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**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)

(OJ L 375, 31.12.1980, p. 46)

Amended by:

	Official Journal		
	No	page	date
► <u>M1</u> Commission Directive 88/195/EEC of 24 March 1988	L 92	50	9.4.1988
► <u>M2</u> Commission Directive 89/491/EEC of 17 July 1989	L 238	43	15.8.1989
► <u>M3</u> Commission Directive 97/21/EC of 18 April 1997	L 125	31	16.5.1997
► <u>M4</u> Commission Directive 1999/99/EC of 15 December 1999	L 334	32	28.12.1999

Corrected by:

► C1 Corrigendum, OJ L 105, 26.4.1988, p. 34 (88/195/EEC)

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**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,

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

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>,

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;

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,

HAS ADOPTED THIS DIRECTIVE:

▼M3

*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 and forestry tractors and all mobile machinery.

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*Article 2*

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 ►M3 the relevant Annexes ◀.

*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.

<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.

**▼B**

*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.
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.

▼ M3

**LIST OF ANNEXES**

- Annex I:** Determination of engine power  
*Appendix 1:* Information document  
*Appendix 2:* Type-approval certificate
- Annex II:** Test report

**▼M1***ANNEX I***DETERMINATION OF ENGINE POWER****▼M3**

1. ADMINISTRATIVE PROVISIONS FOR TYPE-APPROVAL
  - 1.1. Application for EC type-approval of a vehicle type
    - 1.1.1. The application for EC type-approval pursuant to Article 3 (4) of Directive 70/156/EEC of a vehicle type with regard to its engine power shall be submitted by the manufacturer.
    - 1.1.2. A model for the information document is given in Appendix 1.
    - 1.1.3. If the technical service responsible for the type-approval tests carries out the test itself, the following must be submitted:
      - 1.1.3.1. an engine representative of the type to be approved together with the auxiliary equipment specified in Table 1.
  - 1.2. Granting of EC type-approval of a vehicle type
    - 1.2.1. If the relevant requirements are satisfied, EC type-approval pursuant to Article 4 (3) and, if applicable, Article 4 (4) of Directive 70/156/EEC shall be granted.
    - 1.2.2. A model for the EC type-approval certificate is given in Appendix 2.
    - 1.2.3. An approval number in accordance with Annex VII to Directive 70/156/EEC shall be assigned to each type of vehicle approved. The same Member State shall not assign the same number to another type of vehicle.
  - 1.3. Modifications of the type and amendments to approvals
    - 1.3.1. In the case of modifications of the type approved pursuant to this Directive, the provisions of Article 5 of Directive 70/156/EEC shall apply.
  - 1.4. Conformity of production
    - 1.4.1. Measures to ensure the conformity of production shall be taken in accordance with the provisions laid down in Article 10 of Directive 70/156/EEC.

**▼M1**

2. SCOPE
  - 2.1. This method applies to internal-combustion engines used for the propulsion of category M and N vehicles as defined in ►M3 Annex II Section A ◀ to Directive 70/156/EEC, belonging to either of the following types.
    - 2.1.1. Internal-combustion piston engines (positive ignition or compression ignition), 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.

▼ **M1**

- 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:**  $\pm 1\%$  of measured torque<sup>(1)</sup>.
- 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:**  $\pm 1\%$  of measured consumption.
- 4.4. **Fuel temperature:**  $\pm 2\text{ K}$ .
- 4.5. **Engine inlet air temperature:**  $\pm 2\text{ K}$ .
- 4.6. **Barometric pressure:**  $\pm 100\text{ Pa}$ .
- 4.7. **Pressure in inlet manifold:**  $\pm 50\text{ Pa}$  (see note 1a to Table 1).
- 4.8. **► C1 Pressure in vehicle exhaust pipe:**  $\pm 200\text{ Pa}$  ◀ (see note 1b to Table 1).

## 5. TEST FOR MEASURING NET ENGINE POWER

5.1. **Auxiliaries**5.1.1. *Auxiliary equipment to be fitted*

During the test, the auxiliary equipment necessary for the engine operation in the intended application (as listed in Table 1) shall be installed on the test bench as far as possible in the same position as the intended application.

5.1.2. *Auxiliary equipment to be removed*

Certain vehicle accessories necessary only for the operation of the vehicle and which may be mounted on the engine shall be removed for the test.

The following non-exhaustive list is given as a sample:

- air compressor for brakes,
- power-steering compressor,
- suspension compressor,
- air-conditioning system.

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

TABLE 1

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

No	Auxiliary equipment	Fitted for net power test
1	Intake system Intake manifold Air filter <sup>(1a)</sup> Intake silencer <sup>(1a)</sup> Crankcase emission control system Speed-limiting device <sup>(1a)</sup>	Yes, standard-production equipment
2	Induction-heating device of intake manifold	

(1) The torque measuring system shall be calibrated to take friction losses into account. The accuracy in the lower half of the measuring range of the dynamometer bench may be  $\pm 2\%$  of measured torque.

## ▼M1

No	Auxiliary equipment	Fitted for net power test
3	Exhaust system Exhaust purifier Exhaust manifold Connecting pipes <sup>(1b)</sup> Silencer <sup>(1b)</sup> Tail pipe <sup>(1b)</sup> Exhaust brake <sup>(2)</sup> Supercharging device	} Yes, standard-production equipment
4	Fuel supply pump <sup>(3)</sup>	Yes, standard-production equipment
5	Carburettor Electronic control system, air flow meter etc. (if fitted) Pressure reducer Evaporator Mixer	} Yes, standard-production equipment } Equipment for gas engines
6	Fuel-injection equipment (petrol and diesel) Prefilter Filter Pump High-pressure pipe Injector Air intake valve, if fitted <sup>(4)</sup> Electronic control system, air flow meter etc. (if fitted) Governor/control system Automatic full-load stop for the control rack depending on atmospheric conditions	} Yes, standard-production equipment
7	Liquid-cooling equipment Engine bonnet Bonnet air outlet Radiator Fan <sup>(5)</sup> <sup>(6)</sup> Fan cowl Water pump Thermostat <sup>(7)</sup>	} No } Yes, standard-production equipment <sup>(5)</sup>
8	Air cooling Cowl Blower <sup>(5)</sup> <sup>(6)</sup> Temperature-regulating device	} Yes, standard-production equipment
9	Electrical equipment	Yes, standard-production equipment <sup>(8)</sup>
10	Supercharging equipment (if fitted) Compressor driven either directly by the engine and/or by the exhaust gases Charge air cooler <sup>(9)</sup> Coolant pump or fan (engine-driven) Coolant flow control device (if fitted)	} Yes, standard-production equipment
11	Auxiliary test-bench fan	Yes, if necessary
12	Anti-pollution device <sup>10</sup>	Yes, standard-production equipment

▼ **M1**

- (<sup>1a</sup>) The complete intake system shall be fitted as provided for the intended application:

where there is a risk of an appreciable effect on the engine power; in the case of two-stroke and positive-ignition engines; when the manufacturer requests that this should be done. In other cases, an equivalent system may be used and a check should be made to ascertain that the intake pressure does not differ by more than 100 Pa from the limit specified by the manufacturer for a clean air filter.

