

**U.S. EPA Tier 4 Final and EU Stage V
151 bkW/202 bhp @ 2200 rpm**



Image shown may not reflect actual engine configuration.

Specifications

| Cat® C7.1 ACERT Industrial Power Unit | Metric | Imperial (English) |
|--|---------------------------------------|---------------------------|
| Configuration | I-6, 4-Stroke | |
| Bore | 105 mm | 4.13 in |
| Stroke | 135 mm | 5.31 in |
| Displacement | 7.01 L | 402.8 in ³ |
| Aspiration | Series Turbocharged-Aftercooled (TTA) | |
| Compression Ratio | 16.5:1 | |
| Combustion System | Direct Injection | |
| Rotation (from flywheel end) | Counterclockwise, viewed on flywheel | |
| Total Coolant Capacity | 24.25 L | 6.4 U.S. gal |
| Total Lubricating Capacity | 17.9 L | 4.72 U.S. gal |
| Total DEF Capacity | 32 L* | 8.45 U.S. gal* |
| Cooling System | Liquid | |
| Estimated total weight including radiator support brackets | | |
| Dry | 1087 kg | 2396 lbs |
| Wet | 1124 kg | 2478 lbs |
| Firing Order | 1, 5, 3, 6, 2, 4 | |
| Lifting Points Location | Baseframe | |
| Mobile Used G-load Limitations | 6 g | |

*Usable volume needs to take into account gradient capability and DEF expansion.

For additional information on all your power requirements, visit www.cat.com/industrial

Technical Data

Overall Dimensions

| | |
|---|---------|
| Height, including radiator support brackets . . | 1461 mm |
| Length, front of radiator to rear of air cleaner | 1769 mm |
| Width | 916 mm |

Moments of Inertia (GD²)

| | |
|--|--------------------------|
| Engine rotational components | 0.18255 kgm ² |
| Crank pulley | 0.01555 kgm ² |
| Flywheel (D0004) SAE 3 | 1.2 kgm ² |
| Flywheel (D0094) SAE 2 | 0.89 kgm ² |
| Flywheel (D0093) SAE 1 | 2.05 kgm ² |

Center of Gravity

| | |
|--|----------|
| Forward from rear of block (wet) | 445.3 mm |
| Above crankshaft centerline (wet) | 253.2 mm |
| Offset to RHS of crankshaft centerline (wet) . . | 8.8 mm |

Center of Gravity (Engine)

| | |
|--|--------|
| Forward from rear of block (wet) | 393 mm |
| Above crankshaft centerline (wet) | 182 mm |
| Offset to RHS of crankshaft centerline (wet) . . | 30 mm |

Performance

All ratings certified to within ± 3%

Note: All data based on operation to ISO/TR14396 standard reference conditions.

Test Conditions

| | |
|---|---------|
| Air Temperature | 25°C |
| Barometric Pressure.. | 100 kPa |
| Relative Humidity | 10.7% |
| Air Inlet Restriction at Maximum Power (Nominal) | 5 kPa |
| Exhaust Backpressure at Maximum Power (Nominal) | 35 kPa |
| Fuel Temperature (Inlet Pump) | 80°C |

Noise Data

| Average Sound Power Level for Bare Engine Without Inlet and Exhaust at 1 m | @ 2200 rpm | @ 1400 rpm |
|--|------------|------------|
| At Rated Speed With Suction Fan | 113 dB(A) | 104 dB(A) |
| Rated Speed With Blower Fan | 117 dB(A) | 107 dB(A) |

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.

General Installation

| Designation | Units | Engine speed rpm | | | | | |
|---|---------------------|------------------|-------|------|------|------|-------|
| | | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 |
| Gross Engine Power ⁽³⁾ | kWm | 116.9 | 144.1 | 151 | 151 | 151 | 150.9 |
| Brake Mean Effective Pressure | kPa | 1668 | 1763 | 1616 | 1436 | 1293 | 1175 |
| Cooling Fan Airflow at Zero Duct – Suction | (m ³ /s) | 3 | 3.5 | 4.1 | 4.6 | 5.2 | 5.7 |
| Radiator Core Resistance | kPa | 0.15 | 0.2 | 0.25 | 0.31 | 0.38 | 0.45 |
| Fan Power Absorption – Suction | kWm | 2 | 3.2 | 4.8 | 6.8 | 9.3 | 12.4 |
| Net Power at Flywheel ⁽¹⁾ | kWm | 115 | 141 | 146 | 144 | 142 | 139 |
| Torque (gross) | kWm | 930 | 983 | 901 | 801 | 721 | 655 |
| Engine Coolant Flow Against 35 kPa Restriction | L/min | 197 | 230 | 262 | 294 | 326 | 360 |
| Inlet Air Flow Volume (Wet) | m ³ /min | 7.3 | 8.5 | 9 | 9.6 | 10.3 | 11.5 |
| Exhaust Gas Flow (Wet) | m ³ /min | 6.8 | 7.9 | 8.3 | 8.8 | 9.5 | 10.5 |
| Exhaust Gas Mass Flow (Wet) | kg/min | 8.8 | 10.2 | 10.7 | 11.4 | 12.2 | 13.5 |
| Exhaust Gas Temperature (Exhaust Manifold/Turbo Outlet) | °C | 448 | 439 | 425 | 437 | 448 | 441 |
| Specific Fuel Consumption (SFC) Gross | g/kW hr | 210 | 202 | 203 | 210 | 217 | 227 |
| Fuel Consumption ⁽²⁾ | L/hour | 29.3 | 34.9 | 36.5 | 37.8 | 39.1 | 40.9 |

1. Gross power less auxiliaries. 2. Figures given for 100% net engine power. 3. Refer to Performance Curve T 4888.

Cautions:

- All engines are to operate between sea level and 1676 m and in ambient temperatures between -40°C and +48°C if a canopy is fitted with a 200 Pa air flow restriction without de-rating or specification change (excluding customer-fit cold start aid).
- Maximum ambient temperature increases to +55°C if the canopy air flow restriction does not exceed 120 Pa.

