THE COUNCIL

Having regard to Article 5(a) of the Convention on the Organisation for Economic Co-operation and Development of 14th December 1960 ;

On the proposal of the Committee for Agriculture ;

I. DECIDES :

1. The Standard Code for the Official Testing of Small Engines used in Agriculture and Commercial Horticulture (hereinafter called the « O.E.C.D. Small Engines Code ») shall be operated in accordance with the provisions of this Decision and on the basis of the Rules and Directions set out in the Annex thereto.

2. The O.E.C.D. Small Engines Code shall be open to all Members of the Organisation. It shall be implemented by the Authorities designated for that purpose by Member Governments adhering to the Code in accordance with paragraph 3. They shall be responsible to their Governments for the implementation of the Code.

3. Members desiring to adhere to the O.E.C.D. Small Engines Code shall notify the Secretary General, who shall inform the other Members accordingly.

4. Members adhering to the Code shall be obliged to take the necessary steps to apply the Rules and Directions set out in the Annex to this Decision and to ensure their application by the Authorities referred to in paragraph 2.

5. Members desiring to lodge a complaint concerning non-execution of the obligation specified in paragraph 4 may lay the matter before the Organisation. The complaint shall be examined by the Committee for Agriculture which shall report to the Council.

6. The O.E.C.D. Small Engines Code shall come into force as from the date of this Decision and shall be renewed from year to year unless the Council decides otherwise on the proposal of the Committee for Agriculture.

II. INSTRUCTS the Committee for Agriculture to report to the Council, when it considers it appropriate, on the operation of the O.E.C.D. Small Engines Code and to submit to the Council, where necessary, proposals for modifying that Code.

*ANNEX*

## INTRODUCTION

The O.E.C.D. Small Engines Code is designed for the testing of small engines, both compression ignition and spark ignition, used in agriculture, forestry and commercial horticulture, as for exemple in walking tractors and cultivators, or to drive irrigation pumps and the lighter type of barn machinery, and such like. The tests would be unnecessarily severe for engines used to drive equipment for amateur use. Engines for use in chain-saws and engines which are not functionally self-sufficient are not included.

The aim of the tests is to determine not only the instantaneous operational characteristics of the engine under standard conditions, but to supply information on the ruggedness of the engine, on its abilities to start and run under all conditions which may be encountered in use, when tilted and under special climatic conditions.

The O.E.C.D. Small Engines Code is open, on a voluntary basis, to all Member countries of the Organisation. In deciding to participate in the Code, a country undertakes the responsibility to adhere strictly to the Rules and Directions for the application of the Code approved by the Council. Governments of participating countries must designate official testing authorities to be responsible for carrying out the tests and issuing the test reports giving their results. Before the test report is issued, the National Designated Testing Authority must certify that the O.E.C.D. Code was followed in the tests, the test report must comply with the requirements set out in the Code and it must be approved by the O.E.C.D. prior to publication.

The international co-ordination of the application of the Code and the consideration of technical problems arising are ensured by annual meetings of representatives of the National Designated Testing Authorities, and meetings of an Advisory Group elected by the Annual Meeting. These bodies report regularly to the Committee for Agriculture of the O.E.C.D. which, in turn, reports to the Council when necessary.

## RULES AND DIRECTIONS
## GENERAL REQUIREMENTS AND PROCEDURE

1. *Selection*

Two engines will be submitted for test and one of these, chosen at random, will be used for the Test (5) : Performance under moderate density dust conditions. The choice of engines shall be carried out under the responsibility of the Testing Station, who shall make absolutely sure that the engines are identical within the production specifications to other engines of the series. The test report shall mention the method of choice, and, if necessary, the operations carried out to verify the conformity of the engine tested with other production models.

2. *Manufacturer's Instructions*

The engine shall never be operated during the tests in a way that is not in accordance with the manufacturer's published instructions in the form of an operating handbook.

3. *Retesting*

A station will only retest an engine model if it has been modified so that its performance may be affected. If the name only has been changed the

station may certify that the test already reported applies to the renamed engine.