- (<sup>1b</sup>) The complete exhaust system shall be fitted as provided for the intended application:

where there is a risk of an appreciable effect on the engine power; in the case of two-stroke and positive-ignition engines; when the manufacturer requests that this should be done.

In other cases an equivalent system may be installed provided the pressure measured at the exit of the engine exhaust system does not differ by more than 1 000 Pa from that specified by the manufacturer. The exit of the engine exhaust system is defined as a point 150 mm downstream from the termination of the part of the exhaust system mounted on the engine.

- (<sup>2</sup>) If an exhaust brake is incorporated in the engine, the throttle valve must be fixed in the fully open position.
- (<sup>3</sup>) The fuel feed pressure may be adjusted, if necessary, to reproduce the pressures existing in the particular engine application (particularly when a 'fuel return' system is used).
- (<sup>4</sup>) 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 injected fuel.
- (<sup>5</sup>) The radiator, the fan, the fan cowl, the water pump and the thermostat shall be located on the test bench in the same relative positions as on the vehicle. The cooling-liquid circulation shall 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, shall 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 used), shall 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 6.2, should be deducted from the corrected power.
- (<sup>6</sup>) Where a disconnectable or progressive fan or blower is incorporated, the test shall be made with the disconnectable fan (or blower) disconnected or with the progressive fan or blower running at maximum slip.
- (<sup>7</sup>) The thermostat may be fixed in the fully open position.
- (<sup>8</sup>) Minimum power of the generator: the power of the generator shall be limited to that necessary for the operation of accessories which are indispensable for the operation of the engine. If the connection of a battery is necessary, a fully charged battery in good order must be used.
- (<sup>9</sup>) Charge air-cooled engines shall be tested with charge air cooling, whether liquid or air cooled, but if the manufacturer prefers, a test-bench system may replace the air-cooled cooler. In either case, the measurement of power at each speed shall be made with the same pressure drop and temperature drop of the engine air across the charge air-cooler on the test-bench system as those specified by the manufacturer for the system on the complete vehicle.
- (<sup>10</sup>) They may include, for example, Exhaust-gas recirculation (EGR)-system, catalytic converter, thermal reactor, secondary air-supply system and fuel evaporation protecting system.

### 5.1.3. *Compression-ignition engine starting auxiliaries*

For the auxiliary equipment used in starting compression-ignition engines, the two following cases shall be considered:

- (a) Electrical starting: The generator is fitted and supplies, where necessary, the auxiliary equipment indispensable to the operation of the engine.
- (b) Starting other than electrical: If there are any electrically operated accessories indispensable to the operation of the engine, the generator is fitted to supply 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.

## 5.2. **Setting conditions**

The setting conditions for the test to determine the net power are indicated in Table 2.



▼ **M1**

TABLE 2

**Setting conditions**

1	Setting of carburettor(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	
3	Ignition or injection timing (timing curve)	
4	Governor setting	
5	Anti-pollution devices	

**5.3. Test conditions**

5.3.1. The net power test shall consist of a run at full throttle for positive-ignition engines and at fixed full load fuel-injection-pump setting for compression-ignition engines, the engine being equipped as specified in Table 1.

5.3.2. Performance data shall be obtained under stabilized operating conditions, with an adequate fresh-air supply to the engine. The engine must have been run-in in accordance with the manufacturer's recommendations. Combustion chambers may contain deposits, but in limited quantity.

Testconditions such as inlet air temperature shall be selected as near to reference conditions (see 6.2) as possible in order to minimize the magnitude of the correction factor.

5.3.3. The temperature of the inlet air to the engine (ambient air) shall be measured within 0,15 m upstream of the point of entry of the air cleaner, or, if no air cleaner is used, within 0,15 m to the air inlet horn. The thermometer or thermocouple shall be shielded from radiant heat and placed directly in the air stream. It shall also be shielded from fuel spray-back. A sufficient number of locations shall be used to give a representative average inlet temperature.

5.3.4. No data shall be taken until torque, speed and temperatures have been maintained substantially constant for at least one minute.

5.3.5. The engine speed during a run or reading shall not deviate from the selected speed by more than  $\pm 1\%$  or  $\pm 10 \text{ min}^{-1}$ , whichever is greater.

5.3.6. Observed brake load, fuel consumption and inlet air temperature data shall be taken simultaneously and shall be the average of two stabilized consecutive values which do not vary more than 2 % for the brake load and fuel consumption.

5.3.7. The temperature of the coolant at the outlet from the engine shall be kept within  $\pm 5 \text{ K}$  from the upper thermostatically controlled temperature specified by the manufacturer. If no temperature is specified by the manufacturer, the temperature shall be  $353 \text{ K} \pm 5 \text{ K}$ .

For air-cooled engines, the temperature at a point indicated by the manufacturer shall be kept within  $+ 0/- 20 \text{ K}$  of the maximum value specified by the manufacturer in the reference conditions.

5.3.8. The fuel temperature shall be measured at the inlet to the carburettor or at the fuel-injection system and maintained within the limits established by the engine manufacturer.

**▼ M1**

- 5.3.9. The temperature of the lubricating oil measured in the oil sump or at the outlet from the oil cooler, if fitted, shall be maintained within the limits established by the engine manufacturer.
- 5.3.10. An auxiliary regulating system may be used if necessary to maintain the temperature within the limits specified in 5.3.7, 5.3.8 and 5.3.9.

