

ENGINE DATASHEET



1104D-E44 Electric Power Engines

Power range 1500 rpm 78-105 kW (engine gross power)

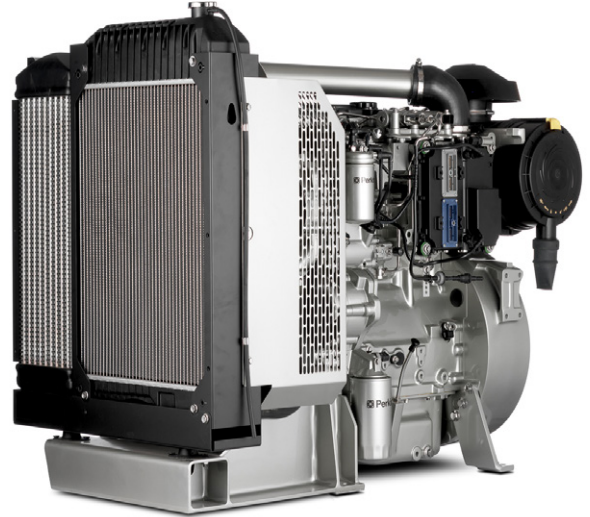
Power range 1800 rpm 65-120 kW (engine gross power)

Emissions EU Stage IIIA/US EPA Tier 3

The Perkins® 1104D-E44TG and 1104D-E44TAG ElectropaKs are the latest addition to 1100 Series electric power line-up. Offering improved power density from a compact package, these ElectropaKs build on Perkins reputation within the power generation industry.

These ultra clean engines are assembled on a high technology production line. Frequent computerised checks during the production process ensure high build quality is maintained throughout.

Hitting the key power nodes required by the market, the 1104D ElectropaK product line-up consists of three models offering a power solution for both prime and standby applications, in 50 Hz and 60 Hz territories and are certified against the relevant legislation.



Features and benefits

- The 1104D utilises the latest common-rail fuel system technologies with a closely optimised air-management system, which is overseen by the latest generation of electronic engine control. This allows the 1104D range to deliver **high power density** and excellent fuel economy with low exhaust emissions and minimum heat rejection.
- Hitting the key power nodes required by the market, the 1104D ElectropaKs have been developed to provide a clean and **cost effective** power solution.
- **Lower operating costs** as the 1104D maintains Tier 2 fuel economy, allowing customers to keep existing fuel tanks and service intervals as 500 hours standard.
- The 1104D has been designed to be worldwide fuel tolerant, and 5% biofuel (RME) options are available to meet local market needs.
- Through an experienced global network of distributors and dealers, fully trained engine experts deliver total service support around the clock, 365 days a year. They have a comprehensive suite of web based tools at their finger tips, covering technical information, parts identification and ordering systems, all dedicated to **maximising the productivity** of your engine. Perkins actively pursues product support excellence with our distribution network investing in their territory to provide you with a consistent quality of support across the globe.
- Throughout the entire life of a Perkins engine, we provide access to genuine factory specification parts giving reassurance that you receive excellent quality for the **lowest possible cost**, wherever your Perkins powered machine is operating in the world.

1104D-E44 Electric Power Engines

Power range 1500 rpm 78-105 kW (engine gross power)

Power range 1800 rpm 65-120 kW (engine gross power)

Emissions EU Stage IIIA/US EPA Tier 3

Specification

	Model		
	1104D-E44TG1	1104D-E44TAG1	1104D-E44TAG2
Configuration	Electropak		
Cylinders	4 vertical in-line		
Displacement, litres (in ³)	4.4 (269)		
Aspiration	Turbocharged	Turbocharged air-to-air chargecooled	
Bore and stroke, mm (in)	105 x 127 (4.1 x 5.0)		
Combustion system	Direct injection		
Compression ratio	16.7:1		
Exhaust aftertreatment	N/A		
Rotation (viewed from flywheel)	Anti-clockwise, viewed from flywheel		
Total lubricating oil capacity, litres (US gal)	8.4 (2.2)		
Cooling system	Watercooled		
Total coolant capacity, litres (US gal)	16.5 (4.3)	17 (4.5)	

