404D-22TAG

36.4 kWm (gross) @ 1800 rpm

Electropak

400 Series

Basic technical data

Number of cylinders 4
Cylinder arrangement . . . . . Vertical in-line
Cycle . . . . . Four stroke
Induction system . . . Turbo charged, with air to air charge cooling
Compression ratio 23.3:1
Bore . . . . . 84 mm
Stroke . . . . . 100 mm
Cubic capacity . . . . . 2·216 litres
Direction of rotation . . . Anti-clockwise when viewed from flywheel
Firing order 1, 3, 4, 2
Estimated total weight (dry) . . . . . 306 kg

Overall dimensions

-height . . . . . 997.5 mm
-length . . . . . 1050.0 mm
-width . . . . . 709.8 mm

Moments of inertia (mk²)

-engine rotational components . . . . . 0.44 kg m²
-flywheel . . . . . 2.55 kg m²

Centre of gravity

-forward from rear of block . . . . . 280 mm
-above centre line of block . . . . . 105 mm
-offset to RHS of centre line . . . . . mm

Performance

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

Steady state speed stability at constant load
G3 . . . . . ± 0.5%
Cyclic irregularity
-at 110% stand-by power . . . . .

Test conditions

-air temperature . . . . . 25 °C
-barometric pressure . . . . . 100 kPa
-relative humidity 31.5%
-air inlet restriction at maximum power (nominal) . . . . . 5 kPa
-exhaust back pressure at maximum power (nominal) . . . 10.2 kPa
-fuel temperature (inlet pump) . . . . . 40 °C

Sound level

Average sound pressure level for bare engine (without inlet and exhaust) at 1 metre . . . . . 78 dB(A)
-all ratings certified to within . . . . . ± 5%
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 capability: Certified against the requirements of EU2007 (EU97/68/EC Stage IIIA) and EPA Interim Tier 4 (EPA 40 CFR Part 1039 Interim Tier 4) legislation for non-road mobile machinery, powered by constant speed engines.

Perkins Engines Company Limited
Peterborough PE1 5FQ United Kingdom
Tel: +44 (0)1733 583000
Fax: +44 (0)1733 582240
www.perkins.com

General installation

Designation	Units	Type of operation and application	
		Prime	Stand-by
		60Hz	60Hz
Gross engine power	kWb	33.1	36.4
Brake mean effective pressure	kPa	996.1	1095.4
Mean piston speed	m/s	6	
Engine coolant flow (coolant pump ratio 1·1:1)	l/min	56.2	
Combustion air flow	m³/min	2.49	
Exhaust gas flow (max)	m³/min	8.4	
Exhaust gas temperature (max)	°C	478	
Overall thermal efficiency (nett)	%	33.1	
Typical genset electrical output (0.8 pf 25°C)	kWe	29.2	32.1
	kVA	36.5	40.2
Assumed alternator efficiency	%	90	
Energy balance			
Energy in fuel (heat of combustion)	kWt	97.9	107.7
Energy in power output (gross)	kWb	33.1	36.4
Energy to cooling fan	kWt	0.7	
Energy in power output (nett)	kWm	32.4	35.7
Energy to coolant and lubricating oil	kWt	34.3	37.7
Energy to exhaust	kWt	26.3	29.0
Energy to radiation	kWt	4.2	4.6

Cooling system

Radiator

-face area ... ... .0.245 m²
-rows and materials . ... 5 rows, Aluminium
-matrix density and material ... ... 38 tubes row, Aluminium
-width of matrix ... ...430 mm
-height of matrix... ... ...570 mm
-pressure cap setting... ... ...110 kPa
Estimated cooling air flow reserve... ... ... .kPa

Fan

-diameter . ...457.2 mm
-drive ratio ... ...1.1 :1
-number of blades 7
-material... ... ... plastic
-type. ... ... pusher

