INTERNATIONAL STANDARD 1585

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Road vehicles — Engine test code — Net power

Véhicules routiers — Code d'essai des moteurs — Puissance nette

First edition — 1974-10-01

UDC 629.113 : 621.43.001.4 **Ref. No. ISO 1585-1974 (E)**

Descriptors : automobiles, automobile engines, internal combustion engines, tests, power measurement, measurement, net power.

Price based on 15 pages

FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 1585 was drawn up by Technical Committee ISO/TC 22, *Road vehicles*, and circulated to the Member Bodies in June 1973.

It has been approved by the Member Bodies of the following countries :

Austria	Iran	South Africa, Rep. of
Belgium	Italy	Spain
Bulgaria	Japan	Sweden
Canada	Netherlands	Switzerland
Czechoslovakia	New Zealand	Thailand
Germany	Poland	Turkey
Hungary	Portugal	U.S.S.R.
India	Romania	Yugoslavia

The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

Australia
France
United Kingdom

This International Standard cancels and replaces ISO Recommendation R 1585-1971.

Printed in Switzerland

Road vehicles — Engine test code — Net power

1 SCOPE

This International Standard specifies a method for testing engines designed for automobile vehicles, applicable to the evaluation of their performances with a view, in particular, to presenting curves of power and specific fuel consumption at full load as a function of engine speed.

It applies only to the net power study.

2 FIELD OF APPLICATION

This International Standard concerns internal combustion engines used for propulsion of private cars and other motor vehicles (excluding motor-cycles and agricultural tractors[1]) normally travelling on roads and included in one of the following categories :

- internal combustion engines (spark ignition, fuel injection or diesel) but excluding free piston engines;
- rotary piston engines.

These engines may be fitted with a supercharging device using a mechanical supercharger or a turbo-charger.

3 REFERENCE

ISO 3173, *Road vehicles — Apparatus for measurement of the opacity of exhaust gas from diesel engines operating under steady state conditions.*[2]

4 DEFINITIONS

4.1 net power : The power obtained on a test bed at the crankshaft or its equivalent, at the engine speed specified by the manufacturer, the engine being equipped with the standard production auxiliaries necessary to its operation for the particular application.

4.2 auxiliaries : The equipment and devices listed in table 1.

4.3 standard production equipment : Any equipment normally provided by the manufacturer for a particular engine application.

5 ACCURACY OF MEASUREMENTS

5.1 Torque

The dynamometer must be such that the first quarter of its scale is not used. It must give an accuracy within ± 0,5 % of the maximum scale value.

5.2 Engine speed

Engine speed shall be measured preferably with a revolution counter and an automatically synchronized chronometer (or counter timer). The accuracy of the measured value shall be ± 0,5 %.

5.3 Fuel consumption

± 1 % overall for the apparatus used.

5.4 Engine inlet air temperature

± 1 °C.

5.5 Barometric pressure

± 70 Pa (0,70 mbar*)

5.6 Pressure in exhaust extraction duct (see note 1 to table 1)

± 25 Pa (0,25 mbar*).

1) International Standards are to be prepared concerning the specifications relating to engines for motor-cycles and agricultural tractors. International Standard ISO 2288, *Agricultural tractors — Engine test code (bench test) — Net power*, is at present at the stage of draft.

2) At present at the stage of draft.

* 1 bar = 10^5 Pa.

TABLE 1 — **Installation of auxiliaries during test for determination of net power of engine**

No.	Auxiliaries	Fitted for net power test
1	Intake system Intake manifold Air filter Intake silencer Crankcase emission control system Speed limiting device	Yes, standard production equipment
2	Induction heating device of intake manifold	Yes, standard production equipment. If possible, to be set in the most favourable condition
3	Exhaust system Exhaust purifier Manifold Connecting pipes[1] Silencer[1] Tail pipe[1] Exhaust brake[2]	Yes, standard production equipment
4	Fuel supply pump[3]	Yes, standard production equipment
5	Carburettor	Yes, standard production equipment
6	Fuel injection equipment (petrol and diesel) Prefilter Filter Pump High pressure pipe Injector Air intake valve, if fitted[4] Governor (if fitted)	Yes, standard production equipment
7	Liquid cooling equipment Engine bonnet Bonnet air outlet Radiator Fan[6][7] Fan cowl Water pump Thermostat[8]	No Yes[5], standard production equipment
8	Air cooling Cowl Fan[6][7] Auxiliary test bed fan Temperature regulating device	Yes, standard production equipment Yes, if necessary Yes, standard production equipment
9	Electrical equipment	Yes[9], standard production equipment