Technical information

Model	Speed	Type of Operation	Engine Power		Typical Generator Output* (Net)		Prime Fuel Consumption			
			Gross	Net			110%	100%	75%	50%
	rpm		kW (hp)	kW (hp)	kVA	kWe	g/kWh	g/kWh	g/kWh	g/kWh
1104D-E44TG1	1800	Prime	65 (87)	63 (85)	68	55	231	236	249	276
		Standby	71 (96)	70 (94)	60	75				
1104D-E44TAG1	1500	Prime	78 (105)	74 (99)	80	64	212	215	225	231
		Standby	86 (115)	81 (109)	88	70				
	1800	Prime	89 (120)	85 (114)	91	73	221	224	238	258
		Standby	98 (132)	93 (124)	100	80				
1104D-E44TAG2	1500	Prime	96 (128)	91 (122)	100	80	205	207	221	236
		Standby	105 (141)	101 (135)	110	88				
	1800	Prime	110 (147)	104 (140)	114	91	215	216	232	253
		Standby	120 (161)	115 (154)	125	100				

*Generator powers are typical and based on typical alternator efficiencies and a power factor (cos θ) or 0.8.

1104D-E44 Electric Power Engines

Power range 1500 rpm 78-105 kW (engine gross power)

Power range 1800 rpm 65-120 kW (engine gross power)

Emissions EU Stage IIIA/US EPA Tier 3

Standard equipment

	Model		
	1104D-E44TG1	1104D-E44TAG1	1104D-E44TAG2
Electro unit or ElectropaK	ElectropaK	ElectropaK	ElectropaK
Radiator fitted	✓	✓	✓
Fuel filter, engine mounted	✓	✓	✓
Water separator	✓	✓	✓
Fuel priming pump (manual/electric)	Manual	Manual	Manual
Fuel cooler (not required for most installations)	N/A	N/A	N/A
Air filter, engine mounted	✓	✓	✓
Engine ECM, engine mounted	✓	✓	✓
Wiring harness to ECM	✓	✓	✓
Wiring harness (all connectors to single customer interface)	N/A	N/A	N/A
Starter motor	✓	✓	✓
Battery charging alternator	✓	✓	✓
Flywheel housing	✓	✓	✓
Flywheel	✓	✓	✓
Fan	✓	✓	✓
Fan guard	✓	✓	✓
Temperature and oil pressure for automatic stop/alarm configurable	✓	✓	✓