Coolant

Total system capacity
-with radiator ... ... litres
-without radiator... ... ... 3.6 litres
Maximum top tank temperature... ... ... 112 °C
Temperature rise across engine.. ... ... .7.5 °C
Max permissible external system resistance... ... ... .kPa
Thermostat operation range ... ... 82 - 95 °C
Maximum static pressure head on pump. ... ... .30.4 kPa
Recommended coolant:
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	m³/sec
73°C	0	2.0
66°C	125	1.2

Charge cooler
-face area . .. .0.1. m²
-rows and materials . ... 2.rows, Aluminium
-matrix density and material ... ... 9 tubes per row Aluminium
-width of matrix ... ... .180. mm
-height of matrix... ... ...550 mm

Electrical system

-type.. ... ... 12V negative grounding
-alternator.. ... ... 65 amps, 12 V
-starter motor Delco Remy, 12 V
-starter solenoid pull-in current . ... TBA
-starter solenoid hold-in current ... ... TBA
Number of teeth on starter pinion 9
Number of teeth on flywheel 126

Cold start recommendations

Minimum engine cranking speed over TDC.. ... ...150 rev/min

Minimum starting temperature	Grade of engine lubricating oil	Battery specifications			
°C		BS3911 Cold start amps	SAEJ537 Cold cranking amps	Number of batteries needed	Commercial ref number
0	20W	540	740	1	647
-15	10W	540	740	1	647
-20	5W	600	780	1	655

Note: Additional information for battery and cable limits can be found in the installation manual.

Exhaust system

Maximum back pressure . ... .10.2 kPa
Exhaust outlet size .. .. 42 mm

Fuel system

Type of injection .. .. .Indirect injection
Fuel injection pump . ... .Cassette type
Fuel injector . ... Pintle nozzle
Nozzle opening pressure . ... 14.7 MPa
Max. 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 ... ...3.0 m
Governor type .. .. Electronic/Mechanical

Fuel specification

USA Fed Off Highway - EPA2D 89.330-96
Europe Off Highway - CEC RF-06-99
For further information on fuel specifications and restrictions, refer to the OMM Fuels section for this engine model.

Fuel consumption - 1800 rev/min

Power rating %			
110	100	75	50
g/kWh (litres/hr)			
247 (10.2)	238 (8.9)	231 (6.5)	244 (4.6)

Note: All fuel consumption figures are based on Nett engine power

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

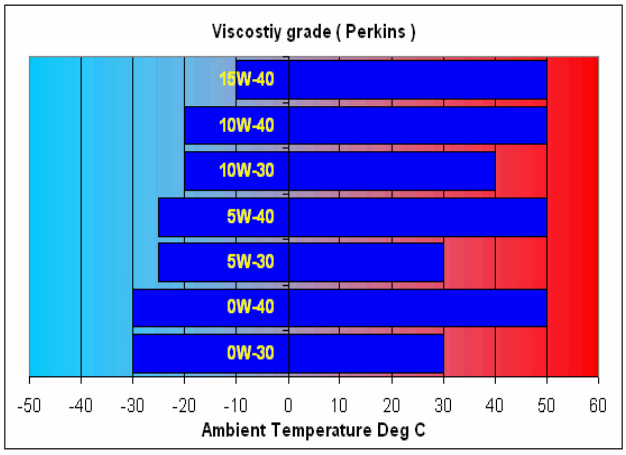
Max. sump capacity .. ..10.6 litres
Min. sump capacity ... ... 8.9 litres
Maximum engine operating angles
-front up, front down, right side or left side ... ...35° continuous

Lubricating oil pressure

-relief valve opens . ... 352 - 448kPa
Min oil pressure . ... 120 kPa
-at maximum no-load speed . ... 147 kPa
Oil flow at rated speed .. ..15.2 litres/min
Normal oil temperature . ... 125 °C

Recommended SAE viscosity

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



Maximum static bending moment

at rear face of block . ...1400 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

