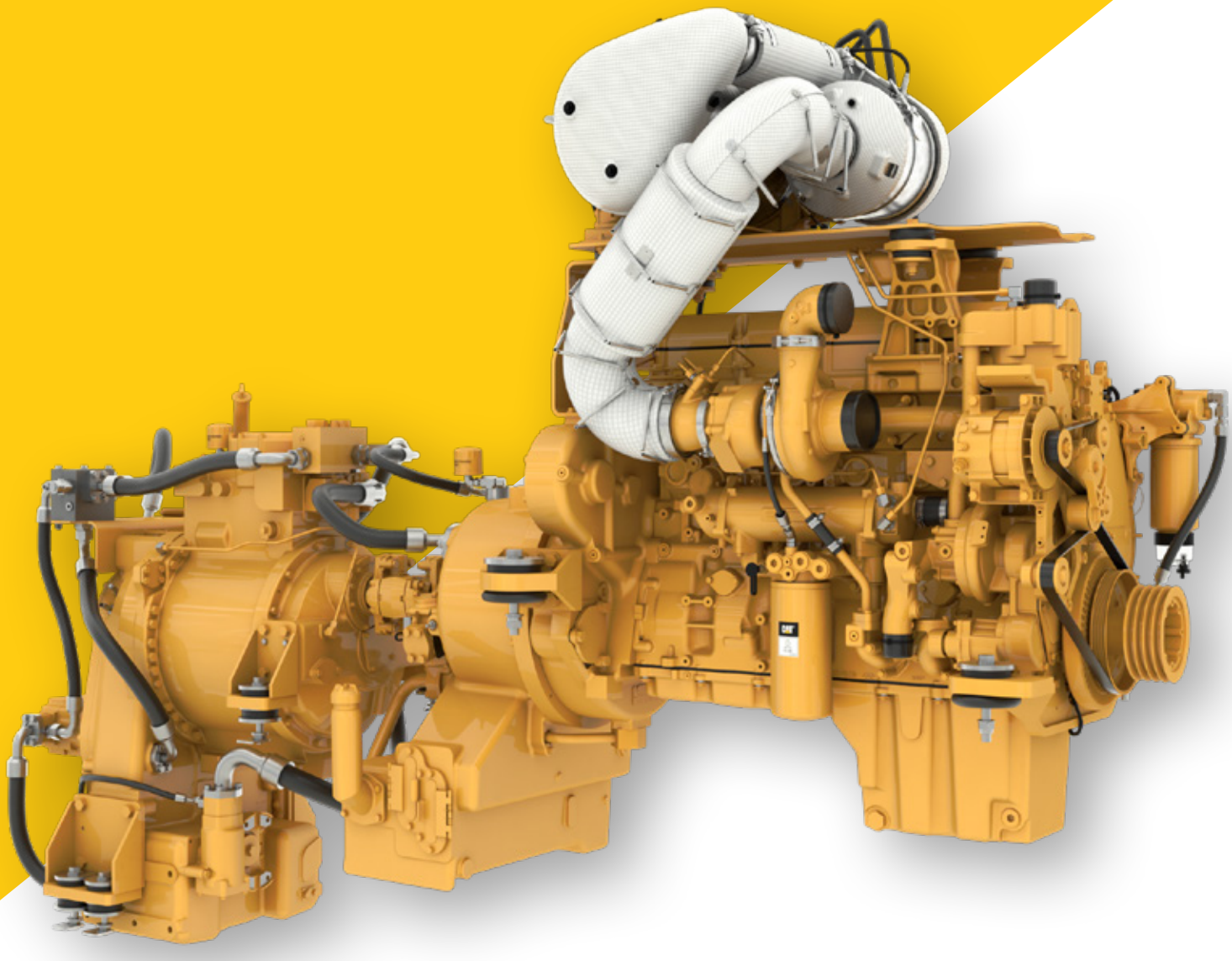
CATERPILLAR OEM SOLUTIONS



# CAT® POWER MODULE
# C13B & TR43-M44
## 430 kW / 577 hp

INTRODUCING

# CAT POWER MODULES FOR RAIL APPLICATIONS

**Caterpillar OEM Solutions provides electronic and electrical components and systems, which enhance the value of your customers' products.**

**For more than 65 years, we have been providing real-world solutions for the industries we serve.** And now we are offering an integrated power module which includes a Cat® engine coupled with a Caterpillar transmission for the rail industry.

**The Cat C13B Industrial Diesel Engine is offered in ratings ranging from 340-430 kW (456-577 hp) @ 1800-2100 rpm.** These ratings meet EU Stage V, U.S. EPA Tier 4 Final, Japan 2014, Korea Tier 4 Final*, and China Nonroad IV emission standards.




*Korea Tier V Capable



## **HIGH** POWER DENSITY

+ Up to 20% more power and 19% more torque compared to C13.
+ Exceptional power density enables you to use a smaller displacement engine and optimize the installation in your application.
+ Torque back-up and high torque at low speed delivers outstanding block acceptance.

## **RELIABLE, QUIET, DURABLE POWER** THAT MAXIMIZES UPTIME

+ World-class manufacturing capability and processes coupled with proven core engine and integral transmission designs assure reliability, quiet operation, and many hours of productive life.
+ Caterpillar Industrial Engines and Transmissions have been validated in a wide variety of applications, including Locomotive and Rail.
+ Electronic control systems are proven to withstand severe conditions.
+ Simple, efficient turbochargers deliver top performance.
+ Aftertreatment module enables quieter engine.
+ Same transmissions have been used in Rail industry for more than 20 years.