Energy Balance

| Designation | Units | Engine speed rpm | | | | | |
|--|-------|------------------|-------|-------|-------|-------|-------|
| | | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 |
| Energy in (Heat of Combustion) | kWt | 335 | 398 | 417 | 433 | 451 | 475 |
| Energy to Power (Gross) | kWm | 116.9 | 144.1 | 151 | 151 | 151 | 150.9 |
| Energy to Cooling Fan – Suction | kWm | 1.5 | 2.3 | 3.5 | 4.9 | 6.8 | 9.1 |
| Energy to Power Net | kWm | 114.9 | 140.9 | 146.2 | 144.2 | 141.7 | 138.5 |
| Energy to (Coolant and Lubricating Oil) Radiator | kWt | 86 | 96 | 98 | 105 | 108 | 117 |
| Energy to Exhaust | kWt | 117 | 133 | 137 | 148 | 162 | 178 |
| Energy to Charge Cooler | kWt | 13 | 16 | 16 | 16 | 16 | 19 |
| Energy to Radiation | kWt | 15 | 18 | 18 | 19 | 20 | 20 |

Cooling System

Cooling Pack

| | |
|---------------------------|-----------------------|
| Overall Weight (Wet)..... | 101.7 kg |
| Overall Face Area | 0.6646 m ² |
| Width | 875.8 mm |
| Height | 1088.5 mm |

Radiator

| | |
|--|----------------------|
| Maximum Load on Rad Assembly from Stone Guard Mounts..... | 2.8 kg |
| Face Area..... | 0.444 m ² |
| Number of Rows | 57 |
| Matrix Density | 10 fins/inch |
| Width of Matrix..... | 555 mm |
| Height of Matrix | 800 mm |
| Pressure Cap Setting..... | 1 bar |

Charge Cooler

| | |
|------------------------|----------------------|
| Face Area..... | 0.203 m ² |
| Number of Rows | 2 |
| Matrix Density | 13 fins/inch |
| Width of Matrix..... | 257.8 mm |
| Height of Matrix | 789 mm |

Fan

| | |
|------------------------|-----------|
| Type..... | Suction |
| Diameter..... | 724 mm |
| Drive Ratio | 1:1 |
| Number of Blades | 7 |
| Material..... | Composite |

Coolant

| | |
|------------------------------------|--------------|
| Total System Capacity..... | 24.25 liters |
| Bare Engine Capacity | 12.25 liters |
| Maximum Top Tank Temperature | 108°C |
| Thermostat Operation Range | 82-94°C |

Recommended Coolant

The following coolant should be used:

Acceptable – A commercial heavy-duty antifreeze that meets “ASTM D6210” specifications.

1. The C7.1 industrial engines must be operated with a 1:1 mixture of water and glycol. This concentration allows the NOx reduction system to operate correctly at high ambient temperatures.
2. Do not use a commercial coolant/antifreeze that only meets the ASTM D3306 specification. This type of coolant/antifreeze is made for light automotive applications.

| Duct allowance – Maximum Additional Restriction to Cooling Airflow and Resultant Minimum Airflow | | | | | |
|--|---------------------|--------------------|------|------|------|
| Description | Units | Engine Speed – rpm | | | |
| | | 1800 | 2200 | 1800 | 2200 |
| Ambient Clearance | °C | 55 | 55 | 55 | 55 |
| Duct Allowance | kPa | 120 | 120 | 200 | 200 |
| Cooling Fan Airflow | m ³ /min | 4.62 | 5.8 | 4.27 | 5.42 |
| Radiator Core Resistance | kPa | 553 | 791 | 609 | 871 |

Electrical System

Engine Stop Method ECM controlled

| Alternator Model | Unit | Remy 13SI | Remy 13SI |
|--------------------|-------|-----------|-----------|
| Alternator Voltage | Volts | 12 | 24 |
| Alternator Output | Amps | 120 | 80 |

| Starter model | Unit | Iskra AZF | Remy iMT | Denso P5 |
|--|-------------|-----------|--------------------|----------|
| Starter Motor Voltage | Volts | 12 | 24 | 12 |
| Starter Motor Power | kW | 4 | 8.5 | 5 |
| Number of Teeth on Flywheel | SAE 1 D0093 | 156 | | |
| | SAE 2 D0094 | 134 | | |
| | SAE 3 D0094 | 126 | 126 ⁽¹⁾ | 126 |
| Number of Teeth on Starter Pinion | | 10 | 12 | 13 |
| Minimum Cranking Speed | rpm | 100 | | |
| Starter Solenoid – Maximum Pull-in Current @ 0°C | Amps | 68 | 2 | 41 |
| Starter Solenoid – Maximum Hold-in Current @ 0°C | Amps | 20 | 2 | 11 |

⁽¹⁾ 24V SAE 3 options only compatible with C0067 LHS starter.