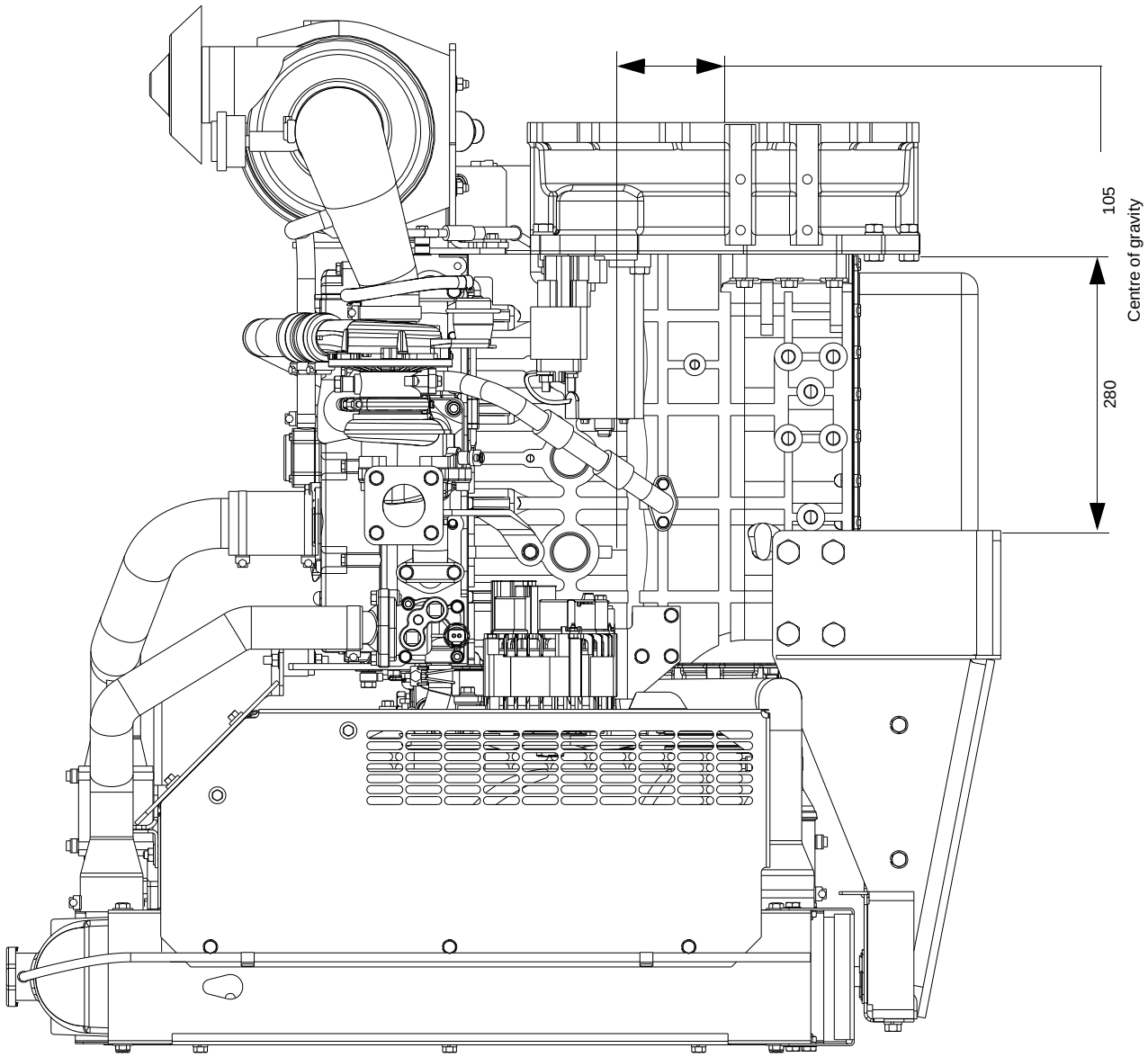
Initial load application: When engine reaches rated speed (15 seconds maximum after engine starts to crank)		
Descriptor	Units	60 Hz
% of prime power	%	92
Transient frequency deviation	%	9.4
Frequency recovery	Seconds	1.9

The above figures were obtained under the following test conditions:
-minimum engine block temperature ... ... 65 °C
-ambient temperature ... ... 11.5 °C
-governing mode ... ... 5 %
-alternator inertia ... ... 0.1611 kgm²
-under frequency roll off (UFRO) point set to2% 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.