When a station submits a test report for a retest, it must point out the modifications which justify the new test.

4. *Running-in and preliminary adjustments*

Both new engines shall be run in by the station before testing.

When the manufacturer has issued precise « running-in » instructions, these instructions shall be followed. The manufacturer is permitted to specify that no running-in is necessary beyond that which he may have carried out prior to submitting the engine for test.

If not, the following running-in procedure shall be used :

1/2 hour at quarter load at the speed specified by the manufacturer for continuous operation
1 hour at half load at that speed
7 1/2 hours at three-quarter load at that speed
1 hour at full load at that speed

In every case the running-in method used shall be specified in the test bulletin.

Ignition and carburation settings or settings of injection equipment shall conform to tolerances specified by the manufacturer. During the period preparatory to the tests, the manufacturer may make adjustments in conformity with the specifications. Settings duly verified by the testing station shall be re-checked during maintenance operations.

5. *Specification sheet*

The engine manufacturer shall supply a list of technical specifications. This list shall be as shown in the specimen report. These specifications shall be verified by the testing station. Results apply only to an engine equipped as described in the specification sheet.

Accessories capable of influencing the running characteristics of the engine such as air cleaner, silencer and reduction gearbox shall be precisely described in the specification sheet attached to the test bulletin. In the case of an engine with integral reduction gearbox and clutch, these components shall in no case be removed from the engine and all the tests shall be carried out with the outlet shaft from the reduction unit as engine output shaft. On the other hand, in all other cases, in respect of engines without reduction gearboxes or engines delivered optionally with reduction boxes, tests shall be carried out on the crankshaft.

6. *Overhauls and repairs during tests*

All overhauls or repairs made during the test shall be noted, together with comments on any practical defects or shortcomings about which there is no doubt. These are the responsability of the testing station but may be carried out by the manufacturer under the supervision of the station.

7. *Fuels and lubricants*

Fuels shall comply with the following requirements unless the manufacturer specifies an alternative type :

(i) Gasoline

| Test | Test limits |
|---|---|
| Distillation : | |
| 10 per cent evaporated at, °C ..... | 60 ± 10 |
| 50 per cent evaporated at, °C ..... | 100 ± 10 |
| 90 per cent evaporated at, °C ..... | 170 ± 10 |
| Final boiling point, °C ..... max. | 205 |
| Octane number (research method) | 90 ± 3 |
| Residue on evaporation, mg/100 ml .. max. | 4 |
| Lead content, g/litre .. ..... .. | 0.55 — 0.60 |

In addition, the specific gravity at 15° C and the Reid vapour pressure, kg., shall be recorded.

(ii) Kerosene

| Test | Test limits |
|---|---|
| Reaction | Neutral |
| Flash point, °C ..... min. | 35 |
| Distillation, 95 % evaporated at, °C .... max. | 320 |
| Sulphur, percent by weight ..... max. | 0.50 |

(iii) Diesel Fuel

| Test | Test limits | |
|---|---|---|
| | Normal | Low temperature |
| Distillation : | | |
| Final boiling point, °C ..... max. | 385 | 343 |
| Pour point, °C ..... max. | —7 | —40 |
| Cloud point, °C ..... max. | —1 | —32 |
| min. | — | —37 |
| Inorganic acidity, mg KOH/g ..... max. | Nil | Nil |
| Carbon residue on 10 per cent bottoms, per cent by weight ..... max. | 0.20 | 0.15 |
| Sulphur, per cent by weight ..... | 1.0 max. | 1.0 max. |
| Ash, per cent by weight ..... max. | 0.01 | 0.01 |
| Water, per cent by volume ..... max. | 0.05 | 0.05 |
| Cetane number ..... min. | 45 | 40 |

In addition, the specific gravity at 15° C and the cetane number will be recorded.

The fuel used during test shall be freshly supplied, this condition being particularly important for endurance tests. Lubricants shall be selected from the range of products commercially available in the country where the equipment is tested but shall conform to the minimum standards approved by the manufacturer. Their types and viscosity shall be recorded.

