

# Technical Data

## 400 Series

## 403D-11G

### Electropak

#### Basic technical data

Number of cylinders .....	3
Cylinder arrangement.....	Vertical in-line
Cycle .....	four stroke
Induction system .....	Naturally aspirated
Compression ratio .....	23:1
Bore.....	77 mm
Stroke.....	81 mm
Cubic capacity.....	1-131 litres
Direction of rotation.....	anti-clockwise viewed from flywheel
Firing order.....	1, 2, 3
Estimated total weight (dry).....	129,2 kg

#### Overall dimensions

-height .....	700 mm
-length .....	776 mm
-width (including mounting brackets) .....	449 mm

#### Moments of inertia (mk<sup>2</sup>)

-engine rotational components .....	0,12 kg m <sup>2</sup>
-flywheel .....	1,51 kg m <sup>2</sup>

#### Centre of gravity

-forward from rear of block.....	tba mm
-above crank centre line.....	tba mm
-offset to RHS of centre line .....	tba mm

#### Performance

**Note:** All data based on operation to ISO 3046-1:2002 standard reference conditions.

Steady state speed stability at constant load

- G2 .....

Cyclic irregularity

-at 110% stand-by power .....

#### Test conditions

-air temperature .....

-barometric pressure .....

-relative humidity .....

-air inlet restriction at maximum power (nominal).....

-exhaust back pressure at maximum power (nominal).....

-fuel temperature (inlet pump).....

#### Sound level

Average sound pressure level for bare engine (without inlet and exhaust) at 1 metre .....

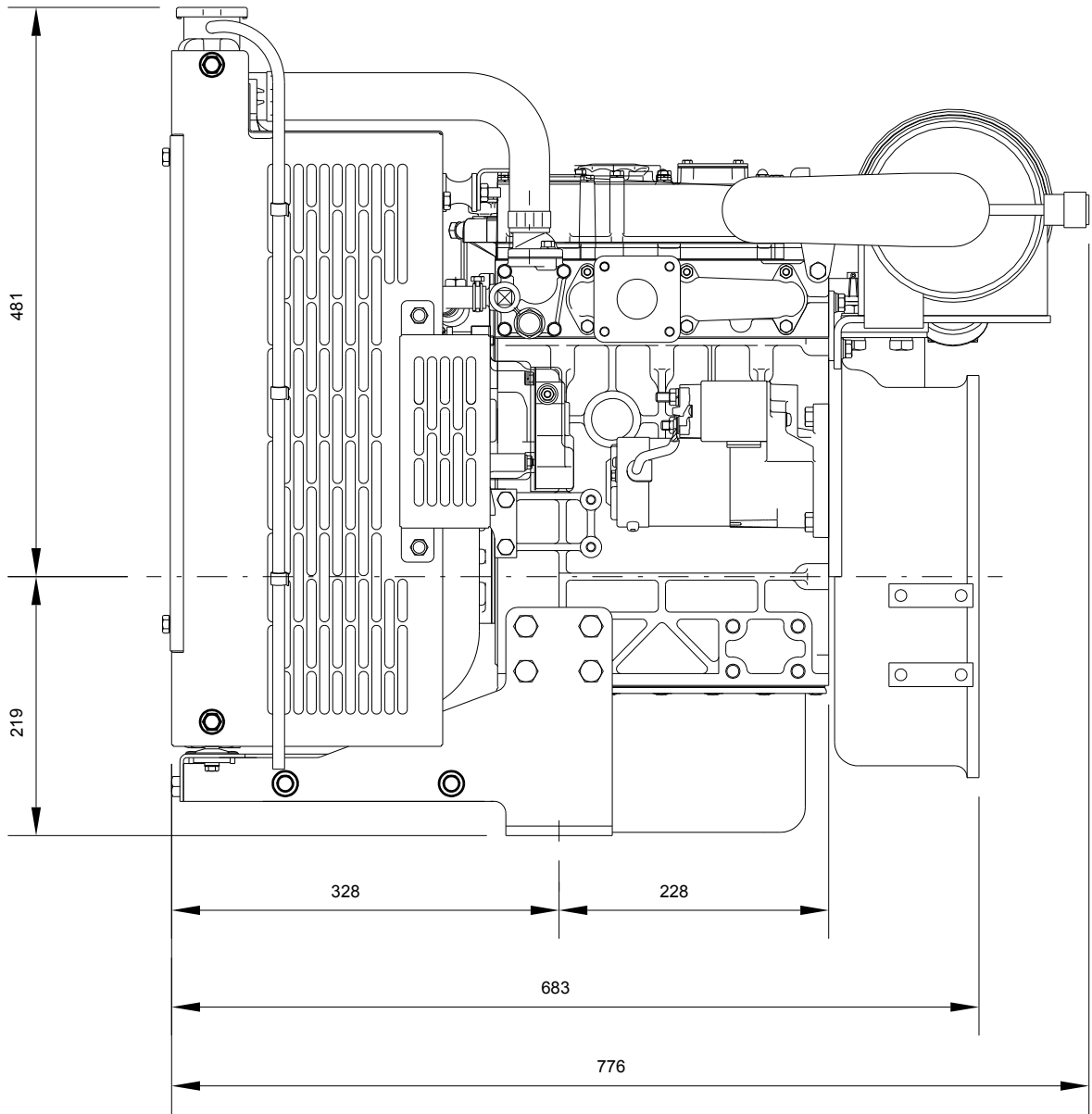
-all ratings certified to within .....