Fuel Injection System

Fuel Pump Type/Model Denso HP4
Injection System Electronic
Injector Type Common rail
Injector Pressure 200 MPa

Fuel Feed

Fuel Lift Pump Type Gerotor
Maximum Fuel Supply Restriction at
Primary Filter -30 kPa
Maximum Fuel Return Restriction
at Low Idle 20 kPa
Maximum Fuel Return Flow 2.5 m³/min
Maximum Fuel Flow Through Inlet
Connection 3.7 l/min
Maximum Lift Pump Delivery Flow Rate . . . 3.7 l/min
Maximum Pump Delivery Pressure 8500 kPa
Maximum Suction Head At Fuel
Pump Inlet 50 kPa
Maximum Static Pressure Head. 20 kPa
Maximum Fuel Temperature at Lift
Pump Inlet 80°C
Maximum Fuel Filter Service Interval 500 hrs

Fuel Specification

BS2869 Class 2 (off highway, gas oil); DIN EN590
DERV (Class A to F and 0 to 4)
Density 0.840-0.865 (kg/liters @ 15°C)
Viscosity 2-3.2 (mm²/s @ 40°C)
Sulfur Content 0.0007-0.0015 (% mass)
Cetane No. 40 - 0

Induction System

Maximum Air Intake Restriction

Clean Filter 5 kPa
Dirty Filter 8 kPa
Induction Indicator Setting 8 kPa
Air Filter Type 125 pm

Cold Start Recommendations

Minimum Battery Cold Cranking Amps

| Air Temp. Oil Viscosity Limit | With Glow Plugs 12V AZF & P5 Bare Engine | | Without Glow Plugs 12V AZF Bare Engine | | With Glow Plugs 24V IMT Bare Engine | | Without Glow Plugs 24V IMT Bare Engine | | With Glow Plugs 24V AZF hp Bare Engine | | Without Glow Plugs 24V AZF hp Bare Engine | |
|--|---|------|--|------|---|------|--|------|---|------|--|------|
| | | | | | | | | | | | | |
| -5°C | 15W40 | 950 | 15W40 | 950 | 15W40 | 525 | 15W40 | 525 | 15W40 | 525 | 15W40 | 525 |
| -10°C | 15W40 | 950 | 15W40 | 950 | 15W40 | 525 | 15W40 | 525 | 15W40 | 525 | 15W40 | 525 |
| -15°C | 15W40 | 1650 | 15W40 | (1) | 15W40 | 680 | 15W40 | (1) | 15W40 | 680 | 15W40 | (1) |
| -20°C | 10W40 | 1650 | 10W40 | (1) | 10W40 | 680 | 10W40 | (1) | 10W40 | 680 | 10W40 | (1) |
| -25°C | 5W30 | 1900 | 5W30 | (1) | 5W30 | 750 | 5W30 | (1) | 5W30 | 680 | 5W30 | (1) |
| Maximum Battery CCA. | | 2400 | | 2400 | | 1400 | | 1400 | | 1200 | | 1200 |

(1) Must use glow plugs.

Lubrication System

Total System Capacity (to Include Filter,
Rail, and Cooler) 17.9 liters
Maximum Sump Capacity 16 liters
Minimum Sump Capacity 13 liters
Maximum Oil Temperature
Continuous Operation 125°C
Maximum Oil Temperature
Intermittent Operation 135°C

Lubricating Oil Pressure

At Rated Speed 400-520 kPa
Minimum 220 kPa
Oil Relief Valves Opens at 520 kPa
Sump Drain Plug Tapping Size or
Hose Connection Size 3/4 UNF STOR port
Oil Pump Speed/Drive Method . . Gerotor (gear-driven
off crankshaft)
Lubricating Oil Flow at Rated Speed 60 l/min
Lubricating Oil Pressure at
Rated Speed 400-520 kPa
Oil Consumption at Full
Load Rated Speed 0.08% of fuel

Exhaust System

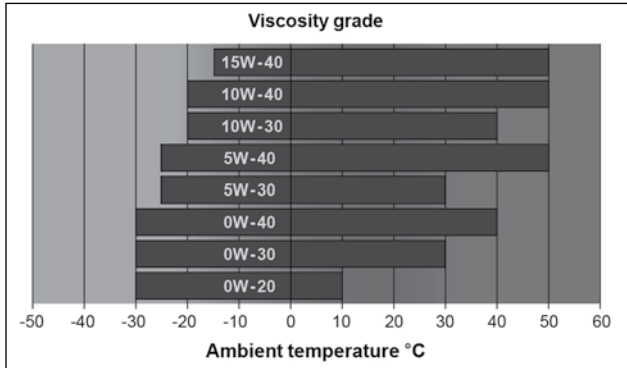
Aftertreatment System Type DOC, DPF, SCR/
AMOX+DEF System
Type of Regeneration
(High/Low Temperature) Low
Aftertreatment Height 455 mm
Aftertreatment Length 733 mm
Aftertreatment Width 769 mm
Aftertreatment Weight 107 Kg
Aftertreatment Skin Temperature 250°C
Maximum Temp. for Electronic
Components on Aftertreatment 120°C
Maximum Temp. for External Electronic
Components for Aftertreatment
(Soot Sensor Box) 85°C
Typical Maximum Temperature
Exhaust Out 475°C
Maximum System Backpressure Limit
for hp 175-275/130-205 kW 49.1 kPa
Aftertreatment Exhaust Outlet Connection . . 76.2 mm
Aftertreatment Exhaust Outlet Connection
Load Limit 60 N•m
Attenuation of the DPF 25 dB(A)
Ash Service NA
Maximum Backpressure for
Customer-installed Pipe Work 5.3 kPa

Normal Operating Angles

Front and Rear 25°
Side 25°

Recommended SAE Viscosity

A multigrade oil which conforms to API-CJ4 (ACEA-E9) must be used.



PTO Capabilities

| Flange Type (N•m) | Standard | Heavy Duty |
|----------------------------------|----------------------|-------------------------|
| | Various Refer to ESM | SAE "B" 13-tooth Spline |
| Torque Capability Intermittent | 142 | 210 |
| Torque Capability Continuous | 99 | 147 |
| Maximum Bending Moment at Flange | 0 | 15 |

Note: Refer to "Applications and Installation Manual" for "PTO approval requirements."