8. *Accuracy of measuring apparatus*

Measuring apparatus for the following items shall have no more than the errors shown :

| | |
|---|---|
| Rotational speeds | 0.5 per cent |
| Time | 0.2 seconds |
| Length | 0.5 per cent |
| Force | 2.0 per cent |
| Weight | 0.5 per cent |
| Atmospheric pressure | 0.2 millibar |
| Temperature of fuels etc. | 2° C |

9. *Dynamometer*

The dynamometer used, together with its coupling, must be of a suitable size for the engine under test.

## PERFORMANCE TESTS

(to be carried out in the order shown)

1. *Power determination*

(a) *General regulations*

Power tests shall be carried out :

(i) at the end of the running-in period ;
(ii) at the end of the endurance test.

The torque and power values in the test report shall be obtained from the dynamometer without correction for losses in power transmission.

In these tests, the dynamometer shall be coupled in line with the engine.

If in the laboratory use is made of an exhaust gas discharge device, it must not change the engine performance.

No correction shall be made to the test results for atmospheric conditions or other factors, in the case of compression ignition engines. Test results will, however, be corrected for temperature and atmospheric pressure in the case of spark ignition engines (correction factor, $\frac{1013}{P}\sqrt{\frac{273 + T}{293}}$ where P is the atmospheric pressure in millibars, and T the air temperature °C).

The specific consumption figures in the report shall be given as mass fuel per unit of work.

To obtain hourly consumption by volume and the work performed per unit volume of fuel, a conversion of units of weight to units of volume shall be made using the density value at 15° C.

When consumption is measured by volume, the specific consumption shall be calculated using the density corresponding to the appropriate fuel temperature.

The various tests shall be carried out in a continuous sequence, the governor control lever or, in its absence, the throttle control being in the fully open position.

Stable operating conditions must have been attained at each load setting before beginning test measurements.

The test report shall include presentation of the following curves made for the full range of engine speed available :

— power as a function of speed
— torque as a function of speed
— hourly and specific fuel consumption as a function of speed

In addition to the performance measurements required above, the following shall also be noted :

— temperature of the fuel at a suitable point between the tank and the engine, and the oil temperature at a suitable point in the oil flow (not two-stroke engines with crankcase compression.)

— the air temperature at the air cleaner inlet and at the inlet of the cooling system.
— the atmospheric pressure.
— the pressure drop across the air cleaner.

(b) *Varying speed*

Hourly consumption, torque and power shall be noted for each point obtained for a given load of the brake dynamometer, and specific consumptions shall be calculated. If the engine has a governor, speed at no load shall also be noted.

If, on the other hand, the engine has no governor, the maximum speed specified by the manufacturer shall not be exceeded.

(c) *Maximum power*

The engine shall operate for a period of two hours subsequent to a sufficiently long warming-up period for power to become stabilised.

The braking force will be applied such that it is the maximum which allows the engine just to be controlled by the governor. If the engine has no governor, the throttle being fully open, the braking effect of the dynamometer shall be regulated until the engine is slowed to the speed specified by the manufacturer for continuous operation.

The maximum sustained power quoted in the report shall be the average of the readings made during the two-hour period ; if the power variation exceeds ± 10 per cent, from the average, the test shall be repeated. If the variation continues, the deviation shall be stated in the report.

No fewer than six readings shall be made at equal intervals during the two-hour test period.

2. *Starting tests*

(a) *Starting system*

If the starting system is electrical, the battery shall be fully charged and then discharged for three hours at the 10 hour rate to produce a 70 per cent charged condition prior to each test. Battery terminals and leads shall be checked for good condition and function. It will be in thermal equilibrium with the environment and with the engine at the time of the test.

The manufacturer's starting instructions must be followed to the letter.

(b) *Hot starting*

(i) Carrying out the test

The engine will be run for at least one hour at maximum power. The engine will be stalled by loading the brake dynamometer and the test will proceed without delay.