TABLE 1 – **Installation of auxiliaries during test for determination of net power of engine** (*concluded*)

No.	Auxiliaries	Fitted for net power test
10	Supercharging equipment (if fitted)	
	Compressor driven either directly or indirectly by the engine, and/or by the exhaust gases	Yes, standard production equipment
	Intercooler[10]	Yes, standard production equipment
	Coolant pump or fan (engine driven)	Yes, standard production equipment
	Coolant flow control device (if fitted)	Yes, standard production equipment
	Auxiliary test bed fan	Yes, if necessary
11	Anti-pollution devices	Yes, standard production equipment

NOTES TO TABLE 1

1) If it is impracticable to fit the standard exhaust system, a system of equivalent restriction may be fitted for the test, provided that this is acceptable to the manufacturer.

In the test laboratory, the exhaust extraction system at the point where the test bed exhaust system is connected shall not, with the engine in operation, create at the exhaust extraction duct a pressure differing from the atmospheric pressure by more than ± 740 Pa (7,40 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 may be removed or fixed in a fully open position.

3) The fuel feed pressure may be adjusted, if necessary, to reproduce pressures existing in the particular engine application (particularly where a "fuel return" system is used).

4) The air intake valve is the control valve for the pneumatic governor of the injection pump.

5) The radiator, the fan, the fan cowl, the water pump and the thermostat shall be located on the test bed in the same relative positions that they will occupy on the vehicle. The cooling liquid circulation shall be operated by the engine water pump only.

Cooling may be produced either by the engine radiator or by an external circuit, provided that the pressure loss of this circuit remains substantially the same as that of the engine cooling system. The radiator shutter, if incorporated, shall be in the open position.

6) Where a disconnectable fan is incorporated, the net power shall be determined firstly with the fan disconnected, then with the fan connected.

7) Where a fixed fan, electrically or mechanically operated, cannot be fitted on the test bed, the power absorbed by the fan should be determined at the same engine speeds as those used for the measurement of the engine power. This power shall be deducted from the corrected power to obtain the net power.

8) The thermostat may be fixed in the fully open position.

9) 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. There shall be no charging of the battery during the test.

10) The temperature of the air at the inlet manifold shall be that specified by the engine manufacturer, if such a specification is given.

6 TESTS

6.1 Auxiliaries

During the test, the auxiliaries specified below shall be installed on the test bed, as far as possible, in the same position as in the intended application.

The engine shall be equipped only with the auxiliaries necessary to make it acceptable for service in the vehicle. (See 6.1.1, 6.1.2 and 6.1.3.)

6.1.1 *Auxiliaries to be fitted*

The auxiliaries which shall be fitted during the test for determination of the net power of the engine are listed in table 1.

6.1.2 *Auxiliaries 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 partial 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.

6.1.3 *Diesel engine starting auxiliaries*

For the auxiliaries used in the starting of diesel engines, the two following cases shall be considered :

a) Electrical starting. The generator is fitted and supplies, where necessary, the auxiliaries 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.

6.2 Setting conditions

The setting conditions for the test for determination of net power are indicated in table 2.

TABLE 2 – **Setting conditions**

1	Setting of carburettor(s)	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	

6.3 Test conditions

6.3.1 The net power test shall consist of a run at full throttle for spark ignition engines and at full load fuel pump setting for diesel engines, the engine being equipped as specified in table 1.

6.3.2 Performance data shall be obtained under stabilized normal operating conditions, with an adequate fresh air supply to the engine. The engines must have been run-in in accordance with the manufacturer's recommendations. Combustion chambers of spark ignition engines may contain deposits, but in limited quantity. Test conditions such as inlet air temperature shall be selected as near to reference conditions (see 7.2) as possible in order to minimize the magnitude of the correction factor.

6.3.3 The temperature of the inlet air to the engine (ambient air), shall be measured within 0,15 m maximum of 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 located 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.