**▼ M4**

- 5.3.11. *The fuel used shall be the following:*
- 5.3.11.1. For positive ignition engine fuelled with petrol:
- the fuel used shall be the one available on the market. In any case of dispute, the reference fuel specified in Annex IX, first point, of Directive 70/220/EEC, as last amended, shall be used. Instead of the abovementioned reference fuel, the reference fuels defined by the CEC<sup>(1)</sup> for petrol-fuelled engines in CEC document RF-08-A-85, may be used.
- 5.3.11.2. For positive ignition engines fuelled with LPG:
- 5.3.11.2.1. In the case of an engine with self-adaptive fuelling:
- the fuel used shall be the one available on the market. In any case of dispute the fuel shall be one of the reference fuels specified in Annex IX a of Directive 70/220/EEC, as last amended.
- 5.3.11.2.2. In the case of an engine without self-adaptive fuelling:
- the fuel used shall be the reference fuel specified in Annex IX a of Directive 70/220/EEC, as last amended, with the lowest C3 content, or
- 5.3.11.2.3. In the case of an engine labelled for one specific fuel composition:
- the fuel used shall be the fuel for which the engine is labelled.
- 5.3.11.2.4. The fuel used shall be specified in the test report.
- 5.3.11.3. For positive ignition engines fuelled with NG:
- 5.3.11.3.1. In the case of an engine with self-adaptive fuelling:
- the fuel used shall be the one available on the market. In any case of dispute the fuel shall be one of the reference fuels specified in Annex IX a of Directive 70/220/EEC, as last amended.
- 5.3.11.3.2. In the case of an engine without self-adaptive fuelling:
- the fuel used shall be the one available on the market with a Wobbe index at least 52,6 MJm<sup>-3</sup> (0 °C, 101,3 kPa). In any case of dispute the fuel used shall be the reference fuel G20 specified in Annex IX a of Directive 70/220/EEC, as last amended, i.e. the fuel with the highest Wobbe Index, or
- 5.3.11.3.3. In the case of an engine labelled for a specific range of fuels:
- the fuel used shall be the one available on the market with a Wobbe Index at least 52,6 MJm<sup>-3</sup> (0 °C, 101,3 kPa) if the engine is labelled for the H-range of gases, or at least 47,2 MJm<sup>-3</sup> (0 °C, 101,3 kPa) if the engine is labelled for the L-range of gases. In any case of dispute the fuel used shall be the reference fuel G20, specified in Annex IX a of Directive 70/220/EEC, as last amended, if the engine is labelled for the H-range of gases, or the reference fuel G23 if the engine is labelled for the L-range of gases, i.e. the fuel with the highest Wobbe for the relevant range, or

<sup>(1)</sup> Coordinating European Council for the Development of Performance Tests for Lubricants and Engine Fuels.

**▼ M4**

5.3.11.3.4. In the case of an engine labelled for one specific fuel composition:

the fuel used shall be the fuel for which the engine is labelled.

5.3.11.3.5. The fuel used shall be specified in the test report.

5.3.11.4. For compression ignition engines:

the fuel used shall be the one available on the market. In any case of dispute, the reference fuel specified in Annex IX, second point, of Directive 70/220/EEC, as last amended, shall be used. Instead of the abovementioned reference fuel, the reference fuel defined by the CEC <sup>(1)</sup> for compression ignition engines in CEC documents RF-03--A-84 may be used.

5.3.11.5. Positive ignition engines of vehicles that can run either on petrol or on a gaseous fuel, are to be tested with both fuels, in accordance with the provisions in items 5.3.11.1 to 5.3.11.3. The vehicles that can be fuelled with both petrol and a gaseous fuel, but where the petrol system is fitted for emergency purposes or starting only and of which the petrol tank cannot contain more than 15 litres of petrol will be regarded for the test as vehicles that can only run a gaseous fuel.

**▼ M1**

5.4. **Test procedure**

Measurements shall be taken at a sufficient number of engine speeds to define correctly the power curve completely between the lowest and the highest engine speeds recommended by the manufacturer. This range of speeds shall include the speed of revolution at which the engine produces its maximum power. For each speed, the average of at least two stabilized measurements is to be determined.

5.5. **Measurement of smoke index**

In the case of compression-ignition engines, the exhaust gases shall be examined during the test for compliance with the conditions set out in Annex VI to Council Directive 72/306/EEC <sup>(2)</sup>.

5.6. **Data to be recorded**

Data to be recorded are those indicated in ► **M3** Annex II ◀.

6. **POWER CORRECTION FACTORS**

6.1. **Definition**

The power correction factor is the coefficient to determine the engine power under the atmospheric reference conditions specified in 6.2:

$$P_o = \alpha \cdot P$$

where

$P_o$  is the corrected power (i.e. power under reference atmospheric conditions);

$\alpha$  is the correction factor ( $\alpha_a$  or  $\alpha_d$ );

$P$  is the measured power (test power).

<sup>(1)</sup> Coordinating European Council for the Development of Performance Tests for Lubricants and Engine Fuels.

<sup>(2)</sup> OJ No L 190, 20. 8. 1972, p. 1.

**▼ M1****6.2. Reference atmospheric conditions**6.2.1. *Temperature* ( $T_o$ ): 298 K (25 °C)6.2.2. *Dry pressure* ( $p_{so}$ ): 99 kPa

*Note:* The dry pressure is based on a total pressure of 100 kPa and a water vapour pressure of 1 kPa.

**6.3. Test atmospheric conditions**

The atmospheric conditions during the test shall be the following:

6.3.1. *Temperature* ( $T$ )

For positive-ignition engines  $288 \text{ K} \leq T \leq 308 \text{ K}$

For compression-ignition engines  $283 \text{ K} \leq T \leq 313 \text{ K}$ .

6.3.2. *Pressure* ( $p$ )

$80 \text{ kPa} \leq p_s \leq 110 \text{ kPa}$ .

**6.4. Determination of correction factors  $\alpha_a$  and  $\alpha_d$ <sup>(1)</sup>**6.4.1. *Naturally aspirated or supercharged positive-ignition engine — Factor  $\alpha_a$ :*

$$\alpha_a = \left(\frac{99}{p_s}\right)^{1,2} \cdot \left(\frac{T}{298}\right)^{0,6} \quad (2)$$

where

$T$  is the absolute temperature in Kelvins (K) of the air drawn in by the engine;

$p_s$  is the total dry atmospheric pressure in kilopascals (kPa), that is, the total barometric pressure minus water vapour pressure.

Conditions to be complied with in the laboratory.

