. 1.

(3) OJ No L 223, 14. 8. 1978, p. 48.

5.1.4. *Test procedure*

Take measurements at a sufficient number of engine speeds to define the full load power curve completely between the lowest and the highest engine speeds stated by the manufacturer. This range of speeds must include the speed of revolution at which the engine produces its maximum power. For each speed, the average of two stabilized measurements is taken.

5.1.5. *Measurement of smoke index*

In the case of diesel engines, the exhaust gases must be examined during the test for compliance with the conditions set out in Annex VI to Directive 72/306/EEC.

5.2. **Correction factors**5.2.1. *Definition*

The correction factor is the coefficient K by which the observed power must be multiplied to determine the engine power under the atmospheric reference conditions specified in 5.2.2.

5.2.2. *Atmospheric reference conditions*

5.2.2.1. Temperature: 25 °C.

5.2.2.2. Dry pressure (ps): 990 mbar.

5.2.3. *Conditions to be complied with in the laboratory*

For a test to be valid, the correction factor K must be such that  $0.96 \leq K \leq 1.06$ .

5.2.4. *Determination of correction factors*5.2.4.1. Positive-ignition engines (carburettor or injection) — factor  $K_a$ .

The correction factor is obtained by applying the following formula:

$$K_a = \left( \frac{990}{ps} \right) \cdot \left( \frac{T}{298} \right)^{0.5}$$

where

T = the absolute temperature in K at the air inlet to the engine;

ps = the dry atmospheric pressure in mbar, in other words the total barometric pressure minus water vapour pressure.

5.2.4.2. Diesel engines — factor  $K_d$ 

5.2.4.2.1. Naturally aspirated four-stroke diesel engines, and two-stroke diesel engines

The correction factor is calculated by means of the following formula:

$$K_d = \left( \frac{990}{ps} \right) \cdot \left( \frac{T}{298} \right)^{0.7}$$

where

T = the absolute temperature in K at the air inlet to the engine;

ps = the dry atmospheric pressure in mbar.

5.2.4.2.2. Pressure charged four-stroke diesel engines

5.2.4.2.2.1. Exhaust driven turbo-charged engines

No correction is made to the power. However, when the density of the ambient air differs by more than 5 % from the air density in the reference conditions (25 °C and 1 000 mbar), the test conditions must be noted in the test report.

5.2.4.2.2.2. Mechanically supercharged engines

5.2.4.2.2.1. The ratio  $r$  is defined by the following formula:

$$r = \frac{D}{V \left( \frac{P_2}{P_1} \right) \cdot \left( \frac{T_1}{T_2} \right)}$$

where

$D$  = the amount of fuel delivered in  $\text{mm}^3$  for each engine cycle,

$V$  = the cylinder capacity of the engine in litres,

$P_1$  = the ambient pressure,

$P_2$  = the pressure at the engine inlet manifold,

$T_1$  = the ambient temperature in K (as defined in 5.1.3.3),

$T_2$  = the temperature at the engine inlet manifold in K.

5.2.4.2.2.2. The correction factor for mechanically supercharged engines is the same as that for naturally aspirated engines if  $r$  is equal to or greater than  $50 \text{ mm}^3/\text{litre}$ , and it is equal to 1 if  $r$  is less than  $50 \text{ mm}^3/\text{litre}$ .

### 5.3. Test report

The test report must contain the results and all the calculations required to obtain the net power, as listed in Annex II, together with the characteristics of the engine listed in Appendix 1 or Appendix 2 to this Annex.

### 5.4. Modification of engine type

Any modification of the engine with regard to the characteristics listed in Appendix 1 or Appendix 2 to this Annex must be reported to the competent authority. That authority may then either:

- 5.4.1. consider that the modifications made are not likely to have any substantial effect on the power of the engine, or
- 5.4.2. request that power of the engine be determined by carrying out such tests as it deems necessary.

## 6. NET POWER MEASUREMENT TOLERANCES

- 6.1. The net power of the engine as determined by the technical service may differ by  $\pm 2\%$  from the net power specified by the manufacturer, with a  $1.5\%$  tolerance for the engine speed.
- 6.2. The net power of an engine during a production conformity test may differ by  $\pm 5\%$  from the net power determined in a type-approval test.