6.3.4 No data shall be taken until torque, speed and temperature have been maintained substantially constant for at least 1 min.

6.3.5 The engine speed during a run or reading shall not deviate from the selected speed by more than ± 1 % or ± 10 rev/min, whichever is greater.

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

6.3.7 A time of measurement of not less than 30 s shall be used when measuring speed and fuel consumption with an automatically synchronized counter timer combination; for hand operation, the time of measurement shall be not less than 60 s.

6.3.8 The coolant outlet temperature in liquid-cooled engines shall be controlled at 80 ± 5 °C unless otherwise specified by the manufacturer.

For air-cooled engines, the temperature at a point indicated by the manufacturer shall be kept within $^{0}_{-20}$ °C of the maximum value specified by the manufacturer.

6.3.9 The fuel temperature at the inlet of the injection pump or carburettor shall be maintained within the limits established by the engine manufacturer.

6.3.10 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.

6.3.11 The exhaust temperature shall be measured at a point in the exhaust pipe(s) adjacent to the outlet flange(s) of the exhaust manifold(s). This temperature shall be maintained within the limits established by the engine manufacturer.

6.3.12 For diesel engines, the fuel shall be one supplied and delivered by the refinery to the customer without any supplementary smoke suppressant additives. In cases of dispute, tests shall be made with the CEC reference fuel CEC RF-03-T-69. For spark ignition engines, in cases of dispute, tests shall be carried out using CEC reference fuel CEC RF-01-T-69 (see annexes A and B).

6.4 Test procedure

Record data at a sufficient number of operating speeds to define completely the power curve between the lowest and the maximum engine speeds recommended by the manufacturer.

6.5 Data to be recorded

Data to be recorded are those indicated in clause 9.

7 CORRECTION FACTORS

7.1 Definition of factor K

A factor by which the observed power must be multiplied to determine the engine power under the reference atmospheric conditions specified in 7.2.

7.2 Reference atmospheric conditions

7.2.1 *Temperature*

25 °C (298 K).

7.2.2 *Total pressure*

100 kPa (1 000 mbar), humidity being neglected.

NOTE – With the temperature range 10 to 35 °C, the effects of humidity on the correction factor value may be neglected (though in some cases these effects may not be negligible), taking into account the accuracy of the measurements.

7.3 Limitations in use of correction formula

The correction formula is only applicable where the correction factor is between 0,96 and 1,04.

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.

NOTE – The tests may be carried out in air-conditioned test rooms where the atmospheric conditions may be controlled.

7.4 Determination of correction factors

7.4.1 *Spark ignition engines (carburettor or injection) – Factor K_a*

Within the limits defined in 7.3, the correction factor is obtained by applying the formula

$$K_a = \left(\frac{100}{p}\right)\left(\frac{T}{298}\right)^{0,5} \qquad \ldots (1)$$

where

T is the absolute temperature, in kelvins, at the air inlet to the engine;

p is the total atmospheric pressure, in kilopascals.

This formula is applied to the observed brake power, without taking into account the mechanical efficiency of the engine.

7.4.2 *Diesel engines*[1] *– Factor K_d*

7.4.2.1 CORRECTION FACTOR FOR NATURALLY ASPIRATED 4-STROKE AND SCAVENGE-BLOWN 2-STROKE DIESEL ENGINES

The correction factor, which applies only at constant fuel delivery, is calculated by means of the formula

$$K_d = \left(\frac{100}{p}\right)^{0,65}\left(\frac{T}{298}\right)^{0,5} \qquad \ldots (2)$$

The following formula, which is nearly equivalent, may also be used :

$$K_d = 1 + \frac{A}{100}$$

where $A = 0,65\,(100 - p) + 0,17\,(T - 298)$

If the correction factor exceeds 1,04 or is less than 0,96, or if fuel delivery, measured during the engine test, is less than 50 mm^3 per litre swept volume or more than 75 mm^3 per litre swept volume, the correction shall be made using the correction factor K_d, but the value of this coefficient, the pressure and temperature conditions during the test, and the specific fuel delivery in mm^3 per litre shall be stated in the test report.