## **HIGH** QUALITY

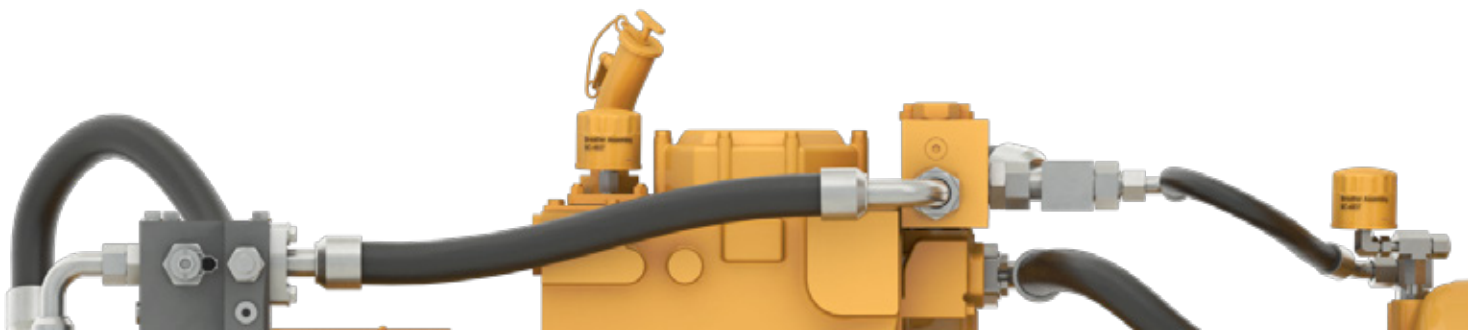
+ Cat engines and transmissions are manufactured to stringent standards for customer satisfaction.
+ Superior dealer service network and world-class product support offered through global Cat dealer network.
+ Scheduled maintenance, including S•O•S sample, reduces operating cost.
+ Extended Service Coverage (ESC) and Customer Value Agreements (CVA) available.
+ Core engine platforms deliver long life to overhaul and engines are designed to be remanufactured
+ Available aftertreatment systems for highly regulated models are built to withstand extreme conditions.

## **EASY** INSTALLATION

+ Compact engine aftertreatment and integral transmission and torque converter minimize package size. Ideal for equipment with narrow compartments.
+ Aftertreatment installation flexibility to meet all applications – including remote mount and engine-mounted options from the factory.
+ Low heat rejection levels allow for optimized cooling package at equivalent power.
+ Fully integrated hydraulics, including pumps, hoses, valves and filters, enables easy installation and protects the transmission during dead-engine towing.
+ Flexible transmission oil level gauge installation allows easier routing checks.

## **AFTERTREATMENT** FEATURES

+ Meets EU Stage V, U.S. EPA Tier 4 Final, Japan 2014, Korea Tier 4 Final, and China Nonroad IV emission standards.
+ Clean emissions module (CEM) consisting of diesel oxidation catalyst (DOC) and combined diesel particulate filter (DPF) and high-efficiency selective catalytic reduction (SCR).
+ Maximum uptime with transparent aftertreatment regeneration, without operator distraction or impact to machine performance.
+ PETU DEF capacity up to 93.7 liters (24.7 U.S. gallons).
+ Minimum 5,000 hour service interval for DPF/PETU filters.