*Appendix 1***ESSENTIAL CHARACTERISTICS OF THE ENGINE (1)****(Diesel engines)**

1. **Description of engine**
- 1.1. Make: .....
- 1.2. Type: .....
- 1.3. Cycle: four-stroke/two-stroke (2)
- 1.4. Bore: ..... mm
- 1.5. Stroke: ..... mm
- 1.6. Number and layout of cylinders and firing order: .....
- 1.7. Cylinder capacity: ..... cm<sup>3</sup>
- 1.8. Compression ratio (3): .....
- 1.9. Drawings of combustion chamber and piston crown: .....
- 1.10. Minimum cross-sectional area of inlet and outlet ports: .....
- 1.11. System of cooling
- 1.11.1. Liquid
- Nature of liquid .....
- Circulating pumps: yes/no (2)
- Characteristics or make(s) and type(s): .....
- Drive ratio: .....
- Thermostat: setting: .....
- Radiator: drawing(s) or make(s) and type(s): .....
- Relief valve pressure setting: .....
- Fan: characteristics or make(s) and type(s): .....
- .....
- Fan drive system: .....
- Drive ratio: .....
- Fan cowl: .....

(1) In the case of non-conventional engines and systems, particulars equivalent to those referred to here must be supplied by the manufacturer.

(2) Delete where inapplicable.

(3) Specify the tolerance.

- 1.11.2. Air
  - Blower: characteristics or make(s) and type(s): .....
  - .....
  - Drive ratio: .....
  - Air ducting (standard production): .....
  - Temperature regulation system: yes/no <sup>(1)</sup>. Brief description: .....
  - .....
- 1.11.3. Temperatures permitted by the manufacturer
  - 1.11.3.1. Liquid cooling: Maximum temperature at engine outlet: .....
  - 1.11.3.2. Air cooling: Reference point: .....
  - Maximum temperature at reference point: .....
  - 1.11.3.3. Maximum outlet temperature of the inlet intercooler <sup>(2)</sup>: .....
  - .....
  - 1.11.3.4. Maximum exhaust temperature at the point indicated in 5.1.3.12 above: .....
  - .....
  - 1.11.3.5. Fuel temperature: min. ....
  - max. ....
  - 1.11.3.6. Lubricant temperature: min. ....
  - max. ....
- 1.12. Supercharger: yes/no <sup>(1)</sup>. Description of the system: .....
- .....
- 1.13 Intake system
  - Intake manifold: ..... Description: .....
  - .....
  - Air filter: ..... Make: .....
  - Type: .....
  - Intake silencer: ..... Make: .....
  - Type: .....
- 2. **Additional anti-smoke devices (if any, and if not covered by another heading)**
  - Description and diagrams: .....
- 3. **Air intake and fuel feed**
  - 3.1. Description and diagrams of air intakes and their accessories (Heating device, intake silencer, etc.): .....
  - .....

<sup>(1)</sup> Delete where inapplicable.

- 3.2. Fuel feed
- 3.2.1. Feed pump
- Pressure <sup>(1)</sup>: ..... or characteristic diagram <sup>(1)</sup>: .....
- .....
- 3.2.2. Injection system: .....
- 3.2.2.1. Pump
- 3.2.2.1.1. Make(s): .....
- 3.2.2.1.2. Type(s): .....
- 3.2.2.1.3. Flow rate: ... mm<sup>3</sup> per stroke at ... r/min of the pump <sup>(1)</sup> at full injection rate or characteristic diagram <sup>(1)</sup> (<sup>(2)</sup>) .....
- Indicate the method used: on the engine/on a bench pump <sup>(2)</sup>
- 3.2.2.1.4. Injection advance <sup>(1)</sup>: .....
- 3.2.2.1.4.1. Injection advance curve: .....
- 3.2.2.1.4.2. Timing: .....
- 3.2.2.2. Injection pipes: .....
- 3.2.2.2.1. Length: .....
- 3.2.2.2.2. Internal diameter: .....
- 3.2.2.3. Injector(s)
- 3.2.2.3.1. Make(s): .....
- 3.2.2.3.2. Type(s): .....
- 3.2.2.3.3. Opening pressure: ..... bar <sup>(1)</sup>  
or characteristic diagram <sup>(1)</sup> (<sup>(2)</sup>)
- 3.2.2.4. Regulator
- 3.2.2.4.1. Make(s): .....
- 3.2.2.4.2. Type(s): .....
- 3.2.2.4.3. Speed at beginning of shut-off on full load: ..... r/min
- 3.2.2.4.4. Maximum speed when empty: ..... r/min
- 3.2.2.4.5. Idling speed: ..... r/min
- 3.3. Cold starting device
- 3.3.1. Make(s): .....
- 3.3.2. Type(s): .....
- 3.3.3. Description: .....
4. **Distributor setting or equivalent data**
- 4.1. Maximum valve lift, opening and closing angles or details of alternative distributor systems, in relation to top dead centre: .....