If the engine is to operate in ambient conditions other than those of the test conditions, suitable adjustments must be made for these changes. For full details, contact Perkins Technical Service Department. **Emissions Statement:** Certified against the requirements of EU2007 (EU 97/68/EC Stage II) legislation for non-road mobile machinery, powered by constant speed engines.

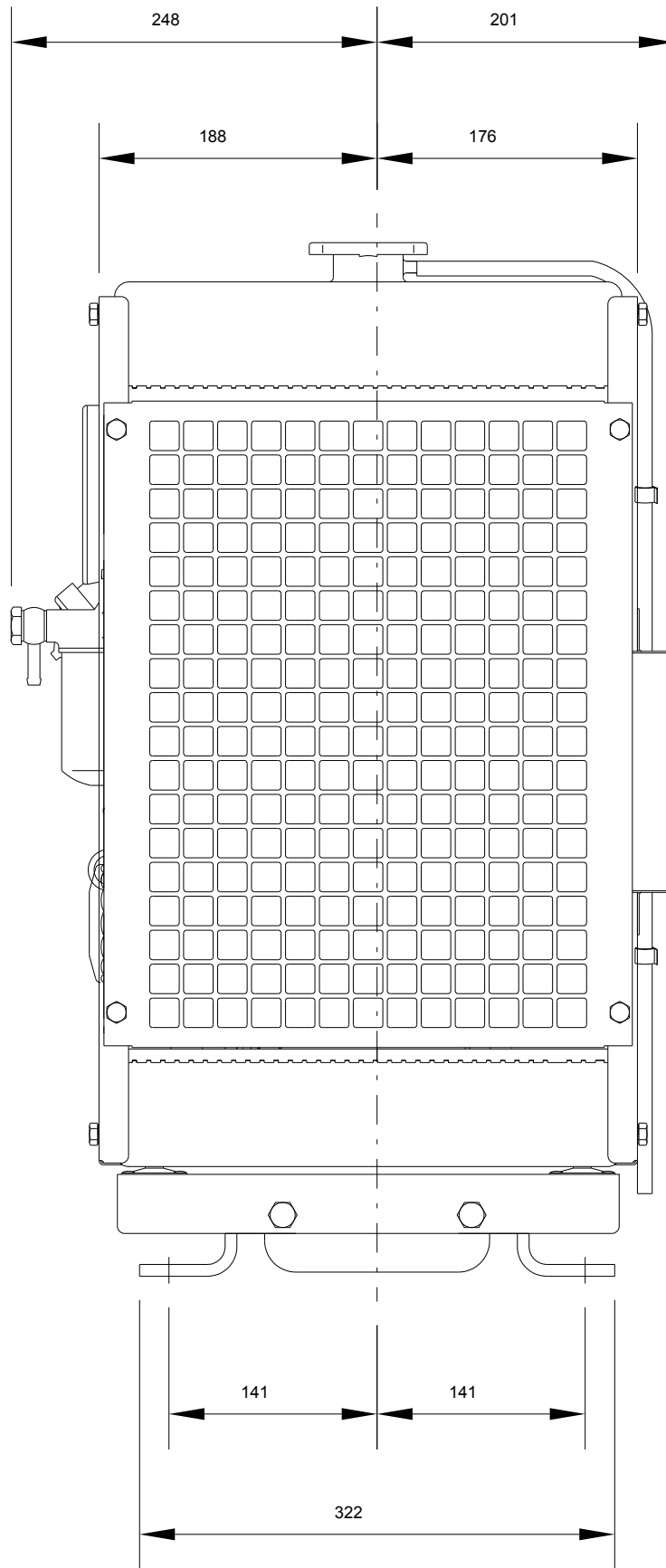
#### General installation

Designation	Units	Type of operation and application	
		Prime	Stand-by
		50Hz	50Hz
Gross engine power	kWb	8,6	9,5
Brake mean effective pressure	kPa	610	672
Mean piston speed	m/s	4,1	
Engine coolant flow (Water pump ratio 1.285:1)	l/min	27,3	
Combustion air flow	m <sup>3</sup> /min	0,7	
Exhaust gas flow (max)	m <sup>3</sup> /min	1,66	1,8
Exhaust gas temperature outlet (max)	°C	368	420
Overall thermal efficiency (nett)	%	32	31
Typical genset electrical output (0,8 pf 25°C)	kWe	7,2	8,0
	kVA	9,0	10
Assumed alternator efficiency	%	86	
<b>Energy balance</b>			
Energy in fuel (heat of combustion)	kWt	25,9	29,5
Energy in power output (gross)	kWb	8,6	9,5
Energy to cooling fan	kWt	0,2	
Energy in power output (nett)	kWm	8,4	9,3
Energy to coolant and lubricating oil	kWt	8,3	9,5
Energy to exhaust	kWt	7,3	8,0
Heat to radiation	kWt	1,7	2,5