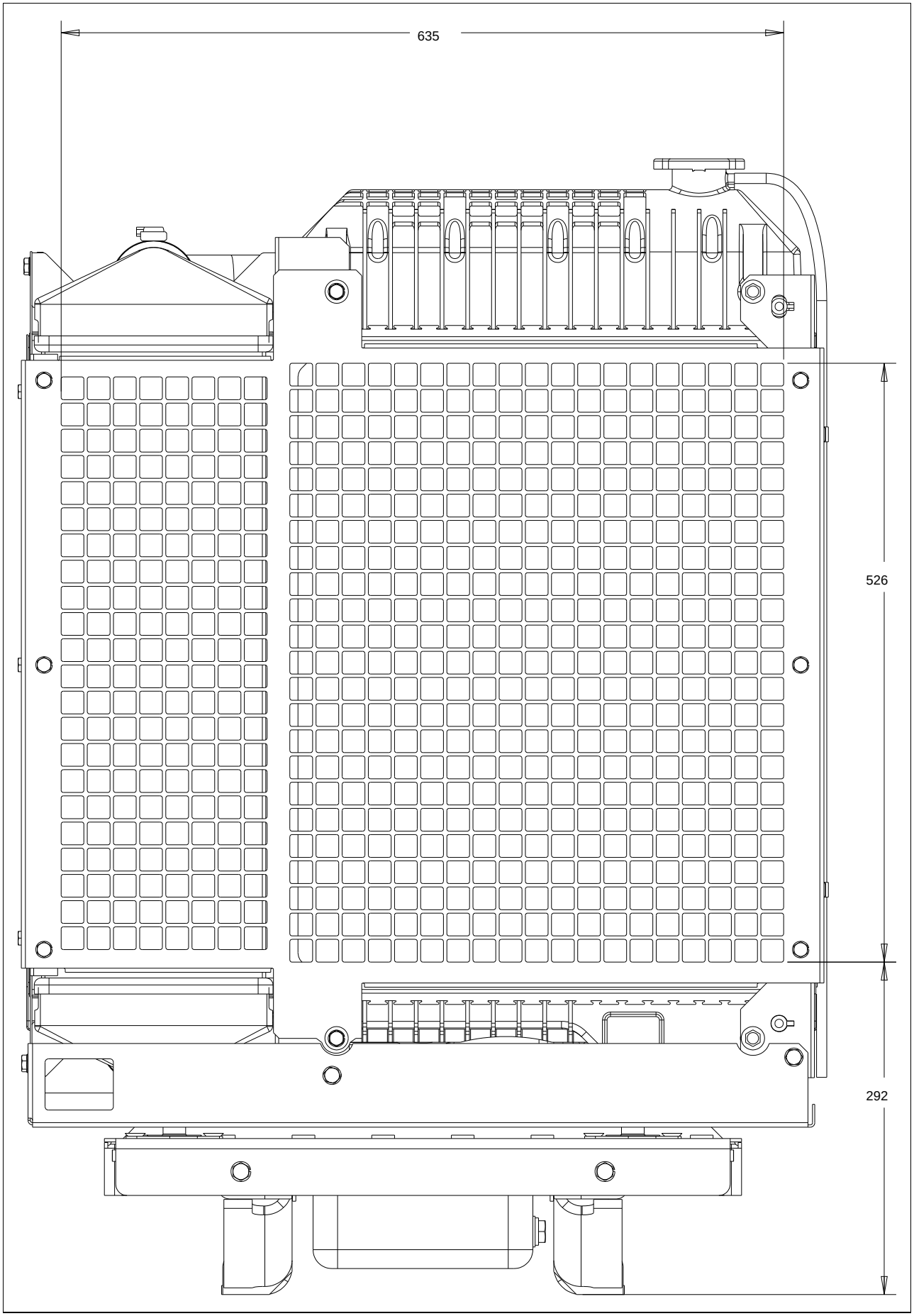
Derate Curves

Derate curves for altitude and humidity can be found in Chapter 6, of the 400D Engine Sales Manual.
The general arrangement drawings shown in this data sheet are for guidance only. For installation purposes, latest versions should be requested from the Applications Department, Perkins Engines Stafford, ST16 3UB United Kingdom.