<sup>(1)</sup> Indicate the tolerance.

<sup>(2)</sup> Delete where inapplicable.

- 4.2. Reference and/or setting ranges <sup>(1)</sup>
  
- 5. **Exhaust system**
  - 5.1. Description of exhaust manifold: .....
  - 5.2. Description of the other parts of the exhaust system where the test is performed with the complete exhaust system specified by the manufacturer, or an indication of the maximum back-pressure specified by the manufacturer for maximum power conditions <sup>(1)</sup> .....
  
- 6. **Lubrication system**
  - 6.1. Description of system
    - 6.1.1. Position of lubricant reservoir: .....
    - 6.1.2. Feed system (by pump, injection into intake, mixing with fuel, etc.): .....
  - 6.2. Lubricating pump <sup>(1)</sup>
    - 6.2.1. Make: .....
    - 6.2.2. Type: .....
  - 6.3. Mixture with fuel <sup>(1)</sup>
    - 6.3.1. Percentage: .....
  - 6.4. Oil cooler: yes/no <sup>(1)</sup>
    - 6.4.1. Drawing(s) or make(s) and type(s): .....
  
- 7. **Electrical equipment**
  - Generator/alternator <sup>(1)</sup>: characteristics or make(s) and type(s): .....
  
- 8. **Other auxiliary equipment driven by the engine** (List and brief description if necessary): .....
- .....

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<sup>(1)</sup> Delete where inapplicable.

## Appendix 2

ESSENTIAL CHARACTERISTICS OF THE ENGINE <sup>(1)</sup>

## (Positive ignition engines)

1. **Description of engine**
- 1.1. Make: .....
- 1.2. Type: .....
- 1.3. Cycle: four-stroke/two-stroke <sup>(2)</sup>
- 1.4. Bore: ..... mm
- 1.5. Stroke: ..... mm
- 1.6. Number and layout of cylinders and firing order: .....
- 1.7. Cylinder capacity: ..... cm<sup>3</sup>
- 1.8. Compression ratio <sup>(3)</sup>: .....
- 1.9. Drawings of combustion chamber and piston crown: .....
- 1.10. Minimum cross-sectional area of inlet and outlet ports: .....
- 1.11. System of cooling:
- 1.11.1. Liquid
- Nature of liquid: .....
- Circulating pump: yes/no <sup>(2)</sup>
- Characteristics or make(s) and type(s): .....
- Drive ratio: .....
- Thermostat: setting: .....
- Radiator: drawing(s) or make(s) and type(s): .....
- Relief valve: pressure setting: .....
- Fan: characteristics or make(s) and type(s): .....
- .....
- Fan drive system: .....
- Drive ratio: .....
- Fan cowl: .....
- 1.11.2. Air
- Blower: characteristics or make(s) and type(s): .....
- .....

<sup>(1)</sup> In the case of non-conventional engines and systems, particulars equivalent to those referred to here must be supplied by the manufacturer.

<sup>(2)</sup> Delete where inapplicable.

<sup>(3)</sup> Specify the tolerance.

- Drive ratio: .....
- Air ducting (standard production): .....
- Temperature regulating system: yes/no <sup>(1)</sup>. Brief description: .....
- 1.11.3. Temperatures permitted by the manufacturer
  - 1.11.3.1. Liquid cooling: maximum temperature at engine outlet: .....
  - 1.11.3.2. Air cooling: reference point: .....
    - maximum temperature at reference point: .....
  - 1.11.3.3. Maximum outlet temperature of the inlet intercooler: .....
  - 1.11.3.4. Maximum exhaust temperature at the point indicated in
    - 5.1.3.12 above: .....
  - 1.11.3.5. Fuel temperature: min.: .....
    - max.: .....
  - 1.11.3.6. Lubricant temperature: min.: .....
    - max.: .....
- 1.12. Supercharger: yes/no <sup>(1)</sup>. Description of the system: .....
- 1.13. Intake system
  - Intake manifold: ..... Description: .....
  - Air filter: ..... Make: ..... Type: .....
  - Intake silencer: ..... Make: ..... Type: .....
- 2. **Additional anti-pollution devices (if any, and if not covered by another heading)**
  - Description and diagrams: .....
- 3. **Air intake and fuel feed**
  - 3.1. Description and diagrams of inlet pipes and their accessories (dash-pot, heating device, additional air intakes, etc.): .....
  - 3.2. Fuel feed
    - 3.2.1. by carburettor(s) <sup>(1)</sup>: ..... Number: .....
    - 3.2.1.1. Make: .....
    - 3.2.1.2. Type: .....
    - 3.2.1.3. Adjustments

<sup>(1)</sup> Delete where inapplicable.