Mountings

| | | |
|--|--|--------------------|
| Maximum Static Bending Moment at Rear Face of Block | 1130 N•m | |
| Maximum Permissible Overhung Load on the Flywheel | See Polar Diagram Chapter 6 of the ESM | |
| | Dynamic Vertical BM | Dynamic Lateral BM |
| Maximum Bending Moment at Rear of Flywheel Housing – SAE 3 | ±3000 N•m | ±1700 N•m |
| Maximum Bending Moment at Rear of Flywheel Housing – SAE 2 | ±5600 N•m | ±2800 N•m |
| Maximum Bending Moment at Rear of Flywheel Housing – SAE 1 | ±8200 N•m | ±5750 N•m |

Note: Refer to "Applications and Installation Manual" for "Bending Moment approval requirements."

Features

Emissions

Meets U.S. EPA Tier 4 Final and EU Stage V emission standards.

Compliance

The engine meets the European Machinery Directive, 2006/42/EC, with each engine supplied with a Declaration of Incorporation.

Reliable, Quiet, and Durable Power

World-class manufacturing capability and processes coupled with proven core engine designs assure reliability, quiet operation, and many hours of productive life.

High Performance

Series turbocharging with smart wastegate available on all ratings for fast response, high power, and increased torque.

Fuel Efficiency

Fluid consumption optimized to match operating cycles of a wide range of equipment and applications.

Fuel & Oil

Tier 4 Final/Stage V engines require ultra-low sulfur diesel fuel (ULSD with 15 ppm of sulfur or less) and new oil formulations to support the new technology. Cat® engines are designed to accommodate B20 biofuel. Your Cat dealer can provide more information regarding fuel and oil.

Broad Application Range

Industry leading range of factory configurable ratings and options for agricultural, materials-handling, construction, mining, aircraft ground support, and other industrial applications.

Package Size

Exceptional power density enables standardization across numerous applications. Multiple installation options minimize total package size. Ideal for equipment with narrow engine compartments.

Low-Cost Maintenance

Worldwide service delivers ease of maintenance and simplifies the servicing routine. Hydraulic tappets, multi-vee belts, service free DPF and 500-hour oil change intervals enable low-cost maintenance. Many service items have a choice of location on either side of the engine to enable choice of service access. The S•O•SSM program is available from your Cat dealer to determine oil change intervals and provide optimal performance.

Quality

Every Cat engine is manufactured to stringent standards in order to assure customer satisfaction.

World-class Product Support Offered Through Global Cat Dealer Network

- Scheduled maintenance, including S•O•S sample
- Customer Support Agreements (CSA)
- Cat Extended Service Coverage (ESC)
- Superior dealer service network
- Extended dealer service network through the Cat Industrial Service Distributor (ISD) program

Standard Engine Equipment

Air Inlet

Standard air cleaners

Control System

Full electronic control system, all connectors and wiring looms waterproof and designed to withstand harsh off-highway environments, flexible and configurable software features and well supported SAE J1939 CAN bus enables highly integrated machines

Cooling System

Top tank temperature 108°C (226°F) as standard to minimize cooling pack size, 50:50 water glycol mix, detailed guidance on cooling system design and validation available to ensure machine reliability

Exhaust System

Diesel Oxidation Catalyst, Diesel Particulate Filter, and Selective Catalytic Reduction system supplied installed on engine. Zero downtime due to regeneration.

Flywheels and Flywheel Housing

Fitted with SAE 3, SAE 2, or SAE 1 flywheel housing configuration as standard – for use with a variety of flywheels.

Fuel System

Electronic high pressure common rail, ACERT™ Technology, innovative filter design to ensure maximum protection of the engine.

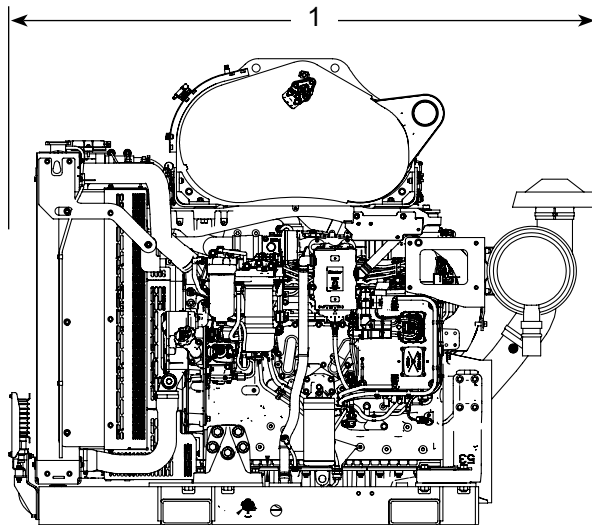
Lube System

Wide choice of sumps for different applications

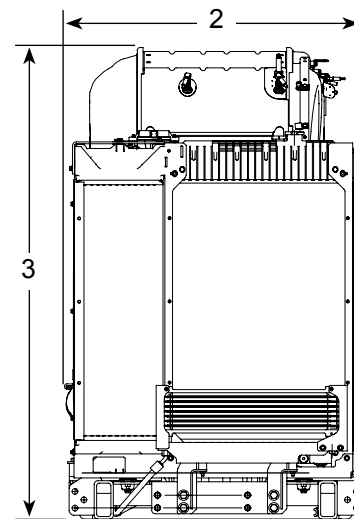
Power Take Off

SAE A or SAE B flanges on left-hand side, engine power can also be taken from the front of the engine on some applications, compressors are also available

Dimensions



(1) Length
1769 mm (69.6 in)



(2) Width
916 mm (36.1 in)