For a test to be valid, the correction factor  $\alpha_a$  must be such that:

$$0,93 \leq \alpha_a \leq 1,07$$

If these limits are exceeded, the correct value obtained shall be given and the test conditions (temperature and pressure) precisely stated in the test report.

<sup>(1)</sup> The tests may be carried out in air-conditioned test rooms where the atmospheric conditions may be controlled.

<sup>(2)</sup> In the case of engines fitted with automatic air temperature control, if the device is such that at full load at 25 °C no heated air is added, the test shall be carried out with the device fully closed. If the device is still operating at 25 °C then the test is made with the device operating normally and the exponent of the temperature term in the correction factor shall be taken as zero (no temperature correction).

▼ M16.4.2. *Compression-ignition engine — Factor  $\alpha_d$* 

The power correction factor ( $\alpha_d$ ) for compression-ignition engines at constant fuel rate is obtained by applying the formula:

▼ M3

$$\alpha_d = (f_a)^{f_m}$$

▼ M1

where

$f_a$  is the atmospheric factor;

$f_m$  is the characteristic parameter for each type of engine and adjustment.

6.4.2.1. Atmospheric factor  $f_a$ 

This factor indicates the effects of environmental conditions (pressure, temperature and humidity) on the air drawn in by the engine.

The atmospheric factor formula differs according to the type of engine.

## 6.4.2.1.1. Naturally aspirated and mechanically supercharged engines.

$$f_a = \left(\frac{99}{p_s}\right) \cdot \left(\frac{T}{298}\right)^{0,7}$$

## 6.4.2.1.2. Turbocharged engines with or without cooling of inlet air.

$$f_a = \left(\frac{99}{p_s}\right)^{0,7} \cdot \left(\frac{T}{298}\right)^{1,5}$$

6.4.2.2. Engine factor  $f_m$ 

$f_m$  is a function of  $q_c$  (fuel flow corrected) as follows:

$$f_m = 0,036 \cdot q_c - 1,14$$

where

$$q_c = q/r$$

where

$q$  is the fuel flow in milligramms per cycle per litre of total swept volume (mg/(litre · cycle)).

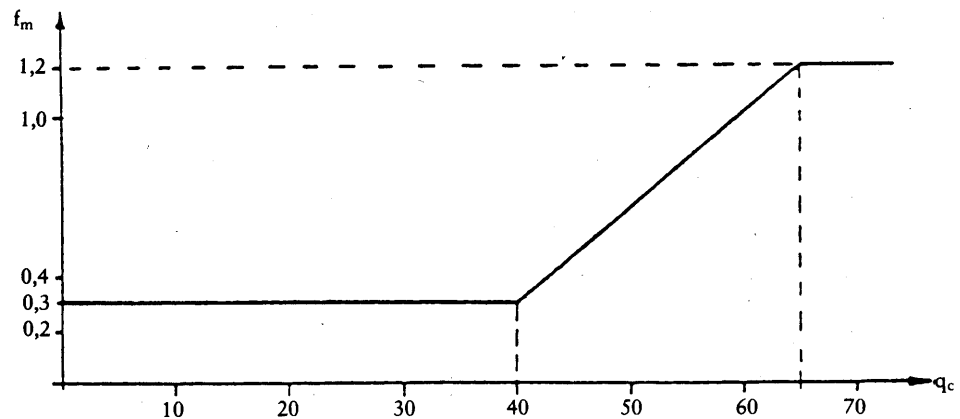
$r$  is the pressure ratio of compressor outlet and compressor inlet ( $r = 1$  for naturally aspirated engines).

**▼ M1**

This formula is valid for a value interval of  $q_c$  included between 40 mg/(litre · cycle) and 65 mg/(litre · cycle).

For  $q_c$  values lower than 40 mg/(litre · cycle), a constant value of  $f_m$  equal to 0,3 ( $f_m = 0,3$ ) will be taken.

For  $q_c$  values higher than 65 mg/(litre · cycle), a constant value of  $f_m$  equal to 1,2 ( $f_m = 1,2$ ) will be taken (see figure):



## 6.4.2.3. Conditions to be complied with in the laboratory.

For a test to be valid, the correction factor  $\alpha_d$  must be such that

$$0,9 \leq \alpha_d \leq 1,1$$

If these limits are exceeded, the corrected value obtained shall be given and the test conditions (temperature and pressure) precisely stated in the test report.

**▼ M3**

## 7. TEST REPORT

The test report shall contain the results and all the calculations required to determine the net power, as listed in Annex II. In order to draw up this document, the competent authority may use the report prepared by an approved or recognized laboratory pursuant to the provisions of this Directive.

**▼ M2****► M3 8. ◀ TOLERANCES FOR MEASURING THE NET POWER**

- M3 8.1. ◀** The net power indicated by the manufacturer for the type of engine shall be accepted if it does not differ by more than  $\pm 2\%$  for maximum power and more than  $\pm 4\%$  at the other measurement points on the curve with a tolerance of  $\pm 1,5\%$  for engine speed, from the values measured by the technical service on the engine submitted for testing. **► M4 (1) ◀**

(1) The manufacturer may only declare one value as long as the engine power is the same within one variant of the engine type. Each variant must be clearly defined.

**▼ M2**

- **M3** 8.2. ◀ During the tests to verify conformity of production the power shall be measured at two engine speeds S1 and S2 corresponding respectively to the measurement points of maximum power and maximum torque accepted for type approval. At these two engine speeds, which are subject to a tolerance of  $\pm 5\%$ , the net power measured at at least one point within the ranges  $S1 \pm 5\%$  and  $S2 \pm 5\%$  shall not differ by more than  $\pm 5\%$  from the approval figure.

▼ **M3***Appendix 1***INFORMATION DOCUMENT No. ...****pursuant to Annex I to Council Directive 70/156/EEC (\*) relating to EC type-approval of a vehicle with respect to the engine power***(Directive 80/1269/EEC, as last amended by Directive .../.../EC)*

The following information, if applicable, must be supplied in triplicate and include a list of contents. Any drawings must be supplied in appropriate scale and in sufficient detail on size A4 or on a folder of A4 format. Photographs, if any, must show sufficient detail.

If the systems, components or separate technical units have electronic controls, information concerning their performance must be supplied.