The test will be carried out by the staff of the testing station. Each attempt to start will consist of up to five operations of the electrical starter, kick starter, rope starter, crank or other mechanical device. If the engine starts, it will be run for one minute and the engine stalled as above. If a complete attempt of five operations is unsuccessful, the engine must be started by some means and run for one hour and then stalled before starting the next attempt. Five attempts to start will be made. If these all fail, the manufacturer's representative will repeat the test. If he succeeds, his explanation for the failure by the testing station will be included in the report.

(ii) Results to be recorded.

The attempts at which starting was successful will be recorded by their number in the series of 5 attempts (e.g. at the 2nd and 3rd attempts.) The manufacturer's starting instructions will be described.

(c) *Low temperature starting*

(i) Carrying out the test

The engine will be in thermal equilibrium with an environment at $-10^{\circ}$ C $\pm$ $1^{\circ}$ C. Up to twenty-five operations of the starter following the manufacturer's instructions will be made to start the engine. If the engine starts, the test will be concluded. If the engine fails to start, it will be brought into a warm environment, started and run until hot. It will then be stopped and returned to the cold environment until it is in thermal equilibrium with it. The manufacturer's representative will then try to start it as above. If this is succesful, the test will be concluded.

(ii) Results to be recorded.

If the engine starts during the first series of twenty-five operations, this fact alone will be recorded. If it fails to start then, but is started by the manufacturer's representative, his explanation for the failure by the testing station will be included in the report.

(d) *Starting under moist conditions*

(i) Preparation of the engine

The engine shall be placed in an environment of between $1^{\circ}$ C and $5^{\circ}$ C for 16 hours. It shall be covered by an enclosure of galvanised metal in the form of a cube of side 1.2 metres so designed internally to prevent any drips of water from falling directly on to the engine. Into this shall be passed in the space of ten minutes half a litre of water in the form of water vapour. After a further fifteen minutes, the enclosure shall be removed and an attempt immediately made to start the engine, following the manufacturer's instructions. Records shall be made of the attempts to start the engine.

If the engine fails to start, the engine shall be removed from the cold environment, dried out, started and run until normal operating temperature has been reached.

The process of soaking at the low temperature and the starting procedure shall then be repeated once by the manufacturer's representative.

(ii) Carrying out the test and recording results

The test will be carried out exactly as for low temperature starting, except that the engine will be returned to the moist environment.

3. *Noise measurement*

(a) *Measuring equipment*

A good quality sound level meter shall be used. Reference may be made to publication no. 123, « Recommendations for Sound Level Meters » of the International Electrotechnical Commission, (I.E.C.). Measurement shall be carried out with a frequence weighting network on conformity with curve A and set tot give « fast response » as described in the I.E.C. recommendations on noise measurement apparatus.

The equipment shall be calibrated frequently and, if possible, before each measuring session.

While awaiting the use of noise measuring equipment in accordance with international standards now being prepared, an adequate technical description of measuring equipment shall be given in the test procedure.

(b) *Carrying out the test*

Measurements will be made 7.5 metres away from the engine and on each side of it, on lines passing through the centre of the engine, one parallel to the crankshaft, one at right angles to it, and two bisecting the angles made by the previous two, in a horizontal plane, the microphone being 1.2 metres above the ground. The engine will be loaded and operating at a steady speed such as to produce the maximum power of the engine. It will stand 1.2 metres above the ground.

Measurements will be made in a sufficiently silent and open zone (ambient noise and noise of wind 10 decibels less than the noise to be measured). For example, this zone may be an open space of 50 m. radius, of which the central part of at least 20 metres radius shall be practically level and made of concrete, asphalt or similar material and shall not be covered with powdery snow, high grass, friable soil or cinders.

Measurements shall be made in good weather conditions with little or no wind. Any extraneous noise occurring during the reading which is not connected to general sound level measurement, shall not be taken into consideration.

(c) *Results to be recorded*

The sound level found at each of the eight positions 7.5 metres from the engine will be recorded in decibels (A). For this purpose, the first position shall be that at the end of the crankshaft which rotates clockwise when facing it. The succeeding positions shall be numbered in a clockwise direction.