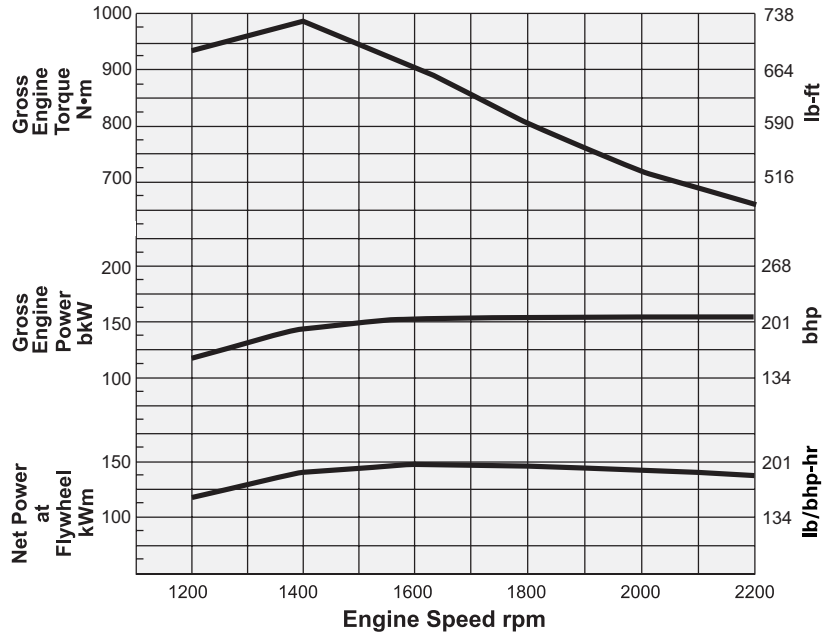
(3) Height (including radiator support brackets)
1461 mm (57.5 in)

Note: Final dimensions dependent on selected options

Performance Data

Series Turbocharged-Aftercooled – 2200 rpm

151 bkW/202 bhp



| Rating | Rated Speed rpm | Max Gross Power kW | Max Gross Power bhp | Peak Torque Speed rpm | Peak Torque N·m | Peak Torque lb-ft | Max Net Power Speed rpm | Max Net Power at Flywheel kW | Max Net Power at Flywheel hp |
|--------|-----------------|--------------------|---------------------|-----------------------|-----------------|-------------------|-------------------------|------------------------------|------------------------------|
| C | 1800-2200 | 151 | 202 | 1400 | 983 | 725 | 1600 | 146 | 196 |

Rating Definitions and Conditions

IND-C (Intermittent) is the horsepower and speed capability of the engine where maximum power and/or speed are cyclic (time at full load not to exceed 50%).

Additional ratings are available for specific customer requirements. Consult your Cat dealer.

Rating Conditions are based on SAE J1995, inlet air standard conditions of 99 kPa (29.31 in Hg) dry barometer and 25°C (77°F) temperature. Performance measured using a standard fuel with fuel gravity of 35° API having a lower heating value of 42 780 kJ/kg (18,390 btu/lb) when used at 29°C (84.2°F) with a density of 838.9 g/L.

Aftertreatment Features

Regeneration: Passive regeneration completely transparent to the operator.