- 0. GENERAL
- 0.1. Make (trade name of manufacturer): .....
- 0.2. Type and general commercial description(s): .....
- 0.3. Means of identification of type, if marked on the vehicle<sup>(b)</sup>: .....
- 0.3.1. Location of that marking: .....
- 0.4. Category of vehicle<sup>(c)</sup>: .....
- 0.5. Name and address of manufacturer: .....
- 0.8. Address(es) of assembly plant(s): .....
- 1. GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE
- 1.1. Photographs and/or drawings of a representative vehicle: .....
- 1.8. Hand of drive: left/right<sup>(1)</sup>: .....

(\*) The item numbers and footnotes used in this information document correspond to those set out in Annex I to Directive 70/156/EEC. Items not relevant for the purpose of this Directive are omitted.



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3.	POWER PLANT <sup>(*)</sup>	
3.1.	Manufacturer: .....	
3.1.1.	Manufacturer's engine code (as marked on the engine, or other means of identification): .....	
3.2.1.1.	Working principle: positive ignition/compression ignition, four stroke/two stroke <sup>(1)</sup>	
3.2.1.2.	Number and arrangement of cylinders: .....	
3.2.1.2.1.	Bore <sup>(1)</sup> : .....	mm
3.2.1.2.2.	Stroke <sup>(1)</sup> : .....	mm
3.2.1.2.3.	Firing order: .....	
3.2.1.3.	Engine capacity <sup>(*)</sup> : .....	cm <sup>3</sup>
3.2.1.4.	Volumetric compression ratio <sup>(2)</sup> : .....	
3.2.1.5.	Drawings of combustion chamber, piston crown and, in the case of positive ignition engines, piston rings: .....	
3.2.1.8.	Maximum net power <sup>(1)</sup> : ..... kW at ..... min <sup>-1</sup> (manufacturer's declared value)	
3.2.1.9.	Maximum permitted engine speed as prescribed by the manufacturer: ..... min <sup>-1</sup>	
3.2.1.10.	Maximum net torque <sup>(1)</sup> : ..... Nm at ..... min <sup>-1</sup> (manufacturer's declared value)	
▶ <sup>(1)</sup> 3.2.2.	Fuel: diesel oil/petrol/LPG/NG <sup>(1)</sup> ◀	
3.2.2.1.	RON, leaded: .....	
3.2.2.2.	RON, unleaded: .....	
3.2.4.	Fuel feed	
3.2.4.1.	By carburettor(s): yes/no <sup>(1)</sup>	
3.2.4.1.1.	Make(s): .....	
3.2.4.1.2.	Type(s): .....	
3.2.4.1.3.	Number fitted: .....	
3.2.4.1.4.	Adjustments <sup>(2)</sup>	
3.2.4.1.4.1.	Jets: .....	} Or the curve of fuel delivery plotted against the air flow and settings required to keep to the curve
3.2.4.1.4.2.	Venturis: .....	
3.2.4.1.4.3.	Float-chamber level: .....	
3.2.4.1.4.4.	Mass of float: .....	
3.2.4.1.4.5.	Float needle: .....	
3.2.4.1.5.	Cold start system: manual/automatic <sup>(1)</sup>	
3.2.4.1.5.1.	Operating principle(s): .....	
3.2.4.1.5.2.	Operating limits/settings <sup>(1)</sup> <sup>(2)</sup> : .....	
3.2.4.2.	By fuel injection (compression ignition only): yes/no <sup>(1)</sup>	
3.2.4.2.1.	System description: .....	
3.2.4.2.2.	Working principle: direct injection/pre-chamber/swirl chamber <sup>(1)</sup>	
3.2.4.2.3.	Injection pump	
3.2.4.2.3.1.	Make(s): .....	
3.2.4.2.3.2.	Type(s): .....	
3.2.4.2.3.3.	Maximum fuel delivery <sup>(1)</sup> <sup>(2)</sup> : ..... mm <sup>3</sup> /stroke or cycle at a pump speed of: ..... min <sup>-1</sup> or, alternatively, a characteristic diagram: .....	
3.2.4.2.3.4.	Injection timing <sup>(2)</sup> : .....	
3.2.4.2.3.5.	Injection advance curve <sup>(2)</sup> : .....	
3.2.4.2.3.6.	Calibration procedure: test bench/engine <sup>(1)</sup>	
3.2.4.2.4.	Governor	
3.2.4.2.4.1.	Type: .....	
3.2.4.2.4.2.	Cut-off point	
3.2.4.2.4.2.1.	Cut-off point under load: .....	min <sup>-1</sup>
3.2.4.2.4.2.2.	Cut-off point without load: .....	min <sup>-1</sup>

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3.2.4.2.5.	Injection piping	
3.2.4.2.5.1.	Length: .....	mm
3.2.4.2.5.2.	Internal diameter: .....	mm
3.2.4.2.6.	Injector(s)	
3.2.4.2.6.1.	Make(s): .....	
3.2.4.2.6.2.	Type(s): .....	
3.2.4.2.6.3.	Opening pressure <sup>(2)</sup> : .....	kPa or characteristic diagram <sup>(2)</sup> : .....
3.2.4.2.7.	Cold start system	
3.2.4.2.7.1.	Make(s): .....	
3.2.4.2.7.2.	Type(s): .....	
3.2.4.2.7.3.	Description: .....	
3.2.4.2.9.	Electronic control unit	
3.2.4.2.9.1.	Make(s): .....	
3.2.4.2.9.2.	Description of the system: .....	
3.2.4.3.	By fuel injection (positive ignition only): yes/no <sup>(1)</sup>	
3.2.4.3.1.	Working principle: intake manifold (single-/multi-point <sup>(1)</sup> ) direct injection/other (specify) <sup>(1)</sup> : .....	
3.2.4.3.2.	Make(s): .....	
3.2.4.3.3.	Type(s): .....	
3.2.4.3.4.	System description	
3.2.4.3.4.1.	Type or number of the control unit: ...	} In the case of systems other than continuous injection give equivalent details.
3.2.4.3.4.2.	Type of fuel regulator: .....	
3.2.4.3.4.3.	Type of air-flow sensor: .....	
3.2.4.3.4.4.	Type of fuel distributor: .....	
3.2.4.3.4.5.	Type of pressure regulator: .....	
3.2.4.3.4.8.	Type of throttle housing: .....	
3.2.4.3.5.	Injectors: opening pressure <sup>(2)</sup> : .....	kPa or characteristic diagram <sup>(2)</sup> : .....
3.2.4.3.6.	Injection timing: .....	
3.2.4.3.7.	Cold start system	
3.2.4.3.7.1.	Operating principle(s): .....	
3.2.4.3.7.2.	Operating limits/settings <sup>(1)</sup> <sup>(2)</sup> : .....	
3.2.4.4.	Feed pump	
3.2.4.4.1.	Pressure <sup>(2)</sup> : .....	kPa or characteristic diagram <sup>(2)</sup> : .....
3.2.5.	Electrical system	
3.2.5.1.	Rated voltage: .....	V, positive/negative ground <sup>(1)</sup>
3.2.5.2.	Generator	
3.2.5.2.1.	Type: .....	
3.2.5.2.2.	Nominal output: .....	VA
3.2.6.	Ignition	
3.2.6.1.	Make(s): .....	
3.2.6.2.	Type(s): .....	
3.2.6.3.	Working principle: .....	
3.2.6.4.	Ignition advance curve <sup>(2)</sup> : .....	
3.2.6.5.	Static ignition timing <sup>(2)</sup> .....	degrees before TDC
3.2.6.6.	Contact-point gap <sup>(2)</sup> : .....	mm
3.2.6.7.	Dwell-angle <sup>(2)</sup> : .....	degrees
3.2.7.	Cooling system (liquid/air) <sup>(1)</sup>	
3.2.7.1.	Nominal setting of the engine temperature control mechanism: .....	
3.2.7.2.	Liquid	
3.2.7.2.1.	Nature of liquid: .....	
3.2.7.2.2.	Circulating pump(s): yes/no <sup>(1)</sup>	
3.2.7.2.3.	Characteristics .....	, or
3.2.7.2.3.1.	Make(s): .....	
3.2.7.2.3.2.	Type(s): .....	