## **LOW-COST** MAINTENANCE

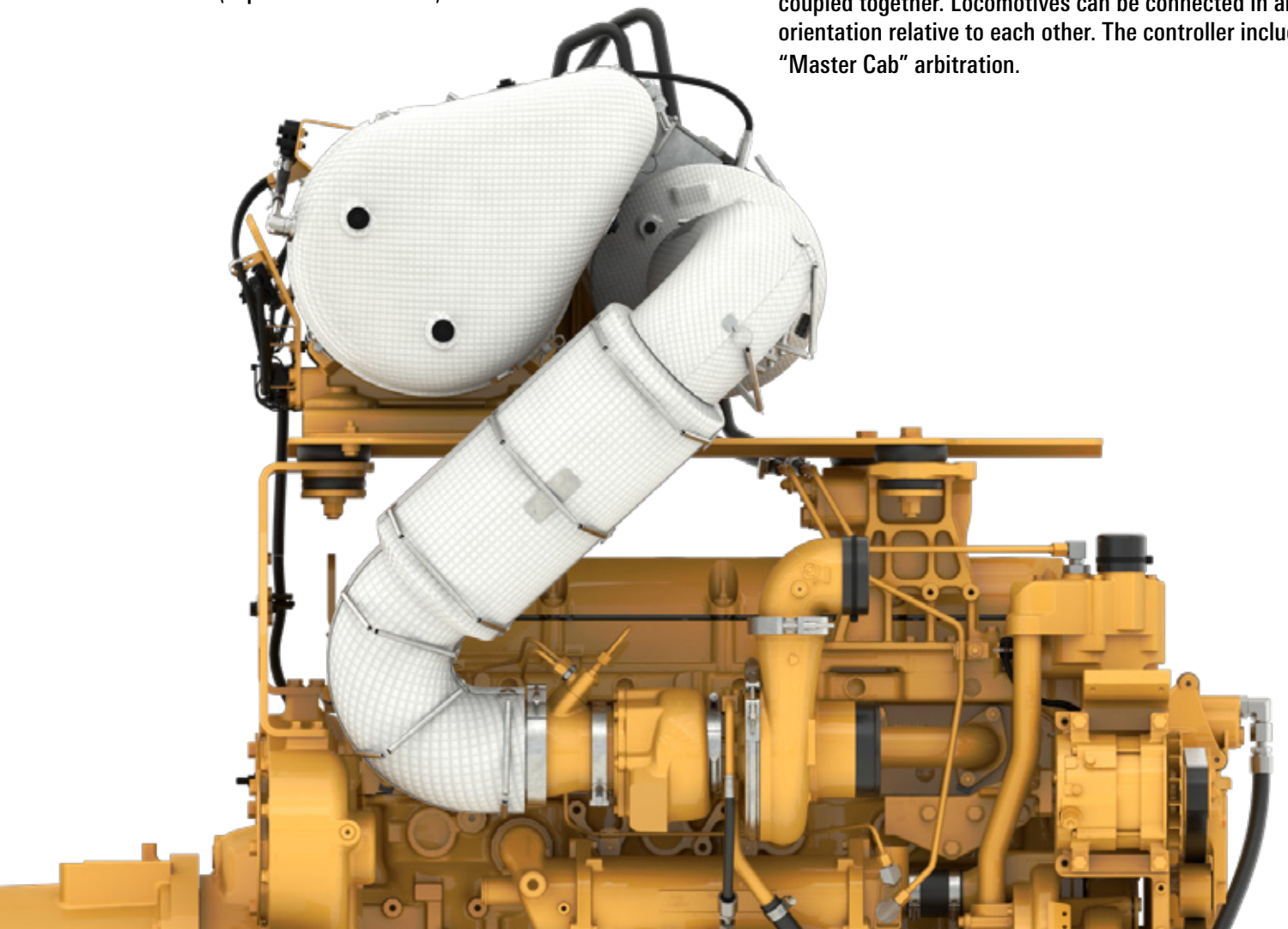
+ Ideal for high-hour applications over 10,000 hours.
+ Minimum 5000-hour diesel particulate filter (DPF) service interval enables low-cost maintenance.
+ Standard service intervals of 500 hours under normal operating conditions.
+ The S•O•S℠ program is available from your Cat dealer to optimize oil change intervals.
+ Precise measurement and control enable better fluid efficiency during aftertreatment regeneration.

## **FLUID & FUEL** EFFICIENCY

+ Caterpillar integration expertise optimizes engine performance for maximum efficiency.
+ Fluid consumption optimized to match operating cycles for a wide range of equipment and applications while maintaining low operating costs.
+ C13B fuel consumption has been improved by up to 6% at equivalent power (BSFC).
+ Engine oil service hours increased from 250 hours to 500 hours (capable of 1000 hours).

## **INTEGRATED** ENHANCED ELECTRONICS

+ The C13B is equipped for the future with the latest technology from a single on-engine ECM.
+ 2-wire Ethernet connection allows for simpler, faster installation and for remote service and software flash.
+ Transmission ECM available for additional safety and advanced control features:
  - Automatic or Manual Shift Mode: Operator can request operation in a specific gear.
  - Vehicle Speed Limit: The controller limits vehicle speed to a configurable value.
  - Traction Control: Proactively prevents wheel slip from occurring.
  - Park Brake Control: Assists in incline start conditions and prevents machine from moving when not powered.
  - Vigilance/Alerter System: Safety feature that stops the machine if the operator doesnot regularly demonstrate alertness.
  - Dual power control system: Allows the two machines to operate individually or in dual power mode, with the two machines mechanically and electronically coupled together. Locomotives can be connected in any orientation relative to each other. The controller includes "Master Cab" arbitration.



# INTEGRATED ELECTRONIC CONTROL FEATURES

## WITH DUAL POWER CONTROL SYSTEM

Allows the two machines to operate individually or in dual power mode, with the two machines mechanically and electronically coupled together. Locomotives can be connected in any orientation relative to each other. The controller includes “Master Cab” arbitration.

### OPTIMIZED SHIFT POINTS

Shift points are optimized to accommodate various applications.

### CONTROLLED THROTTLE SHIFT

Upon shift, transmission sends a command to bring engine speed to required value expected at end of shift to provide smooth shifts.

### AUTOMATIC OR MANUAL SHIFT MODE

Operator can request operation in a specific gear.

### VEHICLE SPEED LIMIT

The controller limits vehicle speed to a configurable value.

### LIMP HOME MODE

Ability to safely control machine in the presence of serious failure.

### TRACTION CONTROL

Proactively prevents wheel slip from occurring.

### PARK BRAKE CONTROL

Assists in incline start conditions. Prevents machine from moving when not powered.

### NEUTRAL LATCH

Controls engine speed without engaging the transmission in order to charge air systems and warm up hydraulics before traveling.

### VIGILANCE/ALERTER SYSTEM

Safety feature that stops the machine if the operator does not regularly demonstrate alertness.