Service: Service-free DPF for the emissions life of the engine

Available in 12V or 24V systems

Standard Emissions Control Equipment

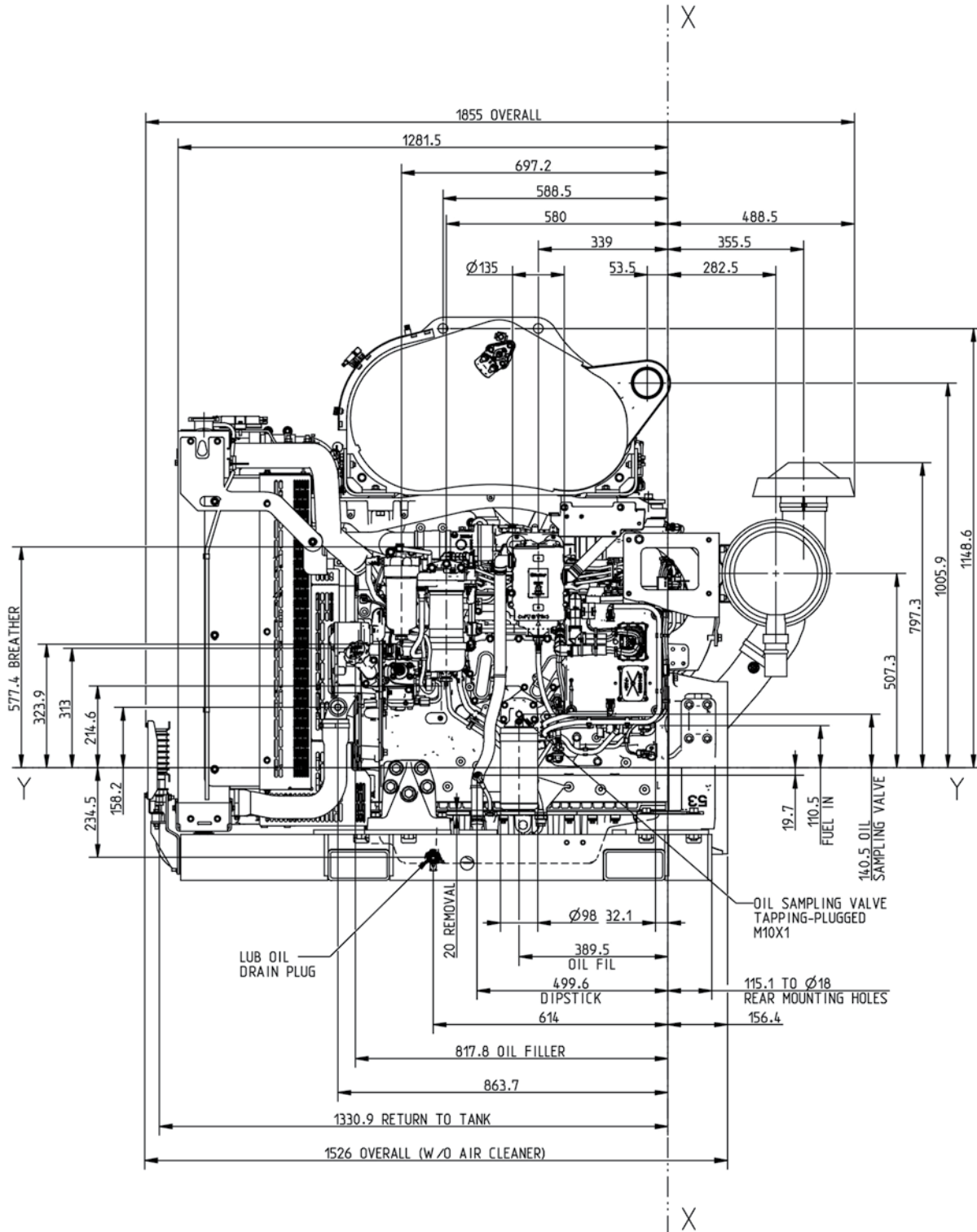
DOC: Diesel Oxidation Catalyst

DPF: Diesel Particulate Filter

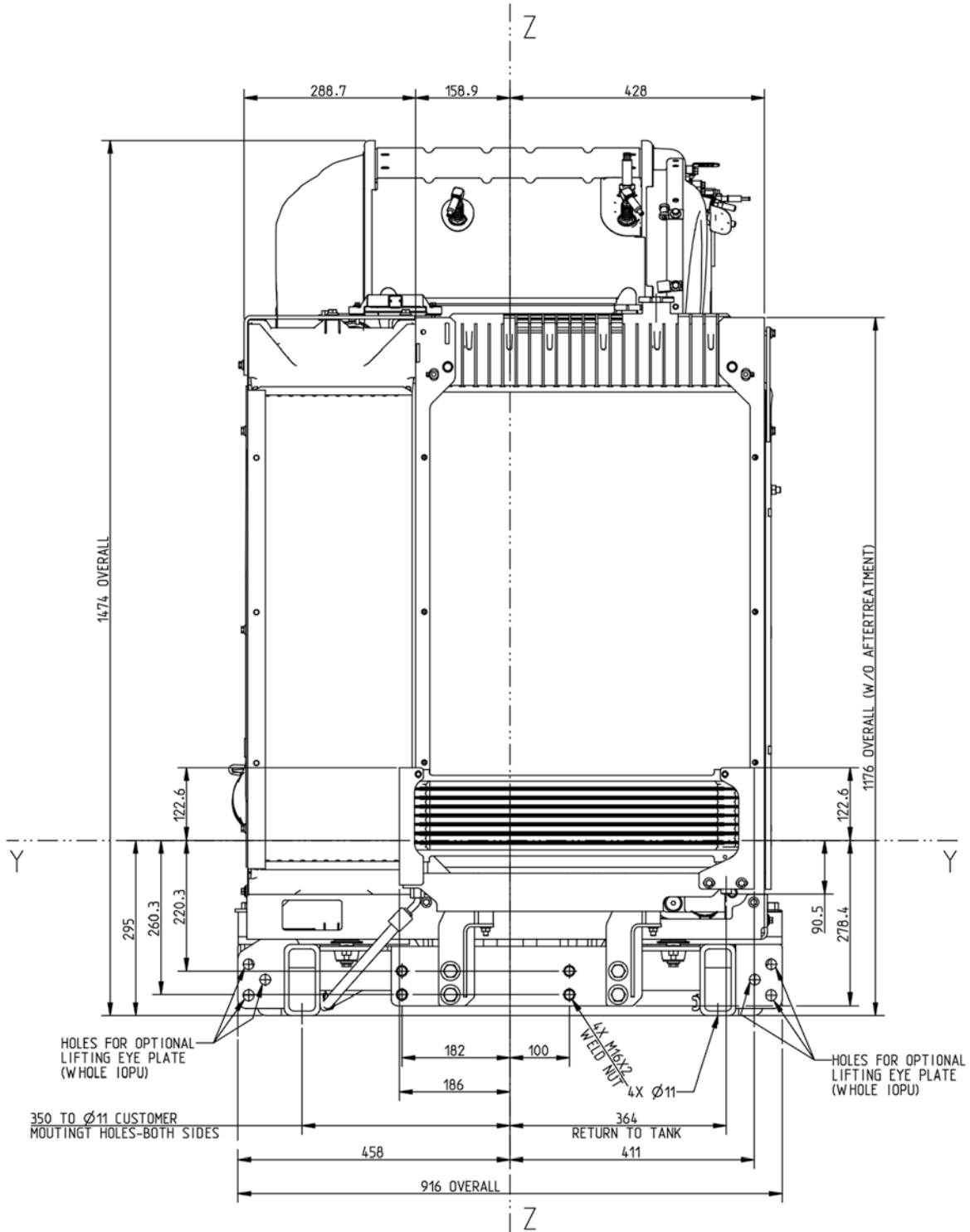
SCR: Selective Catalytic Reduction