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3.2.7.2.4.	Drive ratio(s): .....
3.2.7.2.5.	Description of the fan and its drive mechanism: .....
3.2.7.3.	Air
3.2.7.3.1.	Blower: yes/no <sup>(1)</sup>
3.2.7.3.2.	Characteristics: ....., or
3.2.7.3.2.1.	Make(s): .....
3.2.7.3.2.2.	Type(s): .....
3.2.7.3.3.	Drive ratio(s): .....
3.2.8.	Intake system
3.2.8.1.	Pressure charger: yes/no <sup>(1)</sup>
3.2.8.1.1.	Make(s): .....
3.2.8.1.2.	Type(s): .....
3.2.8.1.3.	Description of the system (e.g. maximum charge pressure: ..... kPa, wastegate if applicable): .....
3.2.8.2.	Intercooler: yes/no <sup>(1)</sup>
3.2.8.4.	Description and drawings of inlet pipes and their accessories (plenum chamber, heating device, additional air intakes, etc.): .....
3.2.8.4.1.	Intake manifold description (include drawings and/or photos): .....
3.2.8.4.2.	Air filter, drawings: ....., or
3.2.8.4.2.1.	Make(s): .....
3.2.8.4.2.2.	Type(s): .....
3.2.8.4.3.	Intake silencer, drawings: ....., or
3.2.8.4.3.1.	Make(s): .....
3.2.8.4.3.2.	Type(s): .....
3.2.9.	Exhaust system
3.2.9.1.	Description and/or drawing of the exhaust manifold: .....
3.2.9.2.	Description and/or drawing of the exhaust system: .....
3.2.9.3.	Maximum allowable exhaust back pressure at rated engine speed and at 100 % load: ..... kPa
3.2.10.	Minimum cross-sectional areas of inlet and outlet ports: .....
3.2.11.	Valve timing or equivalent data
3.2.11.1.	Maximum lift of valves, angles of opening and closing, or timing details of alternative distribution systems, in relation to dead-centres: .....
3.2.11.2.	Reference and/or setting ranges <sup>(1)</sup> : .....
3.2.12.	Measures taken against air pollution
3.2.12.2.	Additional anti-pollution devices (if any, and if not covered by another heading)
3.2.12.2.1.	Catalytic converter: yes/no <sup>(1)</sup>
3.2.12.2.1.1.	Number of catalytic converters and elements: .....
3.2.12.2.1.2.	Dimensions, shape and volume of the catalytic converter(s): .....
3.2.12.2.2.	Oxygen sensor: yes/no <sup>(1)</sup>
3.2.12.2.3.	Air injection: yes/no <sup>(1)</sup>
3.2.12.2.4.	Exhaust gas recirculation: yes/no <sup>(1)</sup>
3.2.12.2.6.	Particulate trap: yes/no <sup>(1)</sup>
3.2.12.2.6.1.	Dimensions, shape and capacity of the particulate trap: .....
3.2.12.2.7.	Other systems (description and operation): .....

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- 3.2.15. LPG fuelling system: yes/no (!)
- 3.2.15.1. Approval number according to Directive 70/221/EEC (!): .....
- 3.2.15.2. Electronic engine management control unit for LPG fuelling:
- 3.2.15.2.1. Make(s): .....
- 3.2.15.2.2. Type(s): .....
- 3.2.15.2.3. Emission related adjustment possibilities .....
- 3.2.15.3. Further documentation:
- 3.2.15.3.1. Description of the safeguarding of the catalyst at switch-over from petrol to LPG or back: .....
- .....
- 3.2.15.3.2. System lay-out (electrical connections, vacuum connections compensation hoses, etc.) .....
- .....
- 3.2.15.3.3. Drawing of the symbol .....
- 3.2.16. NG fuelling system: yes/no (!)
- 3.2.16.1. Approval number according to Directive 70/221/EEC (!): .....
- 3.2.16.2. Electronic engine management control unit for NG fuelling:
- 3.2.16.2.1. Make(s): .....
- 3.2.16.2.2. Type(s): .....
- 3.2.16.2.3. Emission related adjustment possibilities .....
- 3.2.16.3. Further documentation:
- 3.2.16.3.1. Description of the safeguarding of the catalyst at switch-over from petrol to NG or back: .....
- .....
- 3.2.16.3.2. System layout (electrical connections, vacuum connections compensation hoses, etc.) .....
- .....
- 3.2.16.3.3. Drawing of the symbol .....