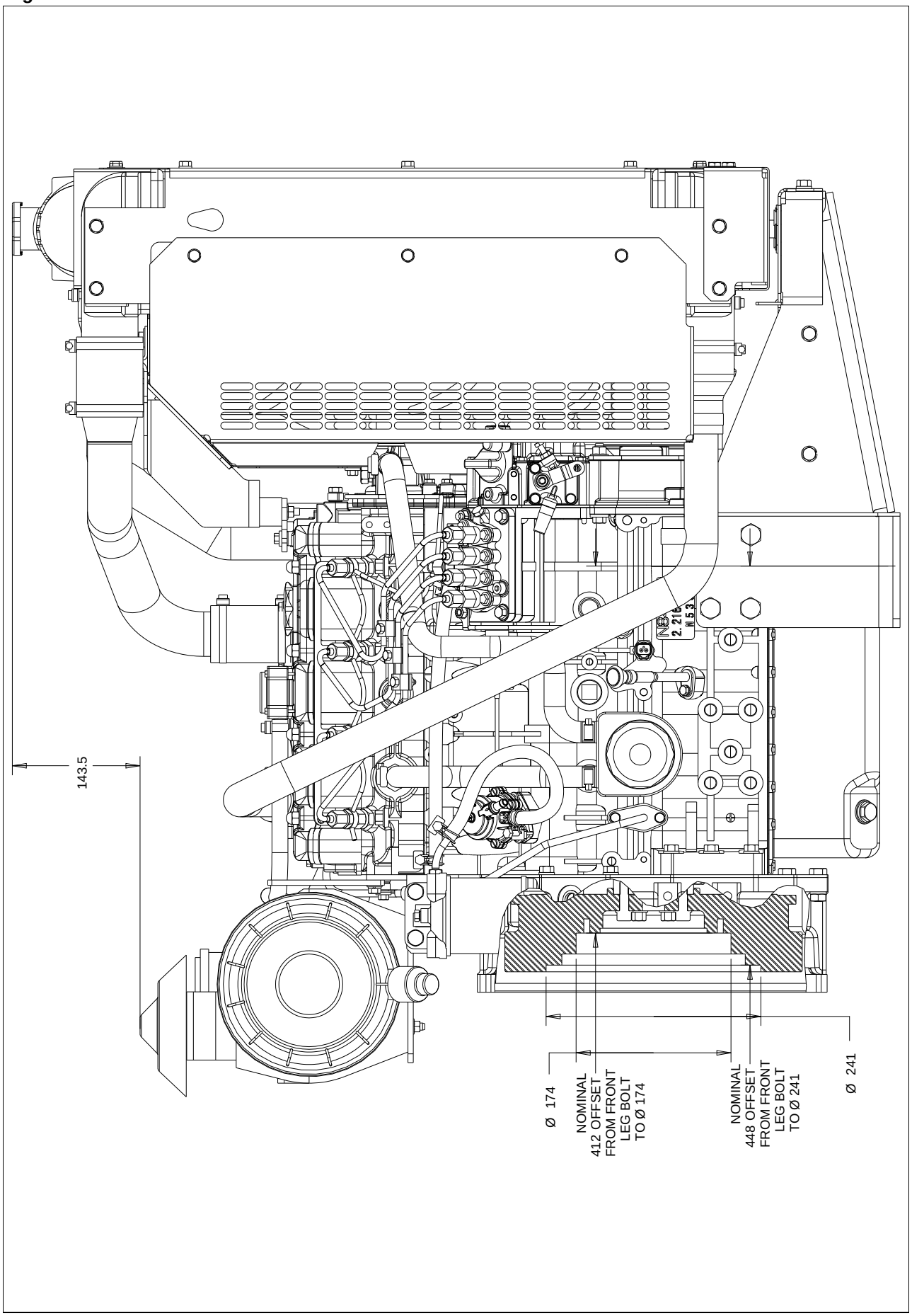
Left side view