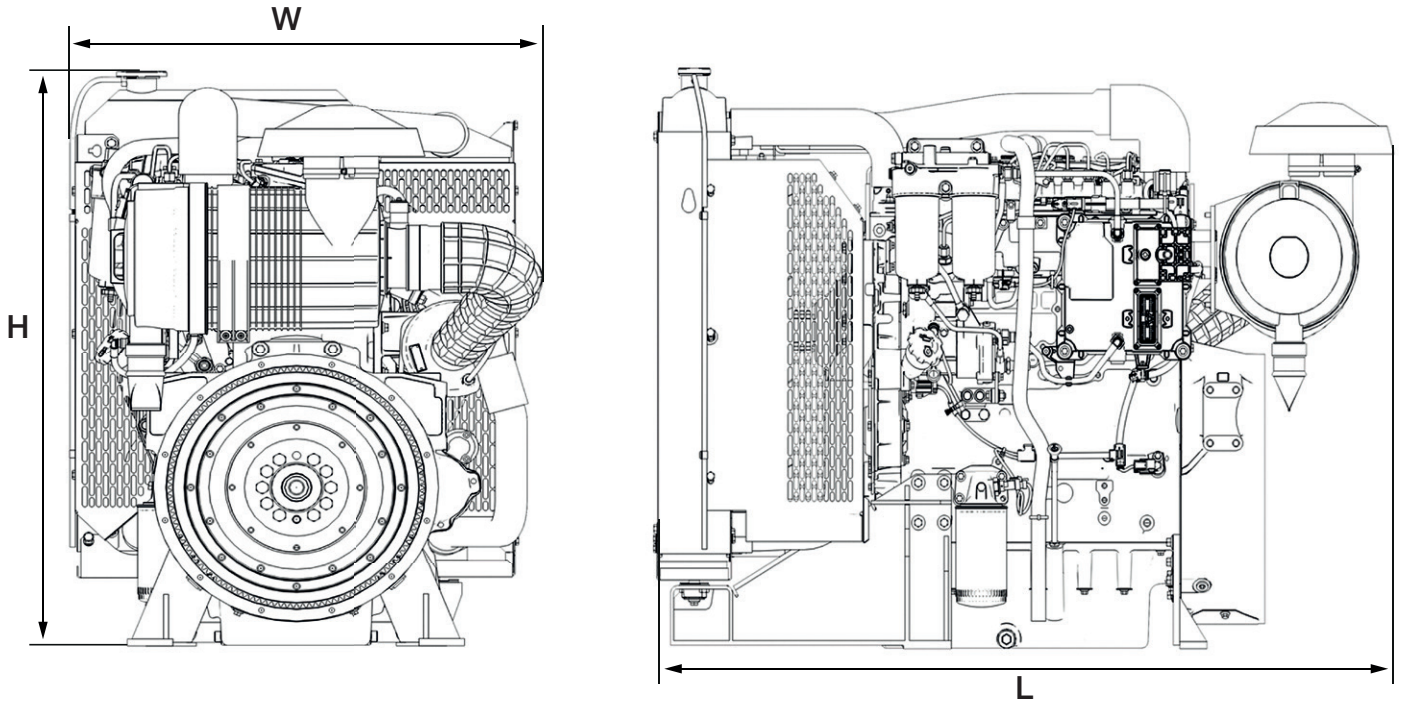
1104D-E44 Electric Power Engines

Power range 1500 rpm 78-105 kW (engine gross power)

Power range 1800 rpm 65-120 kW (engine gross power)

Emissions EU Stage IIIA/US EPA Tier 3

Engine package weights and dimensions



	Model		
	1104D-E44TG1	1104D-E44TAG1	1104D-E44TAG2
Configuration	ElectropaK		
Dimensions, H x L x W, mm (in)	967 x 1280 x 717 (38 x 50.4 x 28.2)	1087 x 1358 x 746 (42.8 x 53.4 x 29.4)	
Dry weight, kg (lb)	439 (968)		

Prime power: Power available at variable load in lieu of a main power network. Overload of 10% is permitted for 1 hour in every 12 hours of operation.

Standby (maximum): Power available at variable load in the event of a main power network failure. No overload is permitted.

1104D-E44TG1

1100

71.4 kWm (Gross) @ 1800 rpm

Electropak

Series

Basic technical data

Number of cylinders	4
Cylinder arrangement	Vertical in-line
Cycle	4 stroke
Induction system	Turbocharged, air to air charge cooled
Compression ratio	16.7:1
Bore	105 mm
Stroke	127 mm
Cubic capacity	4.399 litres
Direction of rotation	Anticlockwise when viewed from flywheel
Direction of rotation	Clockwise when viewed from front of engine
Firing order	1, 3, 4, 2

Estimated total weight of IOPU

Dry	439 kg
Wet	448 kg

Overall dimensions

Height	967 mm
Length	1280 mm
Width (including mounting brackets)	717 mm

Centre of gravity

Forward from rear of block	289.0 mm
Above centre line of block	138.0 mm
Offset to RHS of centre line	-3.0 mm

Moments of inertia

Engine rotational excluding crank pulley and flywheel	0.124 kgm ²
Flywheel	1.2 kgm ²

Performance

Note: All performance data based on operation to ISO Standard reference conditions.