4. *Endurance test*

(a) *Organisation*

The test will be in three parts. During the first part, lasting for eighty-eight hours running time, the engine will be run level. During the first forty-four hours the engine will be run in a cycle of 5 minutes at the maximum speed recommended by the manufacturer for continuous running and 70 %

of the torque available at this speed at the beginning of the endurance test followed by one minute without load at idling speed, the cycle then being recommenced. During the second forty-four hours, the engine will be run for five minutes at the minimum speed recommended by the manufacturer for continuous running under load and 70 % of the torque available at this speed at the beginning of the test, followed by one minute without load at idling speed, the cycle then being recommenced. When increasing speed and reapplying the load in both these cycles the throttle must be opened first to avoid stalling. Both throttle and brake will be operated smoothly and the operation completed in seven seconds.

During the second part, lasting for one hundred and seventy-six hours, the engine will be run at the maximum angle of tilt allowed by the manufacturer. If this is impossible, due for example to oil spilling, the engine will be run at the maximum possible angle of tilt. The time tilted will be divided into four equal parts, each of forty-four hours, the engine being tilted successively in each direction on its longitudinal axis and at right angles to it. Each of these four periods is in turn divided into two equal parts of twenty-two hours. During the first twenty-two hours, the engine will cycle as in the first forty-four hours above and, in the second twenty-two hours, as in the second forty-four hours above. The sequence will be repeated for each direction of tilt.

During the third part of the endurance test lasting one hundred and thirty-two hours, the engine will be run level without cycling at the maximum speed recommended by the manufacturer for continuous running and 70 % of the torque available at this speed at the beginning of the test.

All periods are multiples of eleven hours. Where engines will run for eleven hours without service, this allows for eleven hours running and a service, in each twelve hours, or two periods of running in the day if automatic working is possible. On engines with no governor the load will be reset to give the correct speed after each twenty-two hours running.

The total length of the endurance test will thus be three hundred and ninety-six hours running time.

(b) *Load application*

The tilting of the engine will create difficulties in connecting the engine to the brake dynamometer. Therefore arrangements other than a straight shaft are allowed. Any radial load applied must be compatible with the data supplied by the manufacturer. If an indirect drive is used it must be of as high efficiency as possible.

(c) *Power checks*

The power available will be determined at the beginning of the endurance test as the value obtained may be lower than that recorded in the maximum power test because of the provision for indirect coupling to the dynamometer. The maximum power available will be checked after each twenty-two hours running.

(d) *Overhauls*

These will be carried out when the original maximum power available in a daily check is found to be below 80 % of the maximum power available at the beginning of the endurance test. One may also be carried out at the end of the endurance test before the final power determination.

(e) *Results to be recorded*

(i) The maximum power found at each check will be recorded as a percentage of the power originally available and shown on a graph as a function of running time. Overhauls will also be shown on this graph with power percentage before and after carrying them out.

(ii) The direction of tilt will be indicated on the graph.

(iii) The volume of fuel and lubricating oil used during the whole endurance test will be recorded.

(iv) Any repairs and adjustments necessary during the endurance test will be recorded together with a statement of the routine maintenance carried out.

## *DUST TESTS*

5. *Performance under moderate density dust conditions* (compulsory)

It is necessary to establish the effectiveness of the air cleaner, and the resistance of the engine as a whole to the ingress of dust when operating in dusty air. This test is intended to represent dust conditions which may fairly be described as normal for temperate regions.

The test wil be carried out on the engine reserved for the dust test. Before starting the test, the engine shall be stripped and measurements taken of the cylinder bore, rings, bearings and valve stems and of the weight of the rings.

The engine shall be operated at rated speed and maximum available power in a chamber enabling the required dust concentration to be maintained under atmospheric conditions approximate to those encountered in temperate regions. The dust concentration shall be approximately 70 mg/m$^3$ and the composition of the dust shall conform to the American Fine test dust specification (SAE code J726A).