7.4.2.2 CORRECTION FACTOR FOR PRESSURE-CHARGED DIESEL ENGINES

7.4.2.2.1 Exhaust turbo-charged engine

A correction factor equal to 1 shall be applied when the ambient air density does not vary by more than ± 5 % from the density under the reference conditions (25 °C, 100 kPa).

When the ambient air density is beyond these limits, no correction shall be applied, but the test conditions shall be stated in the test report.

7.4.2.2.2 Mechanically supercharged engines

For the correction factor of mechanically supercharged engines, the formula applicable to naturally aspirated engines shall be used, provided that the following ratio is within the limits of fuel delivery specified for naturally aspirated engines (see 7.4.2.1) :

$$\frac{\text{fuel delivery}}{\text{swept volume}\ (p_2/p_1)\ (T_1/T_2)}$$

where

p_1 is the ambient pressure;

p_2 is the pressure at the inlet manifold;

T_1 is the ambient temperature, in kelvins;

T_2 is the temperature at the inlet manifold, in kelvins.

8 MEASUREMENT OF SMOKE VALUE

The smoke value shall be measured and recorded at every test point. The opacimeter used, and its installation, shall be designed in accordance with ISO 3173.

1) Although the formulae given above are recommended at present, they must be considered only as provisional. Studies are being made to establish more accurate formulae which will take into account particularly the fuel/air ratio.

9 TEST REPORT

(State "NONE" where not applicable, or delete)

9.1 Engine data

9.1.1 *Reciprocating engines*

Make : . . . . . Type : . . . . . Serial No. : . . . . . .

Bore : . . . . . Stroke : . . . . . Swept volume of one cylinder : . . . . . .

Number of cylinders : . . . . . Arrangement of cylinders : . . . . . .

Total swept volume of the cylinders : . . . . . Ignition : spark* or compression*
firing or injection order : . . . . . .

Compression ratio : . . . . . Cycle : 2* or 4* strokes

Supercharging device : . . . Make : . . . . . Type : . . . . . Serial No. : . . . . . .

9.1.2 *Rotary trochoidal engines*

Make : . . . . . Type : . . . . . Serial No. : . . . . . .

Epitrochoidal* or Hypotrochoidal*

Envelope : internal* or external*

Number of gas-tight chambers between the rotor and the stator, i.e. number of peripheral sealing devices per rotor or stator :
. . . . . .

Eccentricity : . . . . . Generating radius : . . . . . .

Operating width : . . . . . Swept volume of one gas-tight chamber : . . . . . .

Number of rotors : . . . . . Ignition : spark* or compression*
firing or injection order : . . . . . .

Compression ratio : . . . . . Cycle : 2* or 4* strokes

Supercharging device : . . . Make : . . . . . Type : . . . . . Serial No. : . . . . . .

9.2 Fuel supply

Pump : . . . . . Make : . . . . . Type : . . . . . Serial No. : . . . . . .

Prefilter : yes* or no* Filter : yes* or no*

* Delete where inapplicable

9.3 Carburettor

Make : . . . . . Type : . . . . . Serial No.: . . . . . .

Number : . . . . . Detailed specifications : . . . . . .

9.4 Injection pumps or devices

Make : . . . . . Type : . . . . . Serial No. : . . . . . .

Static timing : . . . . . Advance device : . . . . . .

Manufacturer's code : . . . . . .

9.5 Injection nozzles and nozzle holders

Make : . . . . . Type : . . . . . Serial No. : . . . . . .

Setting pressure : . . . . . Injection high pressure pipes { lengths . . . . . / inside diameter : . . . . . .

9.6 Governor

Make : . . . . . Type : . . . . . Serial No. : . . . . . .

Cutting-in speed under load : . . . . . rev/min

Maximum no-load speed : . . . . . rev/min

9.7 Ignition distributor

Make : . . . . . Type : . . . . . Serial No. : . . . . . .

Static timing : . . . . . Advance device : . . . . . .

Timing at . . . . . rev/min : . . . . . .(as specified by the manufacturer)

Maximum range of advance device : . . . . . .

Distributor contact breaker gap : . . . . . .

9.8 Spark plugs

Make : . . . . . Type : . . . . . Serial No. : . . . . . .

Number per cylinder : . . . . . Electrodes gap : . . . . . .