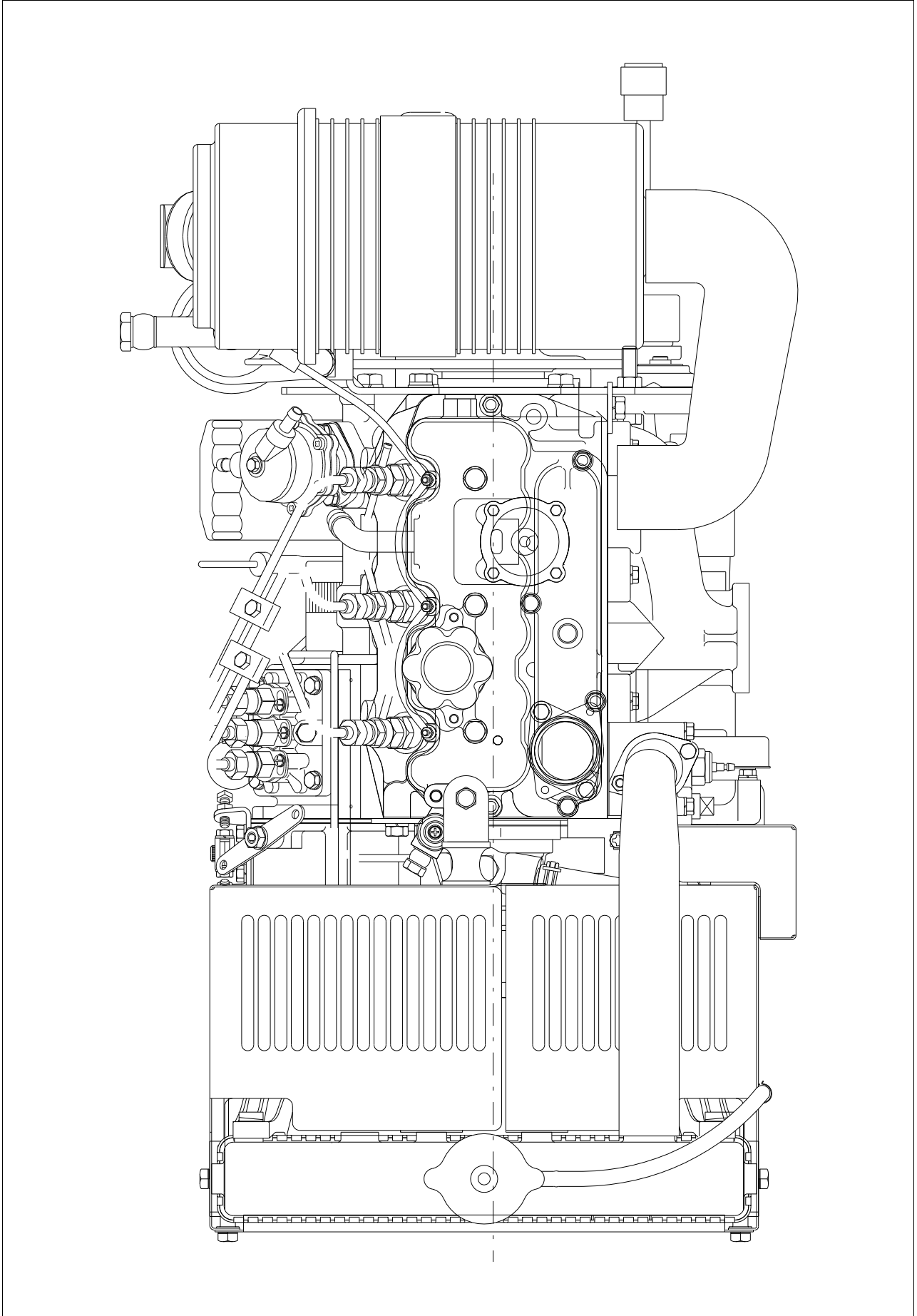
403D-11G ElectropaK, left side view



403D-11G ElectropaK, front view



403D-11G ElectropaK, plan view



## Cooling system

### Radiator

-face area ..... 0,147 m<sup>2</sup>  
 -rows and materials ..... 2 rows, Aluminium  
 -matrix density and material ..... 14,5 FPI Aluminium  
 -width of matrix ..... 334 mm  
 -height of matrix ..... 440 mm  
 -pressure cap setting ..... 90 kPa  
 Estimated cooling air flow reserve ..... 0,125 kPa

### Fan

-diameter ..... 320 mm  
 -drive ratio ..... 1,285:1  
 -number of blades ..... 7  
 -material ..... Plastic  
 -type ..... Pusher

### Coolant

Total system capacity  
 -with radiator ..... 5,2 litres  
 -without radiator ..... 1,9 litres  
 Maximum top tank temperature ..... 112 °C  
 Max static pressure head on pump ..... 30,4 kPa  
 Temperature rise across engine ..... tba °C  
 Max permissible external system resistance ..... tbatba kPa  
 Thermostat operation range ..... 75 - 87°C  
 Recommended coolant: 50% anti freeze / 50% water. For complete details of recommended coolant specifications, refer to the Operation and Maintenance Manual for this engine model

### Duct allowance

Maximum additional restriction (duct allowance) to cooling airflow and resultant minimum airflow		
Ambient clearance 50% Glycol	Duct allowance Pa	m <sup>3</sup> /sec
53°C	0	0,67
46°C	125	0,44

## Electrical system

-alternator ..... 15 / 40 amps -12 V  
 -starter motor ..... Bosch 1,1 kW -12 V

### Cold start recommendations

Minimum cranking speed ..... 150 rev/min

Minimum starting temperature °C	Grade of engine lubricating oil	Battery specifications			
		BS3911 Cold start amps	SAEJ537 Cold cranking amps	No. of batteries needed	Commercial ref number
0	20W	340	540	1	069
-15	10W	340	540	1	069
-20	5W	420	590	1	072

**Note:** Additional information for battery and cable limits can be found in section 6 (Electrics) of 400D Engine Sales Manual.