Measurements shall be made at suitable intervals of the output of the engine and of atmospheric conditions, including dust concentration, and also of pressure drop across the air cleaner. If a cleaning procedure and frequency is recommended for the air cleaner in such operating conditions this shall be followed. Otherwise the cleaner element shall be cleaned by a convenient field method such as knocking, shaking or brushing whenever the pressure difference across the cleaner has increased to the limit specified by the engine manufacturer or 200 mm. of water of no specification is given, or engine power drops by 20 % or the engine starts operating erratically. The test shall be continued for 24 hours.

After the test the engine shall be stripped and examined for ingress of dust and for wear by comparison with measurements taken during the examination before the test.

The results of this test shall be presented in the report in tabular form as a log of the test and, in the appendix, in graphical form to a base line of time, showing the variation in all measured quantities and each cleaning of the element.

6. *Performance under high density dust conditions* (optional addition)

The conditions for this test are intended to represent the maximum dust density in which a small engine is likely to be operated. The general procedure shall be as laid down for the test under moderate density conditions but the concentration of dust shall be maintained at 900 mg/m$^3$. This test may be carried out as a supplementary test after the test report for the full test has been published. It must however refer to an engine of the type already tested and this must be checked by the testing station. Engine power will be checked for comparison with the original engine. Any new air cleaning device must be described.

## METHOD OF OPERATION

(a) The Government of each country participating in the O.E.C.D. Small Engines Code will designate the Authorities for the purpose of implementing the Code in that country.

(b) The names and addresses of the Designated Authorities and any changes in their designation will be circulated by the O.E.C.D. to all countries participating in the Code.

(c) The operation and progress of the Code shall be reviewed at an Annual Meeting of representatives of the Designated Authorities. This Annual Meeting shall report on its work and make such proposals as may be deemed necessary to the Committee for Agriculture of the O.E.C.D.

(d) The Annual Meeting shall each year nominate from amongst its members an Advisory Group. Its task shall be to advise the O.E.C.D. Secretariat, when requested, on the technical aspects of the Code, to deal with urgent problems which may arise out of the implementation of the Code and to assist in the preparation of the next Annual Meeting.

(e) The necessary co-ordination of the operation of the Code at the international level shall be ensured by the O.E.C.D.

(f) When an engine test report is published, it is understood that the whole specification of the engine has been checked and all test have been made in accordance with the Code.

(g) Test report publication and the use of those reports shall not involve the O.E.C.D. in any liability for compensation.

## SPECIMEN TEST REPORT

(N.B. The use of S.I. units is compulsory but national units may be used in addition. If gallons are used as units of volume, the report must show, at least once, whether they are U.S. or U.K.)

Manufacturer's name and address .....
Submitted for test by : .....
Selected by : .....
Place of running in : .....
Duration of running-in : .....
Full load while running-in : .....
Was one of the standard fuels specified in the code used ? Yes / No.

## SPECIFICATION OF ENGINE

Where alternative data is required, for example in the case of ignition equipment for different types of engine, all relevant headings are given ; in an actual report, only those headings which are relevant will be used.

*Engine :*

Make : ..... Type : .....
Model : ..... Serial nos. : .....

*Cylinders :*

Number : ..... Disposition : ..... Bore/stroke : ..... mm.
Capacity : ..... cm3 compression ratio .....
Arrangement of valves : ..... cylinder liners .....

*Speeds :*

Maximum speed for continuous operation ..... rad/s
Minimum speed for continuous operation ..... rad/s

*Fuel and ignition system :*

Type of fuel feed .....
Type, make and model of fuel filter(s) .....

Capacity of fuel tank ..... litres
Type, make and model of injection pump ..... Serial No. .....

Manufacturer's production setting .....
Type, make and model of injectors .....
Manufacturer's production setting .....
Type, make and model of ignition .....
Type, make and model of carburettor .....
Sizes of fuel jets .....
Ignition timing (manual or automatic) .....

Sparking plugs make and model .....

*Governor :*

Make : .....
Type : ..... Range of speed : ..... rad/s

*Air cleaner :*

Main : Make : ..... Type : .....
Oil capacity ..... litres. Changing period : ..... hours.
N.B. Include any alternatives available.

Pre-cleaner :
Make : ..... Type : .....