Steady state speed stability at constant load	± 0.25%
Cyclic irregularity at rated power with 1.2 kgm ² flywheel	TBA

Test conditions

Air temperature	25°C
Barometric pressure	100 kPa
Relative humidity	30%
Air inlet restriction at rated speed	3 kPa
Exhaust back pressure at rated speed (nominal)	15 kPa (60Hz)

Sound level

Estimated Electropak sound power level @ 1 metre without inlet and exhaust 105.5 dB(amps)

Note: 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 EU (EU 97/68/EC Stage IIIa) legislation for non-road mobile machinery, powered by constant speed engines.

General installation

Designation	Units	TG1 60Hz	
		Prime	Standby
Gross engine power	kWb	64.7	71.4
ElectropaK nett engine power	kWm	63.2	69.9
Brake mean effective pressure	kPa	981	1082
Combustion air flow (at rated speed)	m ³ /min	6.02	6.17
Exhaust gas flow (maximum)	m ³ /min	13.9	14.48
Exhaust gas mass flow (maximum)	kg/min	7.15	7.33
Exhaust gas temperature in manifold maximum	°C	616	644
Boost pressure ratio			
Overall thermal efficiency (nett)		35.8%	36.2%
Typical genset electrical output (0.8 pf 25°C)	KVA	68.2	75.0
	kWe	54.5	60.0
Assumed alternator efficiency	%	88.5	88.5

Energy balance

Designation	Units	TG1 60Hz	
		Prime	Standby
Energy in fuel	kWt	180.9	197.3
Energy to power output (gross)	kWt	64.7	71.4
Energy to cooling fan	kWm	1	1
Energy to power (nett)	kWm	63.7	70.4
Energy to exhaust	kWt	62.0	66.9
Energy to coolant and oil	kWt	43.0	47.1
Energy to charge cooler	kWt	N/A	N/A
Energy to radiation	kWt	11.2	11.9

Cooling system

Cooling pack

Overall weight (wet)	71.0 kg
Overall face area of matrix	0.27 m ²
Width of matrix	550 mm
Height of matrix	762 mm

Radiator

Face area	0.27 m ²
Number of rows and material	2.0 rows, Aluminium
Matrix density and material	12.7 fins per inch, Aluminium
Width of matrix	526.2 mm
Height of matrix	524.2 mm
Pressure cap setting (minimum)	110 kPa

Fan

Diameter	457.2 mm
Drive ratio	1.25:1
Number of blades	7
Blade Material	Composite
Type	Pusher

Coolant

Total system capacity	
With radiator	16.5 litres
Coolant pump drive	Gear
Coolant pump drive ratio	2:1
Maximum top tank temperature	110°C
Temperature rise across engine (rating dependent)	6.6 - 7.0°C
Thermostat operation range	82 - 97°C

Recommended coolant: 50% ethylene glycol with a corrosion inhibitor (BS 658 :1992 or MOD AL39) and 50% clean fresh water.

Duct allowance

Duct allowance with 50% glycol @ 1800		
°C	kPa	m ³ /min
53	0	120.0
50	120	112.5
46	200	108.0

Cold start recommendation

Minimum required cranking speed over TDC 60 rpm			
	5 to -10°C	-10 to -20°C	-20 to -25°C
Oil	15W40	10W40	5W40
Starter	AZE		
Battery	1 x 950 CCA		
Cranking current	600 amps		
Aids	None	Glowplugs	
Minimum mean cranking speed	130 rpm	100 rpm	100 rpm

Note: Battery capacity is defined by the 20 hour rate.

Note: If a change to a low viscosity oil is made, the cranking torque necessary at low ambient temperatures is much reduced. The starting equipment has been selected to take advantage of this. It is important to change to the appropriate multigrade oil in anticipation of operating in low ambient temperatures.