A range of SCR system components, including pump, tanks, and lines

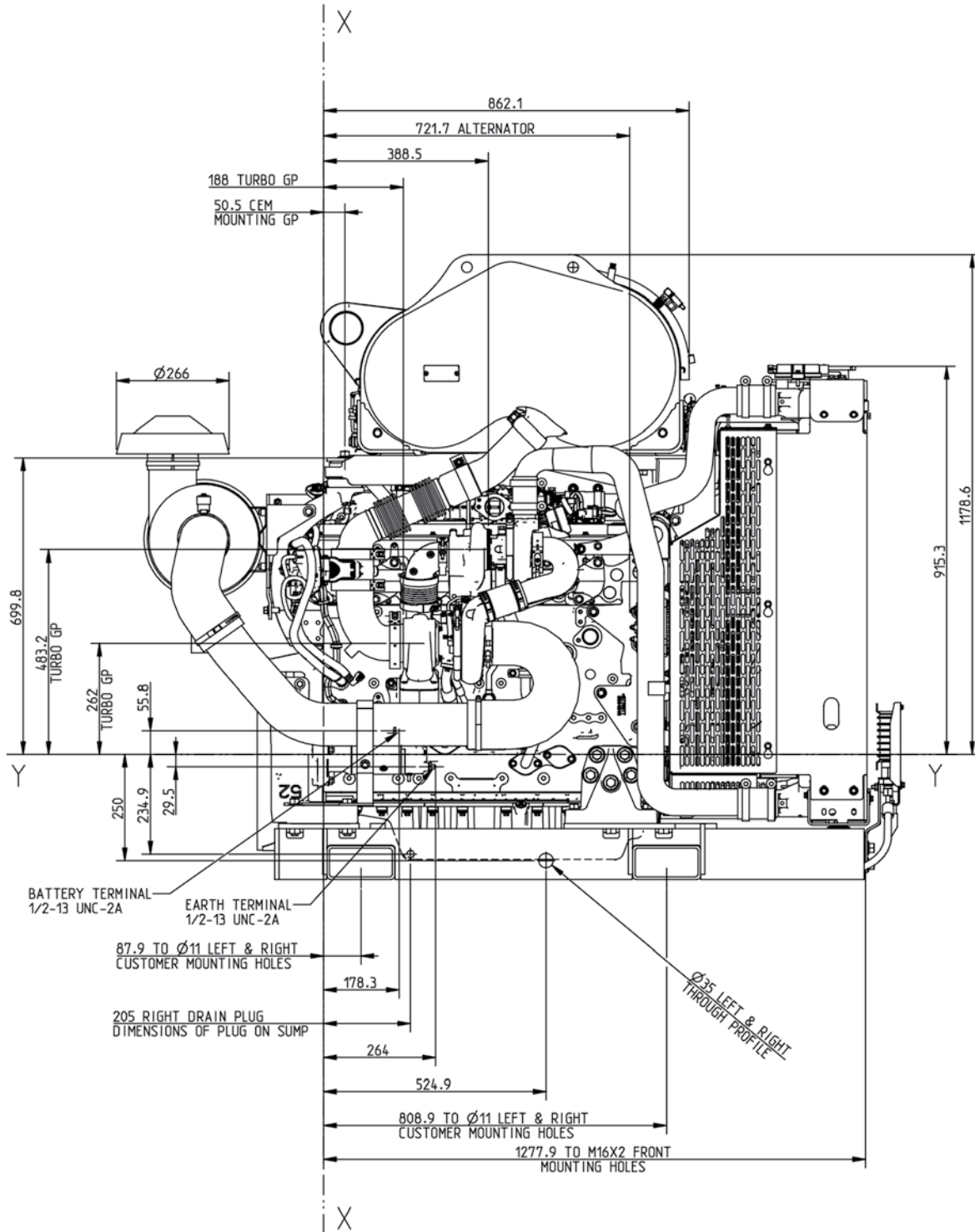
151 kW @ 2200 rpm – Left Side View with SAE 3 flywheel housing shown



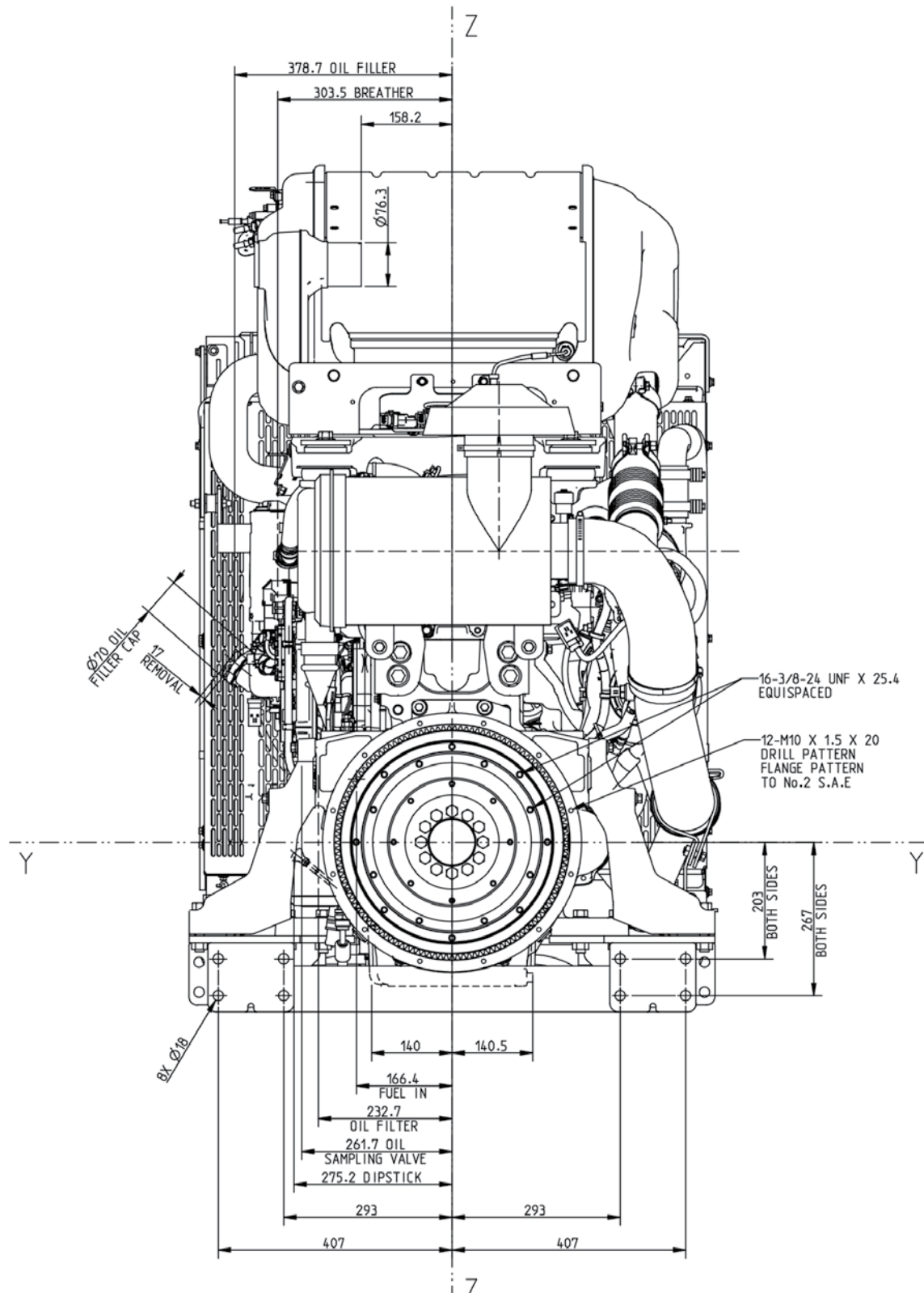
151 kW @ 2200 rpm – Front View with SAE 3 flywheel housing shown