9.9 Ignition coils

Make :. . . . . Type : . . . . . Serial No. : . . . . . .

Number : . . . . . .

9.10 Glow plugs

Make : . . . . . Type : . . . . . Serial No. : . . . . . .

Number : . . . . . .

9.11 Interference suppressor

Make : . . . . . Type : . . . . . Serial No. : . . . . . .

9.12 Intake system

Intake manifold : . . . . . Description : . . . . . .

Air filter : Make : . . . . . Type : . . . . . Serial No. : . . . . . .

Intake silencer : Make : . . . . . Type : . . . . . Serial No. : . . . . . .

Inlet maximum depression at full flow recommended by the manufacturer : . . kPa (mbar)

9.13 Valve gear

Type of valve gear : . . . . . Brief description : . . . . . .

Valve timing : . . . . . Tappet clearances (hot* or cold*) : . . . . . .

9.14 Crankcase emission control system

Brief description : . . . . . .

Make : . . . . . Type : . . . . . Serial No. : . . . . . .

9.15 Induction heating device

Type : . . . . . Brief description : . . . . . .

9.16 Exhaust system

Pipes and other components : standard* or not* Brief description if not : . . . . . .

Exhaust brake : Make : . . . . . Type : . . . . . Serial No. : . . . . . .

Silencer : Make : . . . . . Type : . . . . . Serial No. : . . . . . .

* Delete where inapplicable

9.17 Cooling system

9.17.1 *Liquid*

Nature of the liquid : . . . . . .

Circulating pump : Make : . . . Type : . . . . . Serial No. : . . . Drive ratio : . . . . . .

Thermostat : Make : . . . . . Type : . . . . . Serial No. : . . . . Setting : . . . . . .

Radiator : Make : . . . . . Type : . . . . . Serial No. : . . . . . .

Pressurizing valve : Make : . . . . Type : . . . . . Pressure setting : . . . . . .

Fan : Make : . . . . . Type : . . . . . Serial No. : . . . . . .

Fan drive system : . . . . . Drive ratio : . . . . . .

Fan cowl : yes* or no*

9.17.2 *Air*

Fan : Make : . . . . . Type : . . . . . Serial No. : . . . Drive ratio : . . . . . .

Air ducting (standard production) : yes* or no*

Auxiliary test bed fan : yes* or no*

Temperature regulating system : yes* or no* Brief description : . . . . . .

9.18 Oil cooler yes* or no*

Make : . . . . . Type : . . . . . Serial No. : . . . . . .

9.19 Electrical equipment

Generator* or Alternator* : Make : . Type : . . . . . Serial No. : . . . . . .

9.20 Anti-pollution systems (Brief description) : . . . . . .

9.21 Other test equipment

(Enumerate, with brief description if necessary.)

* Delete where inapplicable

9.22 Specific test conditions

Barometric pressure : . . . . . **kPa** (mbar)

Relative humidity : . . . . . % (for information)

Temperature of the test laboratory : . . . . . °C (for information)

Cooling liquid outlet temperature specified by the manufacturer : . . . . . °C

Oil temperature range specified by the manufacturer : . . . . . °C min. . . . °C max.

Fuel temperature range specified by the manufacturer at inlet of the carburettor or of the injection pump : . . . . . °C min. . . . °C max.

Exhaust temperature (measured at a point in the exhaust pipe(s) adjacent to the outlet flange(s) of the exhaust manifold(s)) recommended by the manufacturer : . . . . . °C

Idling speed : . . . . . rev/min (for information)

Laboratory extraction system for the exhaust gases :

Over-pressure or maximum depression : . . . . . ± . . . **Pa, at full load**

Dynamometer : Make : . . . . . Type : . . . . . Serial No. : . . . . .

Constant : . . . . . .

Fuel consumption measuring apparatus : gravimetric* or volumetric*

Smoke opacity measuring apparatus (diesel) : Make : . . . . . Type : . . . . . .

Measuring point or installation : . . . . . .

9.23 Fuels and lubricants

Liquid fuel

Make : . . . . . Type : . . . . . Octane **RON**** No. : . . . . .

Cetane No. : . . . . . .

Distillation : Temperature at which the distillate volume is equal to : 10 % . . . 50 % . . . 90 % . . End point . .