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- 3.6. Temperatures permitted by the manufacturer
- 3.6.1. Cooling system
- 3.6.1.1. Liquid cooling  
Maximum temperature at outlet: ..... °C
- 3.6.1.2. Air cooling
- 3.6.1.2.1. Reference point: .....
- 3.6.1.2.2. Maximum temperature at reference point: ..... °C
- 3.6.2. Maximum outlet temperature of the inlet intercooler: ..... °C
- 3.6.3. Maximum exhaust temperature at the point in the exhaust pipe(s) adjacent to the outer flange(s) of the exhaust manifold: ..... °C
- 3.6.4. Fuel temperature  
minimum: ..... °C  
maximum: ..... °C
- 3.6.5. Lubricant temperature  
minimum: ..... °C  
maximum: ..... °C
- 3.8. Lubrication system
- 3.8.1. Description of the system
- 3.8.1.1. Position of the lubricant reservoir: .....
- 3.8.1.2. Feed system (by pump/injection into intake/mixing with fuel, etc.)<sup>(1)</sup>: .....
- 3.8.2. Lubricating pump
- 3.8.2.1. Make(s): .....
- 3.8.2.2. Type(s): .....
- 3.8.3. Mixture with fuel
- 3.8.3.1. Percentage: .....
- 3.8.4. Oil cooler: yes/no<sup>(1)</sup>
- 3.8.4.1. Drawing(s): ....., or
- 3.8.4.1.1. Make(s): .....
- 3.8.4.1.2. Type(s): .....

.....  
(Date, file)<sup>(1)</sup> Delete where not applicable.<sup>(2)</sup> If the means of identification of type contains characters not relevant to describe the vehicle, component or separate technical unit types covered by this type-approval certificate such characters shall be represented in the documentation by the symbol: '?' (e.g. ABC??123??).▶<sup>(3)</sup> When this Directive will be amended to cover gaseous fuel tanks. ◀

**▼M3***Addendum to Appendix I*

1. Other auxiliary equipment driven by the engine (as per item 5.1.2 of Annex I) (list and brief description if necessary): .....
2. Additional information on test conditions (for positive ignition engines only)
  - 2.1. Spark plugs
    - 2.1.1. Make: .....
    - 2.1.2. Type: .....
    - 2.1.3. Spark-gap setting: .....
  - 2.2. Ignition coil
    - 2.2.1. Make: .....
    - 2.2.2. Type: .....
  - 2.3. Ignition condenser
    - 2.3.1. Make: .....
    - 2.3.2. Type: .....
  - 2.4. Radio interference suppression equipment
    - 2.4.1. Make: .....
    - 2.4.2. Type: .....

▼M3

## Appendix 2

## MODEL

(maximum format: A4 (210 × 297 mm))

## EC TYPE-APPROVAL CERTIFICATE

Stamp of  
administration

Communication concerning the

- type-approval<sup>(1)</sup>,
- extension of type-approval<sup>(1)</sup>,
- refusal of type-approval<sup>(1)</sup>,
- withdrawal of type-approval<sup>(1)</sup>,

of a type of a vehicle/component/separate technical unit<sup>(1)</sup> with regard to Directive . . . / . . . /EEC, as last amended by Directive . . . / . . . /EC.

Type-approval number: .....

Reason for extension: .....

## SECTION I

- 0.1. Make (trade name of manufacturer): .....
- 0.2. Type and general commercial description(s): .....
- 0.3. Means of identification of type if marked on the vehicle/component/separate technical unit<sup>(1)</sup><sup>(2)</sup>: .....
- 0.3.1. Location of that marking: .....
- 0.4. Category of vehicle<sup>(1)</sup><sup>(3)</sup>: .....
- 0.5. Name and address of manufacturer: .....
- 0.7. In the case of components and separate technical units, location and method of affixing of the EC approval mark: .....
- 0.8. Address(es) of assembly plant(s): .....

## SECTION II

1. Additional information (where applicable): see Addendum
2. Technical service responsible for carrying out the tests: .....
3. Date of test report: .....
4. Number of test report: .....
5. Remarks (if any): see Addendum
6. Place: .....

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7. Date: .....
8. Signature: .....
9. The index to the information package lodged with the approval authority, which may be obtained on request, is attached.

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<sup>(1)</sup> Delete where not applicable.

<sup>(2)</sup> If the means of identification of type contains characters not relevant to describe the vehicle, component or separate technical unit types covered by this type-approval certificate such characters shall be represented in the documentation by the symbol: “?” (e.g. ABC??123??).

<sup>(3)</sup> As defined in Annex II Section A to Directive 70/156/EEC.



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**Addendum to EC type-approval certificate No ...**  
**concerning the type-approval of a vehicle with regard to Directive 80/1269/EEC, as last amended**  
**by Directive .../.../EC**

1. Additional information
- 1.1. Engine .....
- 1.1.1. Manufacturer's engine code: .....  
(as marked on the engine, or other means of identification)
- 1.1.2. Engine capacity: .....
- ▶<sup>(1)</sup> 1.1.3. Fuel: diesel oil/petrol/LPG/NG<sup>(1)</sup> ◀
- 1.1.4. Maximum net power: ..... kW at ..... min<sup>-1</sup>
5. Remarks: .....

<sup>(1)</sup> Delete where not applicable.

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## 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)

▶<sup>(6)</sup> TEST REPORT ◀▶<sup>(6)</sup> — ◀▶<sup>(7)</sup> 1. ◀ **Test conditions**▶<sup>(8)</sup> 1.1. ◀ Pressures measured at maximum power▶<sup>(9)</sup> 1.1.1. ◀ barometric: ..... ▶<sup>(1)</sup> kPa ◀▶<sup>(10)</sup> 1.1.2. ◀ exhaust: ..... ▶<sup>(2)</sup> kPa ◀▶<sup>(11)</sup> 1.1.3. ◀ Inlet depression: ▶<sup>(3)</sup> kPa ◀ at engine intake system▶<sup>(12)</sup> 1.2. ◀ Temperatures measured at maximum power of the engine:▶<sup>(13)</sup> 1.2.1. ◀ of the intake air: ..... °C▶<sup>(14)</sup> 1.2.2. ◀ at the outlet of the inlet intercooler: .... °C<sup>(1)</sup>▶<sup>(15)</sup> 1.2.3. ◀ of the cooling liquid▶<sup>(16)</sup> 1.2.3.1. ◀ at the engine cooling liquid outlet: ..... °C<sup>(1)</sup>▶<sup>(17)</sup> 1.2.3.2. ◀ at the reference point in the case of air cooling: ..... °C<sup>(1)</sup>▶<sup>(18)</sup> 1.2.4. ◀ of the oil: °C (indicate point of measurement)▶<sup>(19)</sup> 1.2.5. ◀ of the fuel▶<sup>(20)</sup> 1.2.5.1. ◀ at the carburettor/injection pump intake<sup>(1)</sup>: ..... °C▶<sup>(21)</sup> 1.2.5.2. ◀ in the fuel-consumption measuring device: ..... °C▶<sup>(22)</sup> 1.2.6. ◀ of the exhaust measured at the point adjacent to the outlet flange(s) of the exhaust manifold(s): ..... °C▶<sup>(23)</sup> 1.3. ◀ Engine speed when idling: ▶<sup>(4)</sup> min<sup>-1</sup> ◀▶<sup>(24)</sup> 1.4. ◀ Characteristics of the dynamometer▶<sup>(25)</sup> 1.4.1. ◀ Make: .....▶<sup>(26)</sup> 1.4.2. ◀ Type: .....▶<sup>(27)</sup> 1.5. ◀ Characteristics of the opacimeter▶<sup>(28)</sup> 1.5.1. ◀ Make: .....