### GENERATOR MODE

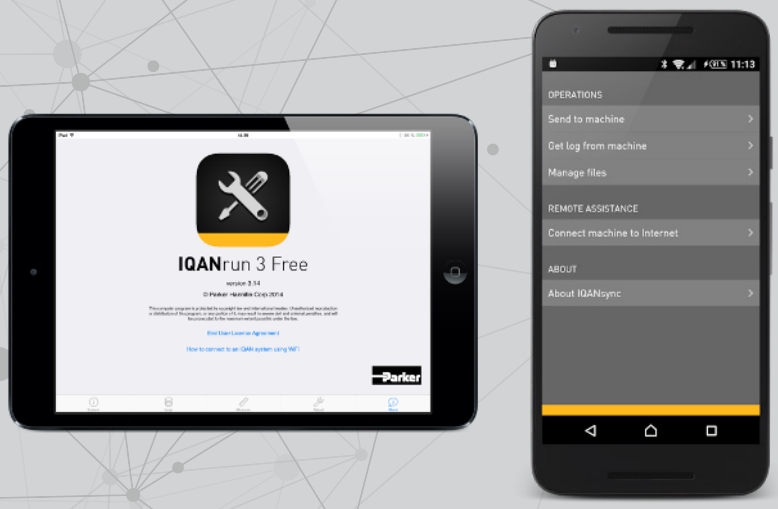
Commands a specific engine speed in order to run an external PTO.




### NEW DISPLAY PLATFORM

Robust Touch Screen with high definition graphics provides a faster response and boot time.

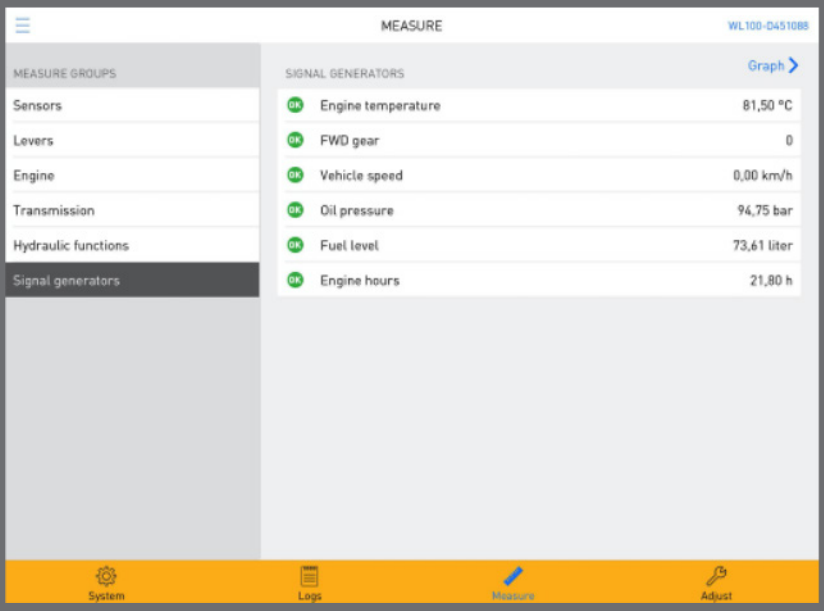
- Gateway for remote product support
- Software Updates wirelessly with free Smart Phone or Tablet app
- Over The Air (OTA) software update and remote into machine capability
- Machine Configuration can be done on screen vs. ET
- Capability to configure machine via display (no ET needed)
- Diagnostic logging and telemetry
- Service literature available via PDF on display
- Quick development and change request capability
- Family of master displays available in sizes of 7" and 10”
- Fully programmable for use in any machine application as a master controller
- Full graphical, diagnostic and CAN gateway capability
- Capacitive Touchscreen interface is offered for interactive, intuitive HMI
- Available with IP-camera support with secure proprietary IP WiFi communication



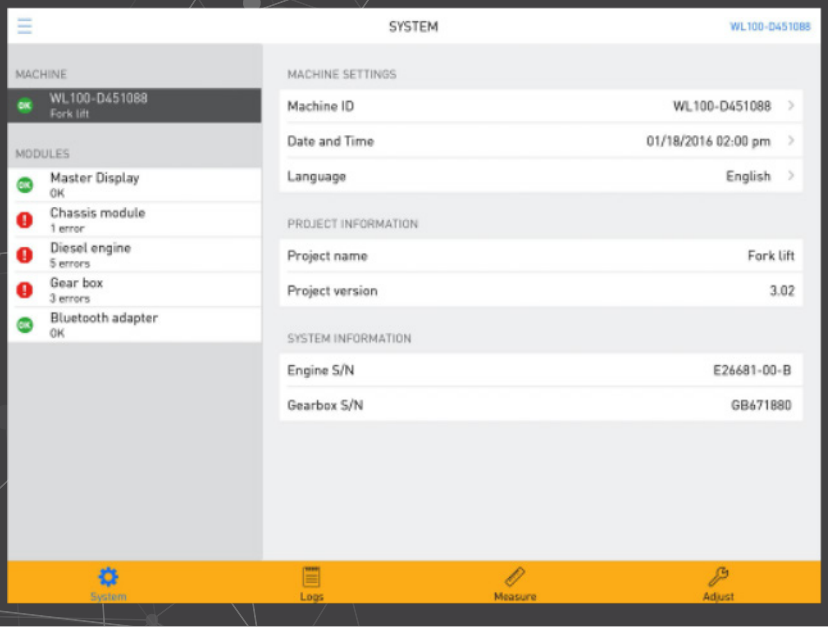

## DISPLAY CONNECTIVITY

+ Bluetooth connectivity and programming via smart phone App.
  – No Cat Comm Adapter needed
+ Smart phone/Tablet App allows remote machine access and datalogging to Cat systems.
  – Available on both Apple or Android system
+ Laptop service tool available via internet download (additional fees).
  – Via Ethernet connector or wireless

## REAL-TIME MONITORING




## DIAGNOSTICS



# POWERED BY THE CAT® C13B ENGINE

The Cat C13B Industrial Diesel Engine is offered in ratings ranging from 340-430 kW (456-577 hp) @1800-2100 rpm. These ratings meet EU Stage V, U.S. EPA Tier 4 Final, Japan 2014, Korea Tier 4 Final*, and China Nonroad IV emission standards.