*Lubrication system :*

Type : ..... Type and number of filters .....
Oil capacity ..... litres. Changing period : ..... hours

*Cooling system :*

Type : ..... details of pump and fan : .....
Coolant capacity ..... litres. Means of temperature control .....
Pressure details ..... millibars

*Starting system :*

Make : ..... Type : .....
Aids for cold starting : .....

*Electrical system :*

Voltage : .....
Generator : ..... Make : ..... Model : .....
Battery : ..... Make : ..... Model : .....
Capacity and rating : .....

*Drive shaft :*

Location : ..... Dimensions ..... mm.
Revolutions of crankshaft per revolution of final drive .....
Clutch, method of operation .....

FUELS AND LUBRICANTS USED IN TESTS

Fuel : Type : .....
* Specific gravity at 15° C : .....
* Reid vapour pressure ..... kg.
* Cetane or octane number .....
Engine oil : Type : ..... Viscosity : ..... SAE
Transmission-oil : Type : ..... Viscosity : ..... SAE

* As applicable.

PERFORMANCE TESTS

1. *Power determination*

Date and location of tests : .....
Make, type and model of dynamometer : .....

(i) Before endurance test

| POWER kW | ENGINE SPEED rad/s | FUEL CONSUMPTION | |
|---|---|---|---|
| | | Litres/hour | Specific g/kWh |
| MAXIMUM POWER (2 hour test) | | | |
| AT VARYING SPEED | | | |

No load maximum engine speed * : ..... rad/s
Torque at maximum power : ..... m ∧ N
Maximum torque ..... m ∧ N at ..... rad/s
of the engine

Mean atmospheric conditions
temperature : ..... °C
pressure : ..... millibars

Maximum temperature :
engine oil : ..... °C
fuel : ..... °C

ii) After endurance test

| POWER kW | ENGINE SPEED rad/s | FUEL CONSUMPTION | |
|---|---|---|---|
| | | Litres/hour | Specific g/kWh |
| MAXIMUM POWER (2 hour test) | | | |
| AT VARYING SPEED | | | |

No load maximum engine speed * : ..... rad/s
Torque at maximum power : ..... m ∧ N
Maximum torque ..... m ∧ N at ..... rad/s
of the engine

Mean atmospheric conditions
temperature : ..... °C
pressure : ..... millibars

Maximum temperature
engine oil : ..... °C
fuel : ..... °C

2. *Starting tests*

Hot starting
Starting procedure used for the tests .....
.....
Starts obtained at the following attempts .....
.....
Observations by manufacturer .....
.....

Low Temperature Starting :
Starting procedure used for the tests .....
.....
Was starting successful by station : Yes/No.
By manufacturer : Yes/No

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* Manufacturer's specification for ungoverned engines.

Observations by manufacturer : .....
.....

Starting under Moist Conditions
Starting procedure used for the tests : .....
.....
Was starting successful by station : Yes/No.
By manufacturer : Yes/No
Observations by manufacturer : .....
.....

3. *Noise measurement at Ear Level*
Date of tests ..... .....

| | Make | Type | Model |
|---|---|---|---|
| Sound level meter | | | |

| Results of Tests | |
|---|---|
| | dBA |
| 1st position | |
| 2nd position | |
| 3rd position | |
| 4th position | |
| 5th position | |
| 6th position | |
| 7th position | |
| 8th position | |

4. *Endurance test*

(i) A graph giving power as a percentage of original power as a function of running time will be presented.
Overhauls will be shown on this.

(ii) Angle of tilt used *
Left ..... °
Right ..... °
Forward ..... °
Backward ..... °

(iii) Total fuel used ..... litres
Total lubricating oil used ..... litres

(iv) Repairs and adjustments :

* The ,,front'' is at end of the crankshaft which rotates clockwise when facing it.

| Hours from start | Comments | Repairs and Adjustments |
|---|---|---|
| | | |

DUST TESTS

5. *Performance under moderate density dust conditions*

Date of test .....
Dust density and type of dust used .....
Engine speed and load .....
Air cleaner details and servicing .....

| Time from start, h | Percentage of initial power | Amb. temp. °C | Depression across air cleaner, millibars |
|---|---|---|---|
| | | | |

Silica present in sump at end of test ..... g
Comments .....