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

▶<sup>(1)</sup> <sup>(2)</sup> <sup>(3)</sup> <sup>(4)</sup> M1▶<sup>(5)</sup> <sup>(6)</sup> <sup>(7)</sup> <sup>(8)</sup> <sup>(9)</sup> <sup>(10)</sup> <sup>(11)</sup> <sup>(12)</sup> <sup>(13)</sup> <sup>(14)</sup> <sup>(15)</sup> <sup>(16)</sup> <sup>(17)</sup> <sup>(18)</sup> <sup>(19)</sup> <sup>(20)</sup> <sup>(21)</sup> <sup>(22)</sup> <sup>(23)</sup> <sup>(24)</sup> <sup>(25)</sup> <sup>(26)</sup> <sup>(27)</sup> <sup>(28)</sup> M3

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- ▶<sup>(3)</sup> 1.5.2. ◀ Type: .....
- ▶<sup>(4)</sup> 1.6. ◀ Fuel
- ▶<sup>(5)</sup> 1.6.1. ◀ For positive ignition engines operating on liquid fuel:
- ▶<sup>(6)</sup> 1.6.1.1. ◀ Make: .....
- ▶<sup>(7)</sup> 1.6.1.2. ◀ Specification: .....
- ▶<sup>(8)</sup> 1.6.1.3. ◀ Anti-knock additive (lead, etc.)
- ▶<sup>(9)</sup> 1.6.1.3.1. ◀ Type: .....
- ▶<sup>(10)</sup> 1.6.1.3.2. ◀ Content mg/litre: .....
- ▶<sup>(11)</sup> 1.6.1.4. ◀ Octane number
- ▶<sup>(12)</sup> 1.6.1.4.1. ◀ RON No: .....
- ▶<sup>(13)</sup> 1.6.1.4.2. ◀ MON No: .....
- ▶<sup>(14)</sup> 1.6.1.5. ◀ Relative density: ..... at 15 °C ..... at 4 °C
- ▶<sup>(15)</sup> 1.6.1.6. ◀ Calorific value: ..... kJ/kg
- ▶<sup>(16)</sup> 1.6.2. ◀ For positive ignition engines operating on gaseous fuel
- ▶<sup>(17)</sup> 1.6.2.1. ◀ Make: .....
- ▶<sup>(18)</sup> 1.6.2.2. ◀ Specification: .....
- ▶<sup>(19)</sup> 1.6.2.3. ◀ Storage pressure: .....
- ▶<sup>(20)</sup> 1.6.2.4. ◀ Utilization pressure: .....
- ▶<sup>(21)</sup> 1.6.3. ◀ For ▶<sup>(1)</sup> compression-ignition ◀ engines operating on gaseous fuels
- ▶<sup>(22)</sup> 1.6.3.1. ◀ Feed system: gas: .....
- ▶<sup>(23)</sup> 1.6.3.2. ◀ Specification of gas used: .....
- ▶<sup>(24)</sup> 1.6.3.3. ◀ Fuel oil/gas proportion: .....
- ▶<sup>(25)</sup> 1.6.4. ◀ For ▶<sup>(2)</sup> compression-ignition ◀ engines operating on liquid fuel
- ▶<sup>(26)</sup> 1.6.4.1. ◀ Make: .....
- ▶<sup>(27)</sup> 1.6.4.2. ◀ Specification of fuel used: .....
- ▶<sup>(28)</sup> 1.6.4.3. ◀ Cetane number: .....
- ▶<sup>(29)</sup> 1.6.4.4. ◀ Relative density: ..... at 15 °C ..... at 4 °C
- ▶<sup>(30)</sup> 1.7. ◀ Lubricant
- ▶<sup>(31)</sup> 1.7.1. ◀ Make: .....
- ▶<sup>(32)</sup> 1.7.2. ◀ Specification: .....
- ▶<sup>(33)</sup> 1.7.3. ◀ SAE viscosity: .....

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►<sup>(7)</sup>2. ◀ Detailed results of measurements

►<sup>(8)</sup>2.1. ◀ Engine performance

Engine speed (► <sup>(9)</sup> min <sup>-1</sup> ◀)						
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						
► <sup>(9)</sup> Power to be added for auxiliary equipment fitted on the engine in excess of Table 1 in Annex I (see item 1 in the Addendum to Appendix 1 of Annex I). Power to be subtracted when fan not fitted (see Table 1 in Annex I, note 5) ◀	No 1					
	No 2					
	No 3					
Net power kW						
Net torque Nm						

(1) Delete where inapplicable.  
 (2) Applicable to ►<sup>(9)</sup>compression-ignition◀ engines only.

►<sup>(10)</sup>2.2. ◀ Exhaust smoke index (to be completed for ►<sup>(9)</sup>compression-ignition◀ engines only):

Engine speed (► <sup>(9)</sup> min <sup>-1</sup> ◀)	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.....	.....	.....	.....

►<sup>(11)</sup>2.3. ◀ Maximum net power: ..... kW at ..... ►<sup>(9)</sup>min<sup>-1</sup>◀ <sup>(1)</sup>

►<sup>(12)</sup>2.4. ◀ Maximum net torque: ..... Nm at ..... ►<sup>(9)</sup>min<sup>-1</sup>◀ <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.

►<sup>(1)</sup> (2) (3) (4) (5) (6) **M1**

►<sup>(7)</sup> (8) (9) (10) (11) (12) **M3**

**▼ M3**