## POWER RATING

| | | |
|---|---|---|
| Minimum Power | 340 kW | 456 hp |
| Maximum Power | 430 kW | 577 hp |
| Rated Speed | | 1,800-2,100 rpm |

## EMISSION STANDARDS

EU Stage V, U.S. EPA Tier 4 Final, Japan 2014, Korea Tier 4 Final*, and China Nonroad IV Emission Standards

| | |
|---|---|
| Performance | UN R120 for measurement of net power and specific fuel consumption |

## ENGINE SPECIFICATIONS

| | | |
|---|---|---|
| Engine Configuration | | In-Line 6, 4-Stroke-Cycle Diesel |
| Bore | 130 mm | 5.1 in |
| Stroke | 157 mm | 6.2 in |
| Displacement | 12.5 L | 762.8 $in^3$ |
| Aspiration | | Turbocharged Aftercooled (TA) |
| Compression Ratio | | 15.8:1 |
| Combustion System | | Direct Injection |
| Rotation (from flywheel end) | | Counterclockwise |
| Cooling System Capacity (engine) | 18.7 L | 19.8 qts |
| Lube System (refill) - varies based on sump/oil pan selection | 34-41 L | 35.9-43.3 qts |

## ENGINE DIMENSIONS (APPROXIMATE. FINAL DIMENSIONS DEPENDENT ON SELECTED OPTIONS.)

| | | |
|---|---|---|
| Length | 1274 mm | 50 in |
| Width | 994 mm | 39 in |
| Height | 1134 mm | 45 in |
| Weight – Net Dry (Basic Operating Engine Without Optional Attachments) | 1125 kg | 2,480 lb |

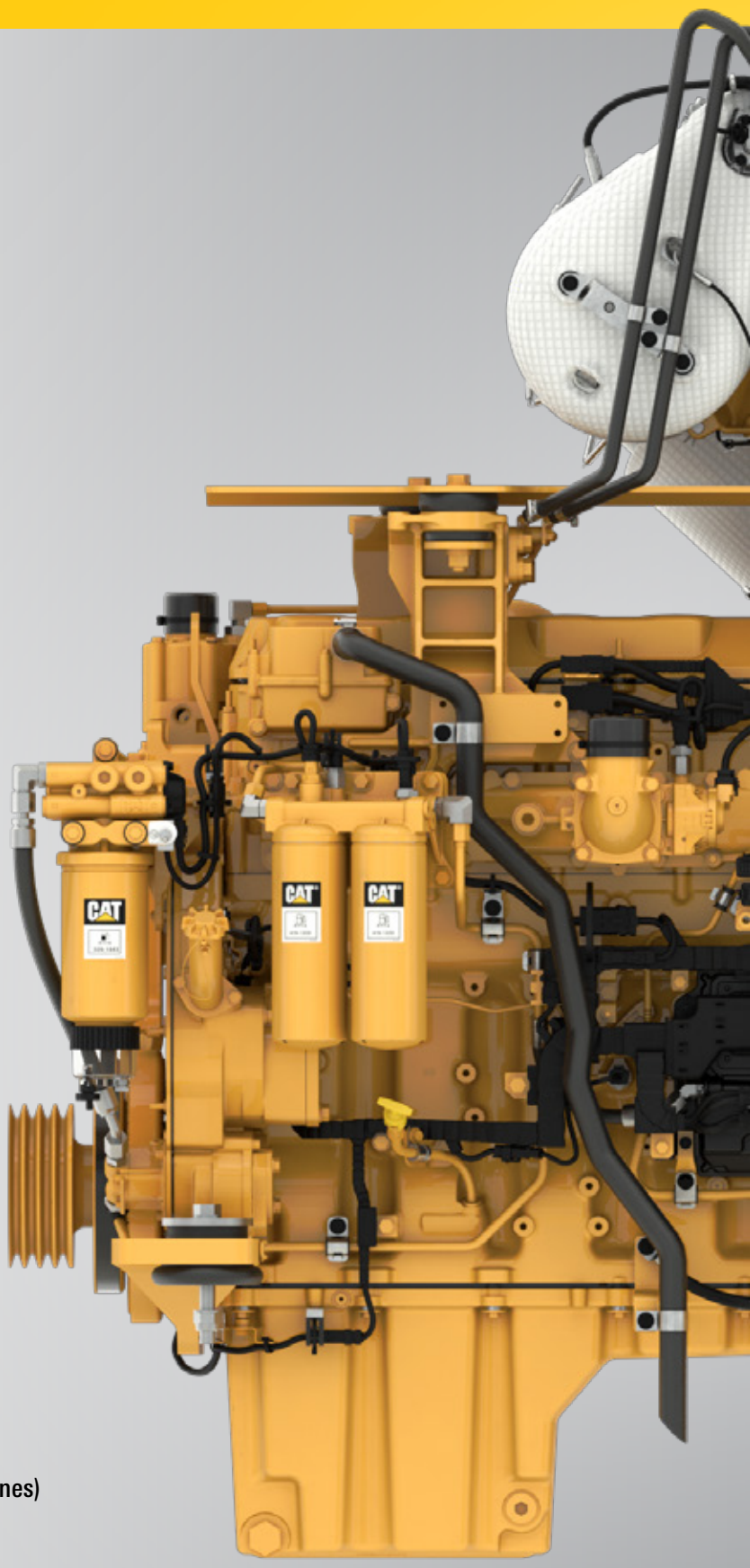
## AFTERTREATMENT DIMENSIONS (APPROXIMATE. FINAL DIMENSIONS DEPENDENT ON SELECTED OPTIONS.)