Fuel system

Type of injection	Direct
Fuel injection pump	Common rail
Fuel atomiser	Unit injector / multi-hole
Nozzle opening pressure	160 MPa
Maximum allowable fuel temperature	80°C
Fuel lift pump delivery	200 l/h

Fuel lift pump

Maximum flow through customer filter	130 litres/hour
Maximum fuel supply restriction at lift pump	40 kPa
Maximum fuel return restriction @ low idle	50 kPa
Maximum fuel return flow	6.6 m ³ /min
Maximum suction head	17 kPa (1.7 m)
Maximum static pressure head	10 kPa (1.0 m)
Governor type	Control by ECM
Speed control to	ISO 8528, G3

Fuel specification

USA Fed Off Highway EPA2D 89.330-96	
Density (kg/l @ 15°C)	0.8373
Viscosity (mm ² /s @ 40°C)	3.086
Sulphur Content	0.02
Cetane Number	53.8

Fuel consumption litres/hour

Power Rating			
110%	100%	75%	50%
19.66	18.02	15.71	11.36

Electrical system

Alternator type	8SI
Alternator voltage	12 volts
Alternator output	65 amps
Starter motor type	AZE
Starter motor voltage	12 volts
Starter motor power	3.2 kW
Number of teeth on flywheel	126
Pull-in and hold-in current of starter motor solenoid @ 20°C maximum ⁽¹⁾	68 amps at 12 volts
Hold-in current of starter motor solenoid @ 20°C maximum ⁽¹⁾	20 amps at 12 volts
Engine stop method	Hardware input to engine ECM

1. All leads to rated at 10 amps minimum

Exhaust system

Maximum back pressure	15 kPa
Exhaust outlet size	64 mm
Crankcase breathing system type	Open circuit

Induction system

Maximum air intake restriction

Clean filter	3 kPa
Dirty filter	5 kPa
Air filter type	2 stage cyclonic/paper element

Load acceptance

Initial load application when engine reaches rated speed, 15 seconds (maximum) after engine starts to crank		
Prime power %	Transient frequency deviation %	Frequency recovery time seconds
72	6.2	1.1

- The above complies with the requirements of classifications 3 and 4 of ISO 8528-12 and G2 operating limits stated in ISO 8528-5
- The above figures were obtained under test conditions as follows:

Minimum engine block temperature	45°C
Alternator efficiency90%
Ambient temperature	15°C
Governing mode	Isochronous
Mechanical governing	4 % ±1 %
Alternator inertia	8 kgm ²
Flywheel inertia	14 kgm ²
Under frequency roll off point (UFRO) set to	Hz below rated
UFRO rate set to	2% voltage / 1% frequency
LAM on/off	Off

All tests were conducted using an engine which was installed and serviced to Perkins Engines Company Limited recommendations.

Mountings

Maximum static bending moment at rear face of block	791 N
Flywheel housing	SAE3

Lubrication system

Lubricating oil capacity total system	8.4 litres
Maximum sump capacity	6.9 litres
Minimum sump capacity	5.6 litres
Maximum engine operating angles	
Front up, front down, right side or left side	24°

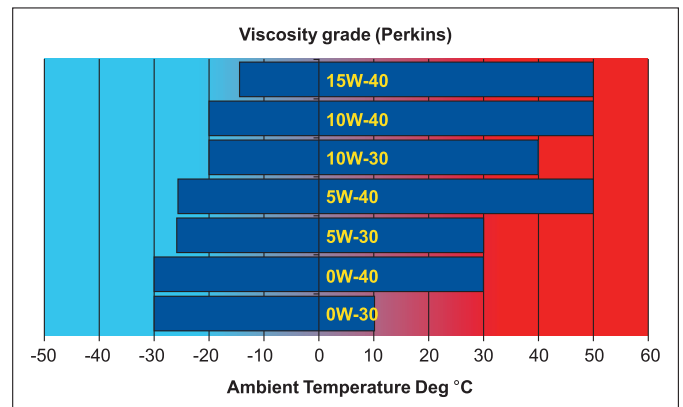
Lubricating oil pressure

Relief valve opens pressure	415 kPa
Pressure at maximum no-load speed	470 kPa
Oil temperature (continuous operation)	125°C
Oil temperature (maximum intermittent operation)	135°C
Oil consumption at full load as a % of fuel consumption	0.10%