Density : . . . . . g/cm^3 at . . . °C

Lower calorific value . . . . . kJ/kg

Other fuels : Characteristics : . . . . . .

Lubricant : Make : . . . . . Type : . . . . . SAE viscosity : . . . . . .

---

* Delete where inapplicable.

** RON : Research octane number.

9.24 Results

Maximum net power : . . . . . kW at . . . rev/min

Maximum net torque : . . . . . N·m at . . . rev/min

Specific fuel consumption

— at maximum net power : . . . . . g/kWh

— at maximum net torque : . . . . . g/kWh

9.25 **Statement of results** (net power)

The characteristic curves of the corrected torque and power, of the specific fuel consumption and of the exhaust smoke emission shall be drawn as a function of the engine speed.

Engine speed	Observed torque	Observed power	Test conditions		Correction factor	Corrected torque	Corrected power	Specific fuel consumption[1]	Fuel delivery[2]	Temperature of engine cooling liquid at outlet	Temperature of oil at measuring point	Exhaust temperature	Smoke value observed
			Barometric pressure	Temperature of inlet air									
rev/min	N·m	kW	kPa	°C		N·m	kW	g/kWh	mm^3/stroke	°C	°C	°C	

1) Spark ignition engine : without correction of power. Compression ignition engine : with correction of power.

2) For diesel engines.

For pressure-charged engines, add the following columns :

Pressure charging			
Temperature		Pressure	
After pressure charger	After intercooler	After pressure charger	After intercooler
°C	°C	kPa	kPa

10 UNITS OF DESIGNATION

10.1 Units

Unit of mass : gram (g)

Unit of power : kilowatt (kW)

Unit of torque : newton metre (N·m)

Unit of volume of injected fuel : cubic millimetre (mm^3)

10.2 Designation

When the performances (power curves, torque and specific fuel consumption) of a heat engine are measured according to the specification of this International Standard, reference shall be made to the method used by stating "measured according to International Standard ISO 1585".

10.2.1 *Indication of net power*

Qualify "net power" by the word "ISO".

Example :

ISO net power : . . . kW at : . . . rev/min. (measured according to International Standard ISO 1585)

10.2.2 *Indication of net torque*

Qualify "net torque" by the word "ISO"

Example :

ISO net torque : . . . N·m at . . . rev/min (measured according to International Standard ISO 1585).

10.2.3 *Indication of specific fuel consumption*

Mention "ISO net power" between parentheses after "specific fuel consumption".

Example :

ISO specific fuel consumption (net power — International Standard ISO 1585) : . . . g/kWh.

ANNEX A

REFERENCE FUEL CEC RF-01-T-69

SPECIFICATIONS

	Limits and units	Test method[1)]
Research octane number	99 ± 1	ASTM D 2699-70
Relative density 15/4 °C	0,742 ± 0,007	ASTM D 1298-67
Reid vapour pressure	60 ± 4 kPa (600 ± 40 mbar)	ASTM D 323-72
Distillation		ASTM D 86-87
Initial boiling point		
10 % (volume)	50 ± 5 °C	
50 % (volume)	100 ± 10 °C	
90 % (volume)	160 ± 10 °C	
Final boiling point	195 ± 10 °C	
– Residue (volume)	2 % max.	
– Loss (volume)	1 % max.	
Hydrocarbon analysis		ASTM D 1319-70
– Olefins (volume)	18 ± 4 %	
– Aromatics (volume)	35 ± 5 %	
– Saturates (volume)	balance	
Oxidation stability	480 minutes, min.	ASTM D 525-55
Existent gum	4 mg/100 mm^3 max.	ASTM D 381-70
Antioxidant	50 ppm min.	
Sulphur content (mass)	0,03 ± 0,015 %	ASTM D 1266-70
Lead content	0,57 ± 0,03 g/dm^3	ASTM D 526-70
– Nature of scavenger	motor mix	
– Nature of lead alkyl	not specified	
Other additives	nil	

NOTE – The blending of CEC RF-01-T-69 must only use conventional European base materials, and exclude unconventional components such as pyrolysis gasoline, thermally cracked material and motor benzole.

1) The references given above will be replaced by ISO references when the corresponding International Standards, at present in preparation, have been adopted.