| | | |
|---|---|---|
| Length | 896 mm | 35.3 in |
| Width | 807 mm | 31.8 in |
| Height | 460 mm | 18.1 in |
| Weight | 100 kg | 220 lb |

**Korea Tier V Capable*

STANDARD EQUIPMENT

# C13B ENGINE




**Air Inlet System**
- » Turbocharged
- » Air-to-Air Aftercooled
- » Front or rear exhaust configurations available

**Control System**
- » Electronic control system
- » Over-foam wiring harness
- » Automatic altitude compensation
- » Power compensated for fuel temperature
- » Configurable software features
- » Engine monitoring system SAE J1939 broadcast and control
- » Integrated Electronic Control Unit (ECU)
- » Remote fan control

**Cooling System**
- » Vertical or RH thermostat outlet
- » Centrifugal water pump
- » Guidance on cooling system design available through your dealer to ensure equipment reliability

**Flywheels and Flywheel Housing**
- » Available SAE No. 1 power take-off with optional SAE B or SAE C power take-off drives
- » Engine power can also be taken from the front of the engine with optional attachments

**Fuel System**
- » Mechanical Electronic Unit Injector fuel system (MEUI-C)
- » Primary fuel filter
- » Secondary and tertiary fuel filters
- » Fuel transfer pump
- » Electronic fuel priming

**Lube System**
- » Oil cooler
- » Oil filler
- » Lube oil filter
- » Oil dipstick
- » Gear-driven oil pump
- » Choice of front, rear or center sumps
- » Open crankcase ventilation system with fumes disposal (OCV filter system required for EU Stage V certification engines)

**Power Take-off (PTO)**
- » SAE B or SAE C power take-off (PTO) drives
- » Engine power can also be taken from the front of the engine on some applications

**General**
- » Caterpillar Yellow paint, with optional colors available
- » Vibration damper
- » Lifting eyes

# C13B ENGINE RATING DEFINITIONS AND CONDITIONS

**IND-A (Continuous)** for heavy duty service where the engine is operated at maximum power and speed up to 100% of the time without interruption or load cycling.

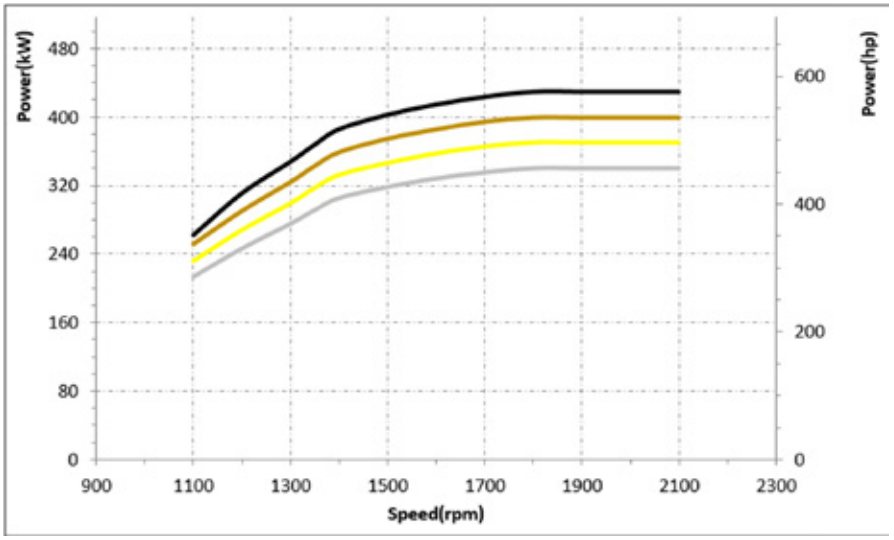
**IND-B** for service where power and/or speed are cyclic (time at full load not to exceed 80%).