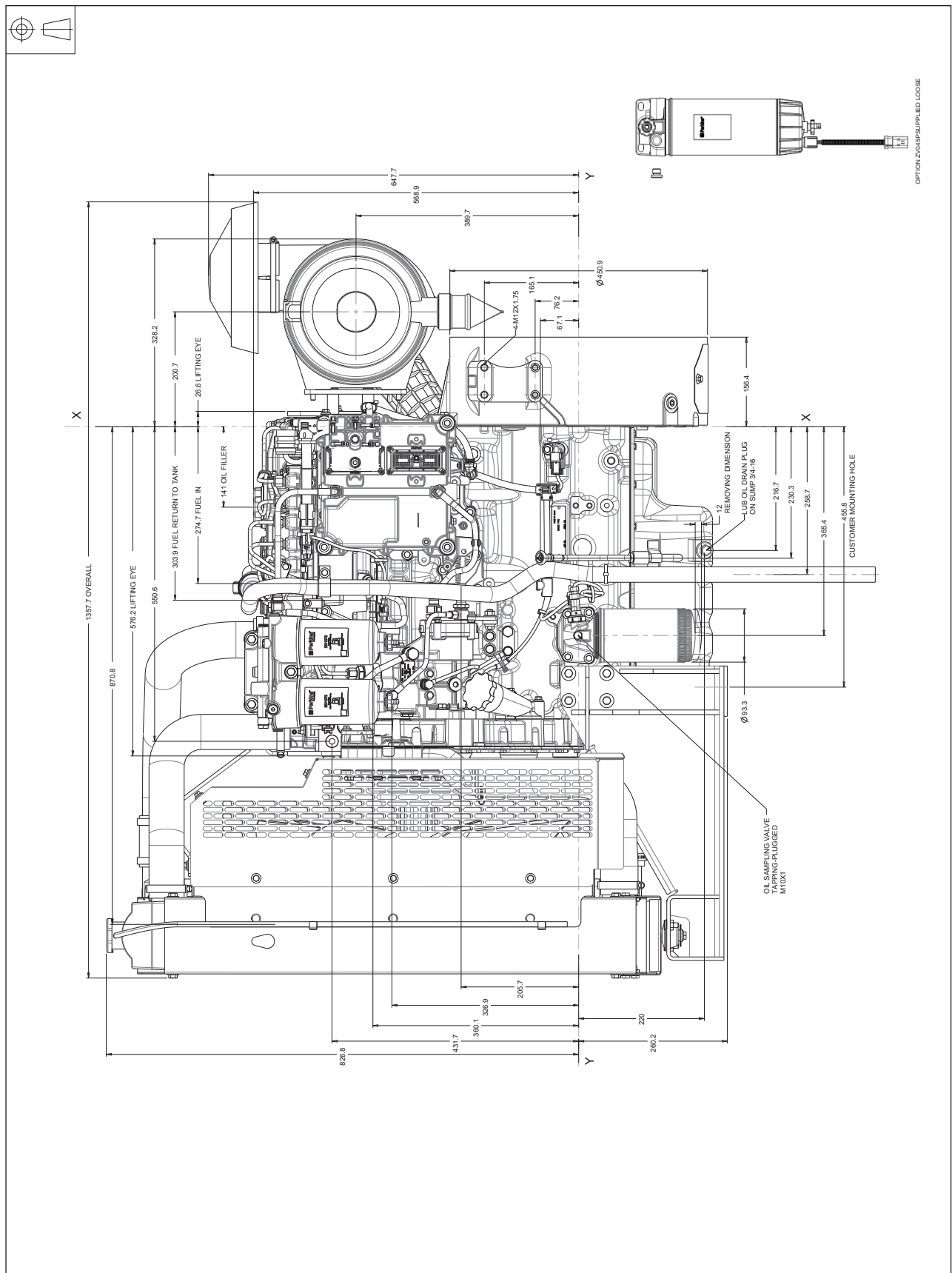
Recommended SAE viscosity

A single or multigrade oil must be used which conforms to API-CC/SE or CCMC-D1, see illustration below:

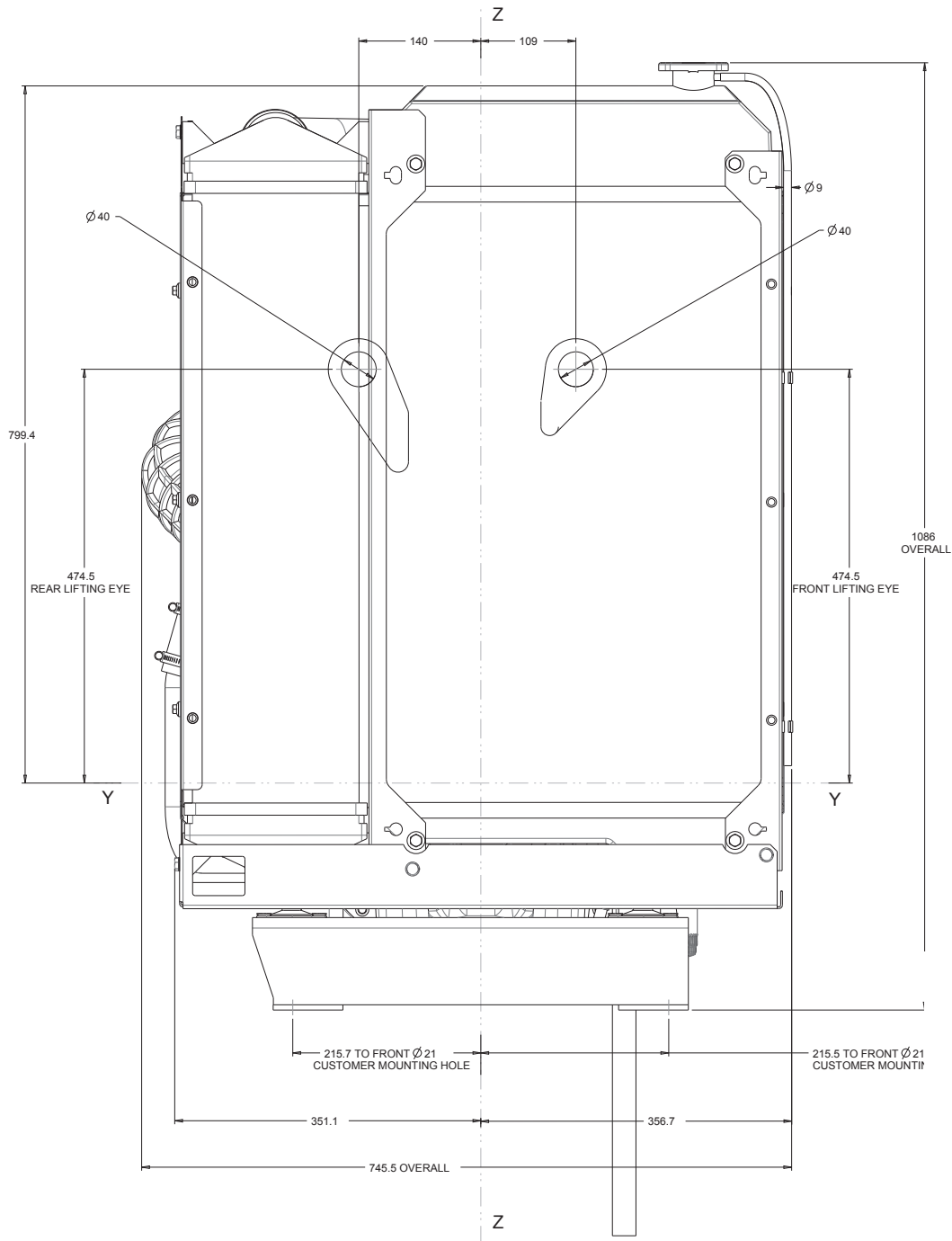
Recommended oil specification



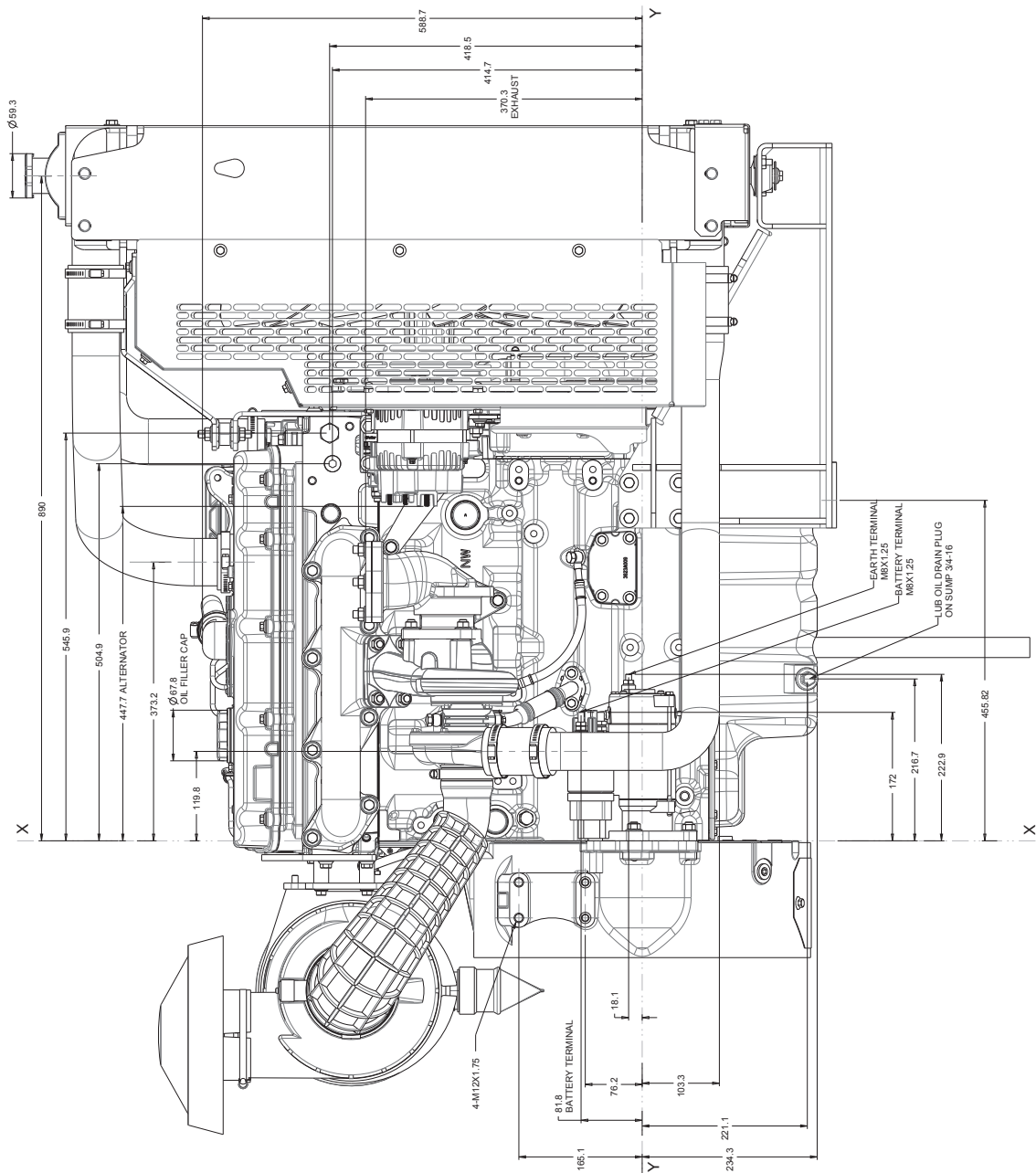
1104D-E44TG1 ElectropaK - left side view



1104D-E44TG1 ElectropaK - front view



1104D-E44TG1 ElectropaK- right side view



1104D-E44TG1 ElectropaK - rear view