- 3.2.1.3.1. Jets: .....
- 3.2.1.3.2. Venturis: .....
- 3.2.1.3.3. Float-chamber level: .....
- 3.2.1.3.4. Weight of float: .....
- 3.2.1.3.5. Float needle: .....
- } or {
- Curve of fuel delivery plotted against air flow, and settings required to keep to the curve <sup>(1)</sup>
- 3.2.1.4. Manual/automatic choke <sup>(1)</sup>, ..... Closure setting <sup>(2)</sup>: .....
- .....
- 3.2.1.5. Feed pump  
Pressure <sup>(2)</sup>: ..... or characteristic diagram <sup>(2)</sup>: .....
- 3.2.2. Injection system
- 3.2.2.1. Make(s): .....
- 3.2.2.2. Type(s): .....
- 3.2.2.3. Description (general): .....
- 3.2.2.4. Calibration: ..... bar <sup>(1)</sup> <sup>(2)</sup>  
or characteristic diagram <sup>(1)</sup> <sup>(2)</sup>: .....
- 4. Valve timing or equivalent data**
- 4.1. Maximum valve lift, opening and closing angles, or details of alternative distribution systems, in relation to top dead centre: .....
- .....
- 4.2. Reference and/or setting ranges <sup>(1)</sup>
- 5. Ignition**
- 5.1. Ignition system type
- 5.1.1. Make: .....
- 5.1.2. Type: .....
- 5.1.3. Ignition advance curve <sup>(2)</sup>: .....
- 5.1.4. Ignition timing <sup>(2)</sup>: .....
- 5.1.5. Contact-point gap <sup>(1)</sup> <sup>(2)</sup> and dwell-angle <sup>(1)</sup>: .....
- 6. Exhaust system**
- Description and diagrams: .....
- 7. Lubrication system**
- 7.1. Description of system
- 7.1.1. Position of lubricant reservoir: .....

<sup>(1)</sup> Delete where inapplicable.

<sup>(2)</sup> Specify the tolerance.

- 7.1.2. Feed system (by pump, injection into intake, mixing with fuel, etc.): .....
- 7.2. Lubricating pump <sup>(1)</sup>
- 7.2.1. Make: .....
- 7.2.2. Type: .....
- 7.3. Mixture with fuel <sup>(1)</sup>
- 7.3.1. Percentage: .....
- 7.4. Oil cooler: yes/no <sup>(1)</sup>
- 7.4.1. Drawing(s) or make(s) and type(s): .....
  
- 8. **Electrical equipment**  
Generator/alternator <sup>(1)</sup>:  
characteristics or make(s) and type(s): .....
  
- 9. **Other auxiliary equipment driven by the engine**  
(List and brief description if necessary): .....
  
- 10. **Additional information on test conditions**
- 10.1. Spark plugs
- 10.1.1. Make: .....
- 10.1.2. Type: .....
- 10.1.3. Spark-gap setting: .....
- 10.2. Ignition coil
- 10.2.1. Make: .....
- 10.2.2. Type: .....
- 10.3. Ignition condenser
- 10.3.1. Make: .....
- 10.3.2. Type: .....
- 10.4. Radio interference suppression equipment
- 10.4.1. Make: .....
- 10.4.2. Type: .....

<sup>(1)</sup> Delete where inapplicable.

## ANNEX II

Name of administration

## MODEL

ANNEX TO THE EEC TYPE-APPROVAL CERTIFICATE FOR A VEHICLE TYPE IN  
RESPECT OF THE ENGINE POWER

(Article 4 (2) and Article 10 of Council Directive 70/156/EEC of 6 February 1970 on the approximation of the laws of the Member States relating to the type-approval of motor vehicles and their trailers)