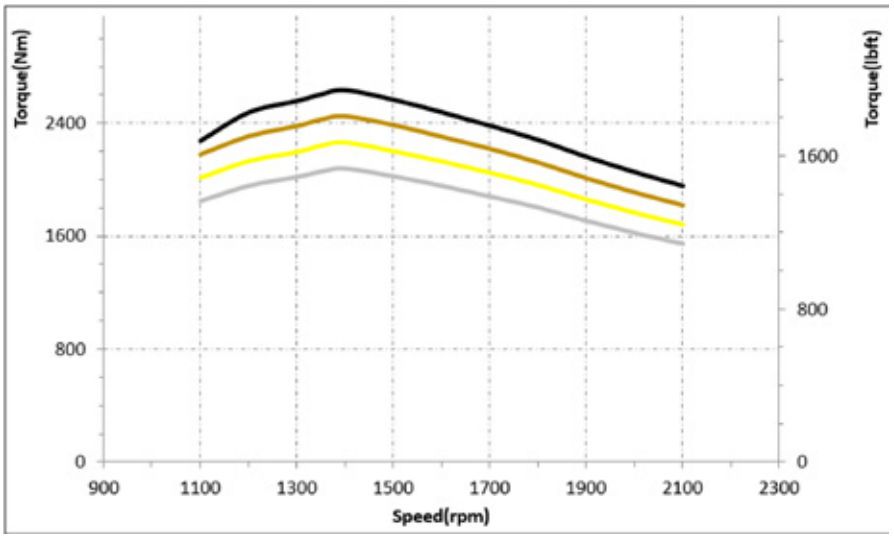
**IND-C (Intermittent)** is the horsepower and speed capability of the engine where maximum power and/or speed are cyclic (time at full load not to exceed 50%).

**IND-D** for service where maximum power is required for periodic overloads (time at full load not to exceed 10% of the duty cycle).

**Diesel Engines** – greater than 7.1 liter.
All 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.

## PERFORMANCE DATA

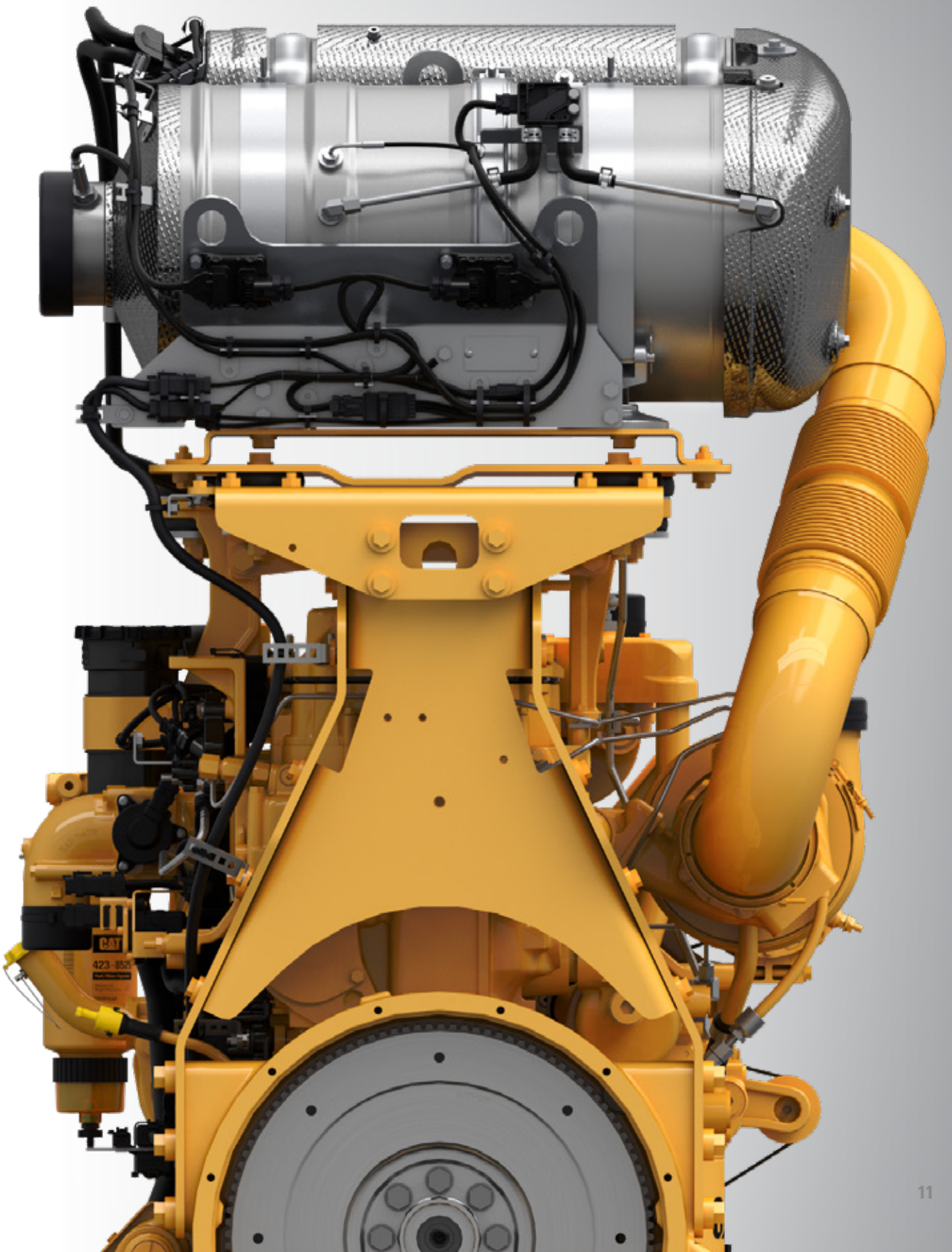



| Rating | Aspiration | Rated Speed rpm | Rated Power bkW | Rated Power bhp | Peak Torque N•m | Peak Torque lb-ft | Speed rpm |
|---|---|---|---|---|---|---|---|
| A | TA | 1800-2200 | 340 | 456 | 2082 | 1536 | 1400 |
| B | TA | 1800-2200 | 370 | 496 | 2266 | 1671 | 1400 |
| C | TA | 1800-2200 | 400 | 536 | 2450 | 1807 | 1400 |
| D | TA | 1800-2200* | 430 | 577 | 2634 | 1943 | 1400 |

*D Rating available up to 2200 rpm with power and torque as reflected by curves shown.