## Exhaust system

Maximum back pressure ..... 10,2 kPa  
 Exhaust outlet size  
 -horizontal ..... 34 mm  
 -vertical ..... 40 mm

## Fuel system

Type of injection ..... Indirect injection  
 Fuel injection pump ..... Cassette type  
 Fuel injector ..... Pintle nozzle  
 Nozzle opening pressure ..... 14,7 MPa  
 Maximum particle size ..... 25 microns

### Fuel lift pump

-type ..... mechanical (camshaft driven)  
 -flow/hour ..... 63 litres/hr  
 -pressure ..... 10 kPa  
 Maximum suction head ..... 0,8 m  
 Maximum static pressure head ..... 3 m  
 Governor type ..... Mechanical

### Fuel specification

**USA Fed Off Highway - EPA2D 89.330-96**

**Europe Off Highway - CEC RF-06-99**

**Note:** For further information on fuel specifications and restrictions, refer to the OMM Fuels section for this engine model

### Fuel consumption

Power rating			
g/kWh (litres/hr)			
110%	100%	75%	50%
261 (2.9)	252 (2.6)	258 (2.0)	286 (1.5)

**Induction system**

**Maximum air intake restriction**

- clean filter ..... 3,0 kPa
- dirty filter ..... 6,4 kPa
- air filter type ..... Dry element type

**Lubrication system**

**Lubricating oil capacity**

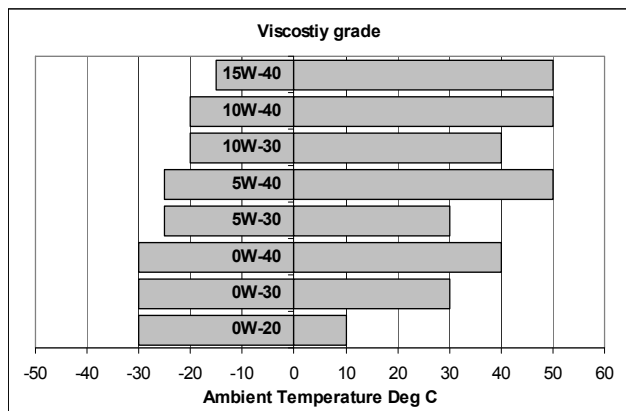
- Maximum sump capacity..... 4,4 litres
- Total system..... 4,9 litres
- Minimum..... 3,4 litres
- Maximum engine operating angles
- front up, front down, right side or left side..... 35° continuous

**Lubricating oil pressure**

- minimum oil pressure..... 120 kPa
- relief valve opens ..... 304 - 500 kPa
- at maximum no-load speed..... tba
- Normal oil temperature..... 125 °C
- oil flow at rated speed ..... 6,6 litres/min.

**Recommended SAE viscosity**

A single or multi grade oil must be used which conforms API-CH-4 or ACEA E5.



**Maximum static bending moment**

at rear face of block.....500 Nm

**Load acceptance**

The below complies with the requirements of classification 3 and 4 of ISO 8528-12 and G2 operating limits stated in ISO 8528-5

Initial load application: When engine reaches rated speed (15 seconds maximum after engine starts to crank)		
Descriptor	Units	50 Hz
% of prime power	%	tba
Transient frequency deviation	%	tba
Frequency recovery	Seconds	tba

The above figures were obtained under the following test conditions:

- minimum engine block temperature ..... tba °C
  - ambient temperature ..... 25 °C
  - governing mode ..... 5 %
  - alternator inertia ..... tba kgm<sup>2</sup>
  - under frequency roll off (UFRO) point set to 2% Volt / 1% frequency
  - UFRO rate set to ..... 1 Hz below rated speed
  - LAM on/off ..... off
- All tests were conducted using an engine which was installed and serviced to Perkins Engines Company Limited recommendations.

**Derate Curves**

Derate curves for altitude and humidity can be found in section six (Ratings) of the 400D Engine Sales Manual

**Note:** The general arrangement drawings shown in this data sheet are for guidance only. For installation purposes, latest versions should be requested from the Applications Dept., Perkins Engines Stafford, ST16 3UB United Kingdom.



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