STATEMENT OF THE RESULTS OF TESTS FOR MEASURING NET ENGINE  
POWER

1. Trade name or mark of the engine: .....
2. Type and identification number of engine: .....
3. Manufacturer's name and address: ....., .....
4. Name and address of manufacturer's representative, if any:  
.....
5. **Test conditions**
  - 5.1. Pressures measured at maximum power
    - 5.1.1. barometric: ..... mbar
    - 5.1.2. exhaust: ..... mbar
    - 5.1.3. Inlet depression: mbar at engine intake system
  - 5.2. Temperatures measured at maximum power of the engine:
    - 5.2.1. of the intake air: ..... °C
    - 5.2.2. at the outlet of the inlet intercooler: .... °C<sup>(1)</sup>
    - 5.2.3. of the cooling liquid
      - 5.2.3.1. at the engine cooling liquid outlet: ..... °C<sup>(1)</sup>
      - 5.2.3.2. at the reference point in the case of air cooling: ..... °C<sup>(1)</sup>
    - 5.2.4. of the oil: °C (indicate point of measurement)
    - 5.2.5. of the fuel
      - 5.2.5.1. at the carburettor/injection pump intake<sup>(1)</sup>: ..... °C
      - 5.2.5.2. in the fuel-consumption measuring device: ..... °C
    - 5.2.6. of the exhaust measured at the point adjacent to the outlet flange(s) of the exhaust manifold(s): ..... °C
  - 5.3. Engine speed when idling: ..... r/min
  - 5.4. Characteristics of the dynamometer

<sup>(1)</sup> Delete where inapplicable.

- 5.4.1. Make: .....
- 5.4.2. Type: .....
- 5.5. Characteristics of the opacimeter
- 5.5.1. Make: .....
- 5.5.2. Type: .....
- 5.6. Fuel
- 5.6.1. For positive ignition engines operating on liquid fuel:
- 5.6.1.1. Make: .....
- 5.6.1.2. Specification: .....
- 5.6.1.3. Anti-knock additive (lead, etc.)
- 5.6.1.3.1. Type: .....
- 5.6.1.3.2. Content mg/litre: .....
- 5.6.1.4. Octane number
- 5.6.1.4.1. RON No: .....
- 5.6.1.4.2. MON No: .....
- 5.6.1.5. Relative density: ..... at 15 °C ..... at 4 °C .....
- 5.6.1.6. Calorific value: ..... kJ/kg
- 5.6.2. For positive ignition engines operating on gaseous fuel
- 5.6.2.1. Make: .....
- 5.6.2.2. Specification: .....
- 5.6.2.3. Storage pressure: .....
- 5.6.2.4. Utilization pressure: .....
- 5.6.3. For diesel engines operating on gaseous fuels
- 5.6.3.1. Feed system: gas: .....
- 5.6.3.2. Specification of gas used: .....
- 5.6.3.3. Fuel oil/gas proportion: .....
- 5.6.4. For diesel engines operating on liquid fuel
- 5.6.4.1. Make: .....
- 5.6.4.2. Specification of fuel used: .....
- 5.6.4.3. Cetane number: .....
- 5.6.4.4. Relative density: ..... at 15 °C ..... at 4 °C .....
- 5.7. Lubricant
- 5.7.1. Make: .....
- 5.7.2. Specification: .....
- 5.7.3. SAE viscosity: .....

6. Detailed results of measurements

6.1. Engine performance

Engine speed (r/min)						
Engine test results	Specific fuel consumption g/kWh kJ/kWh <sup>(1)</sup>					
	Torque Nm					
	Power kW					
Correction factor						
Corrected brake power kW						
Corrected fuel consumption <sup>(2)</sup>						
Corrected torque Nm						
Power to be added for auxiliary equipment fitted on engine in excess of Table 1 (see Appendix 1, section 8, and Appendix 2, section 9). Power to be subtracted when fan not fitted (see Table 1, note 5)	No 1					
	No 2					
	No 3					
Net power kW						
Net torque Nm						

<sup>(1)</sup> Delete where inapplicable.  
<sup>(2)</sup> Applicable to diesel engines only.

6.2. Exhaust smoke index (to be completed for diesel engines only):

Engine speed (r/min)	Nominal flow G (litres/second)	Limit absorption values (m <sup>-1</sup> )	Measured absorption values (m <sup>-1</sup> )
1 .....	.....	.....	.....
2 .....	.....	.....	.....
3 .....	.....	.....	.....
4 .....	.....	.....	.....
5 .....	.....	.....	.....
6 .....	.....	.....	.....

6.3. Maximum net power: ..... kW at ..... r/min <sup>(1)</sup>

6.4. Maximum net torque: ..... Nm at ..... r/min <sup>(1)</sup>

<sup>(1)</sup> The maximum net power, the maximum net torque and the corresponding engine speeds are determined, where applicable, by the horizontal tangent to the curve of the net power/torque as a function of engine speed.

- 7. Date engine submitted for testing: .....
- 8. Technical service conducting the tests: .....
- 9. Date of test report issued by that service: .....
- 10. Number of test report issued by that service: .....
- 11. Place: .....
- 12. Date: .....
- 13. Signature: .....

14. The following documents are annexed to this statement:

One copy of Appendix 1/2 <sup>(1)</sup> duly completed, with the drawings and documents required under the different headings.

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<sup>(1)</sup> Delete where inapplicable.