ENGINE WEAR

*Piston ring gap (at top of bore) mm*

| | Top ring | Middle ring | Bottom ring |
|---|---|---|---|
| Before test | | | |
| After test | | | |
| Increase | | | |
| *Piston ring weights, g* | | | |
| Before test | | | |
| After test | | | |
| Decrease | | | |

*Cylinder bore dimensions (diameter mm)*
*In line with crankshaft*

| | Top of bore | Top of stroke | Mid stroke | Bottom stroke | Bottom bore |
|---|---|---|---|---|---|
| Before test | | | | | |
| After test | | | | | |
| Increase | | | | | |
| *At right angles to crankshaft* | | | | | |
| Before test | | | | | |
| After test | | | | | |
| Increase | | | | | |

*Crankshaft Journals, mean diameter (mm)*

| | In line with crank | Rt. angles to crank |
|---|---|---|
| | Main, flywheel side | |
| Before test | | |
| After test | | |
| Difference | | |
| | Main, shaft side | |
| Before test | | |
| After test | | |
| Difference | | |
| | Crankpin | |
| Before test | | |
| After test | | |
| Difference | | |

*Crankshaft bearings, mean diameter, mm.*

| | Main, flywheel side | Main, shaft side | Crankpin |
|---|---|---|---|
| Before test | | | |
| After test | | | |
| Difference | | | |

*Valve stems, diameter, mm.*

| | Top of stem | Middle of stem | Bottom of stem |
|---|---|---|---|
| Inlet | | | |
| Before test | | | |
| After test | | | |
| Difference | | | |
| Exhaust | | | |
| Before test | | | |
| After test | | | |
| Difference | | | |

6. *Performance under high density dust conditions*

Date of test .....
Dust density and type of dust used .....
Engine speed and load .....
Air cleaner details and servicing .....

| Time from start, h | Percentage of initial power | Amb. temp. °C | Depression across air cleaner, millibars |
|---|---|---|---|
| | | | |

Silica present in sump at end of test ..... g
Comments .....

ENGINE WEAR

*Piston ring gap (at top of bore) mm*

| | Top ring | Middle ring | Bottom ring |
|---|---|---|---|
| Before test | | | |
| After test | | | |
| Increase | | | |

*Piston ring weights, g*

| | | | |
|---|---|---|---|
| Before test | | | |
| After test | | | |
| Decrease | | | |

*Cylinder bore dimensions (diameter mm)*

*In line with crankshaft*

| | Top of bore | Top of stroke | Mid stroke | Bottom stroke | Bottom of bore |
|---|---|---|---|---|---|
| Before test | | | | | |
| After test | | | | | |
| Increase | | | | | |
| *At right angles to crankshaft* | | | | | |
| Before test | | | | | |
| After test | | | | | |
| Increase | | | | | |

*Crankshaft Journals, mean diameter (mm)*

| | In line with crank | Rt. angles to crank |
|---|---|---|
| | Main, flywheel side | |
| Before test | | |
| After test | | |
| Difference | | |
| | Main, shaft side | |
| Before test | | |
| After test | | |
| Difference | | |
| | Crankpin | |
| Before test | | |
| After test | | |
| Difference | | |

*Crankshaft bearings, mean diameter, mm.*

| | Main, flywheel side | Main, shaft side | Crankpin |
|---|---|---|---|
| Before test | | | |
| After test | | | |
| Difference | | | |

*Valve stems, diameter, mm.*

| | Top of stem | Middle of stem | Bottom of stem |
|---|---|---|---|
| Inlet | | | |
| Before test | | | |
| After test | | | |
| Difference | | | |
| Exhaust | | | |
| Before test | | | |
| After test | | | |
| Difference | | | |

In adopting this Decision, the Council DECIDED that the O.E.C.D. Small Engines Code would be implemented by the same Advisory Group and the same Annual Meeting as were responsible for the O.E.C.D. Tractor Code.