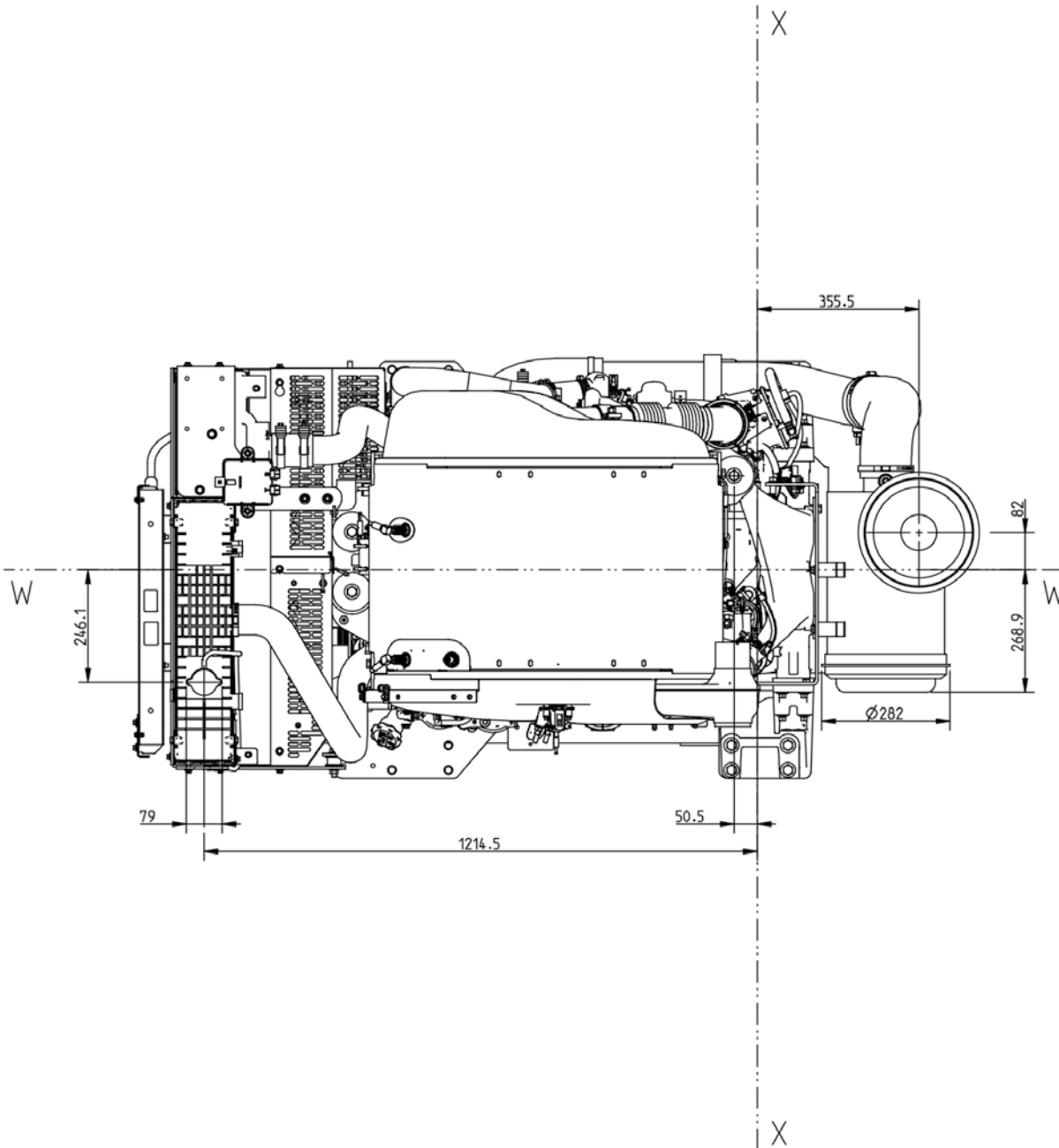
151 kW @ 2200 rpm – Right Side View with SAE 3 flywheel housing shown



151 kW @ 2200 rpm – Rear View with SAE 3 flywheel housing shown



151 kW @ 2200 rpm – Plan View with SAE 3 flywheel housing shown



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