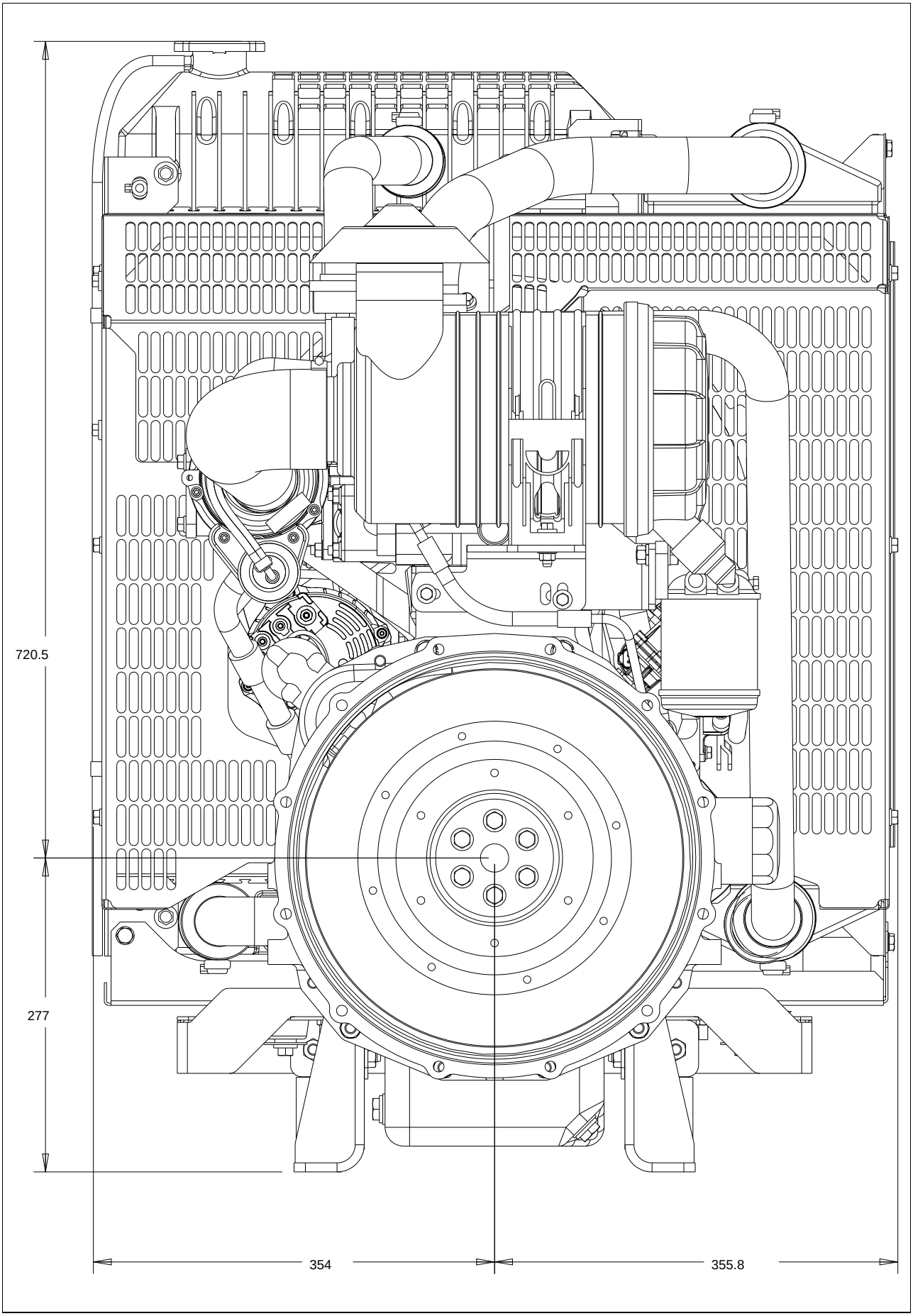
Front view



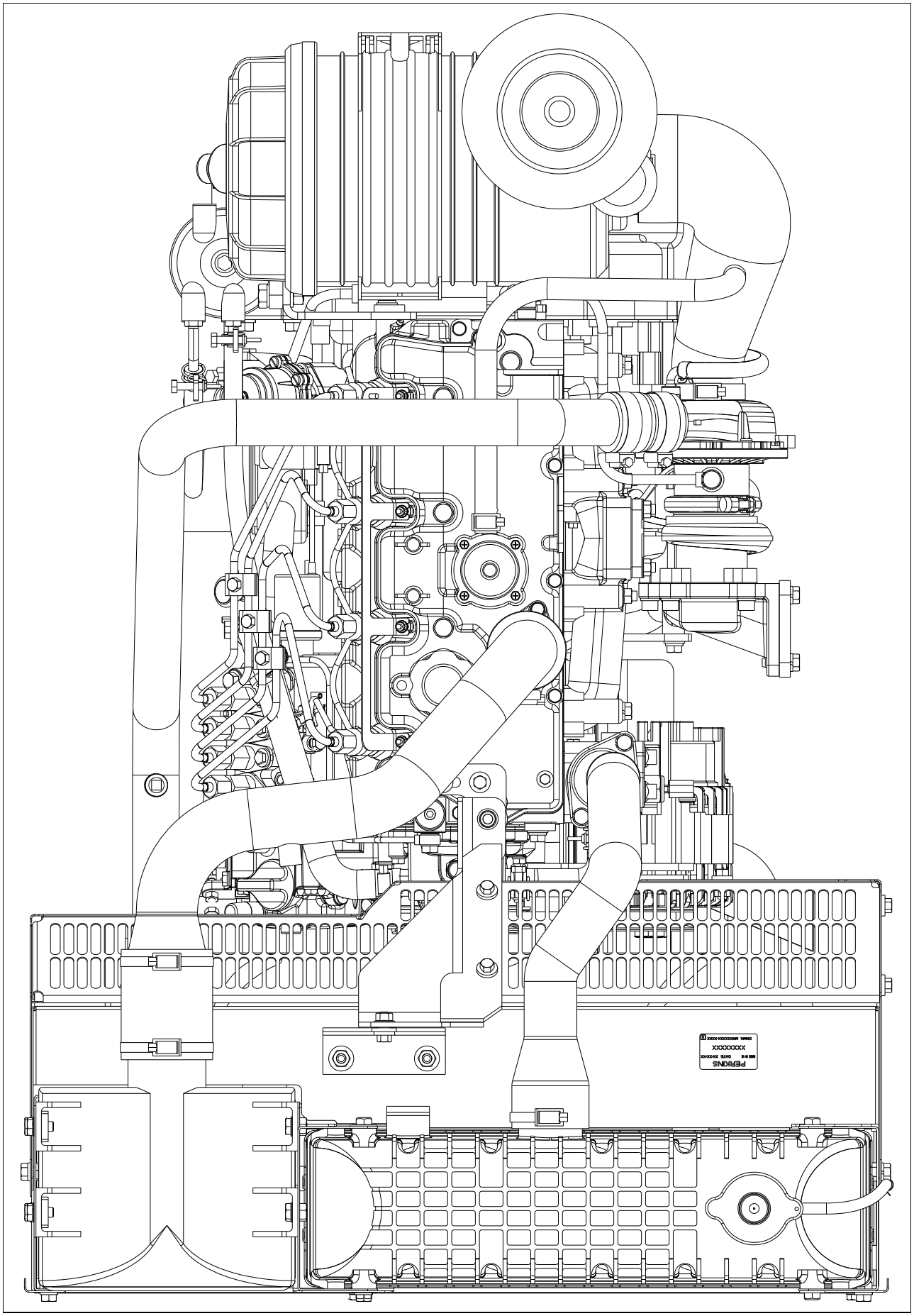
Right side view



Rear view



Plan view



View from below