# **MORE POWER, HIGHER TORQUE, LESS SYSTEM WEIGHT** AND IMPROVED FUEL ECONOMY



# DRIVEN BY THE CAT TR43-M44 TRANSMISSION
## WITH INTEGRAL TORQUE CONVERTER

### MODEL DESCRIPTION

TR – Transmission, Reversing
43 – Clutch Plate Diameter in Centimeters
M – Mid-Mount Installation Configuration
4 – Number of Forward Gears
4 – Number of Reverse Gears

### APPLICATIONS

Typical applications for the TR43-M44 include 2WD or 4WD locomotive, subway and railway applications.

It can also be used by other vehicles that frequently make directional changes during a normal work cycle.

### OPTIONS

| |
|---|
| Dead Engine Towing Pump |
| Engine-Mount Configurations Available |

### RATINGS

| | | |
|---|---|---|
| Maximum Input Power | 470 kW | 630 hp |
| Maximum Input Torque | 2769 N•m | 2,043 lb-ft |
| Maximum Input Speed | | 2,100 rpm |
| Minimum Input Speed | | 700 rpm |

### ROTATION

| | |
|---|---|
| Input Rotation | SAE J824 Standard, Counterclockwise |
| Output Rotation | Forward: Clockwise / Reverse: Counterclockwise |

### CONNECTIONS

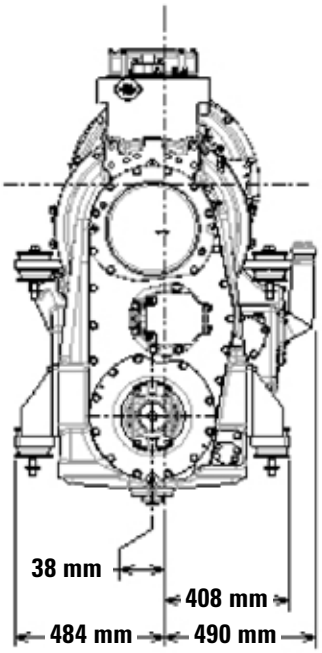
| | |
|---|---|
| Input | Yoke (9C) |
| Output | Yoke (10C) x 2 |
| Electrical Power | 12V or 24V |
| Electrical Control | 1 Bundle |
| Hydraulic Connections | Oil Cooler, Filter and TC |

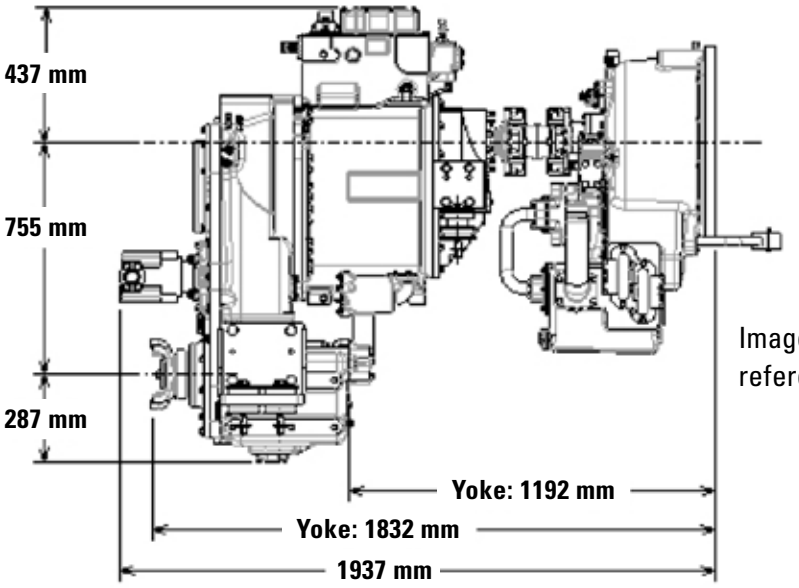
### CLUTCHES

| | |
|---|---|
| Electro-Hydraulic Oil Cooled, Multidisc | |
| Clutch Modulation Control | Cat® Electronic Long Range Transmission (ELRT) |

### WEIGHT

| | | |
|---|---|---|
| Approximate Dry Weight (Transmission) | 1503 kg | 3,314 lb |
| Approximate Dry Weight (Torque Converter) | 386 kg | 851 lb |




Images shown for reference only

## TORQUE CONVERTER OPTIONS

| | |
|---|---|
| Series | TC45, TC46, TC53 with Lock-Up Clutch |
| Stall Torque Ratio Range | 2.29-3.08 |

## AUXILIARY PUMP DRIVES ON TORQUE CONVERTER (OPTIONAL)

| | |
|---|---|
| Up to 2 PTOs Integral Live Drive From Input Shaft | |
| Location | 1:00 and 11:00 |
| Mountings | Up to 1 Front-Facing Mounting Pad / Up to 2 Rear-Facing Mounting Pads |
| Rated Torque | 37 kW / 50 hp (Each) |

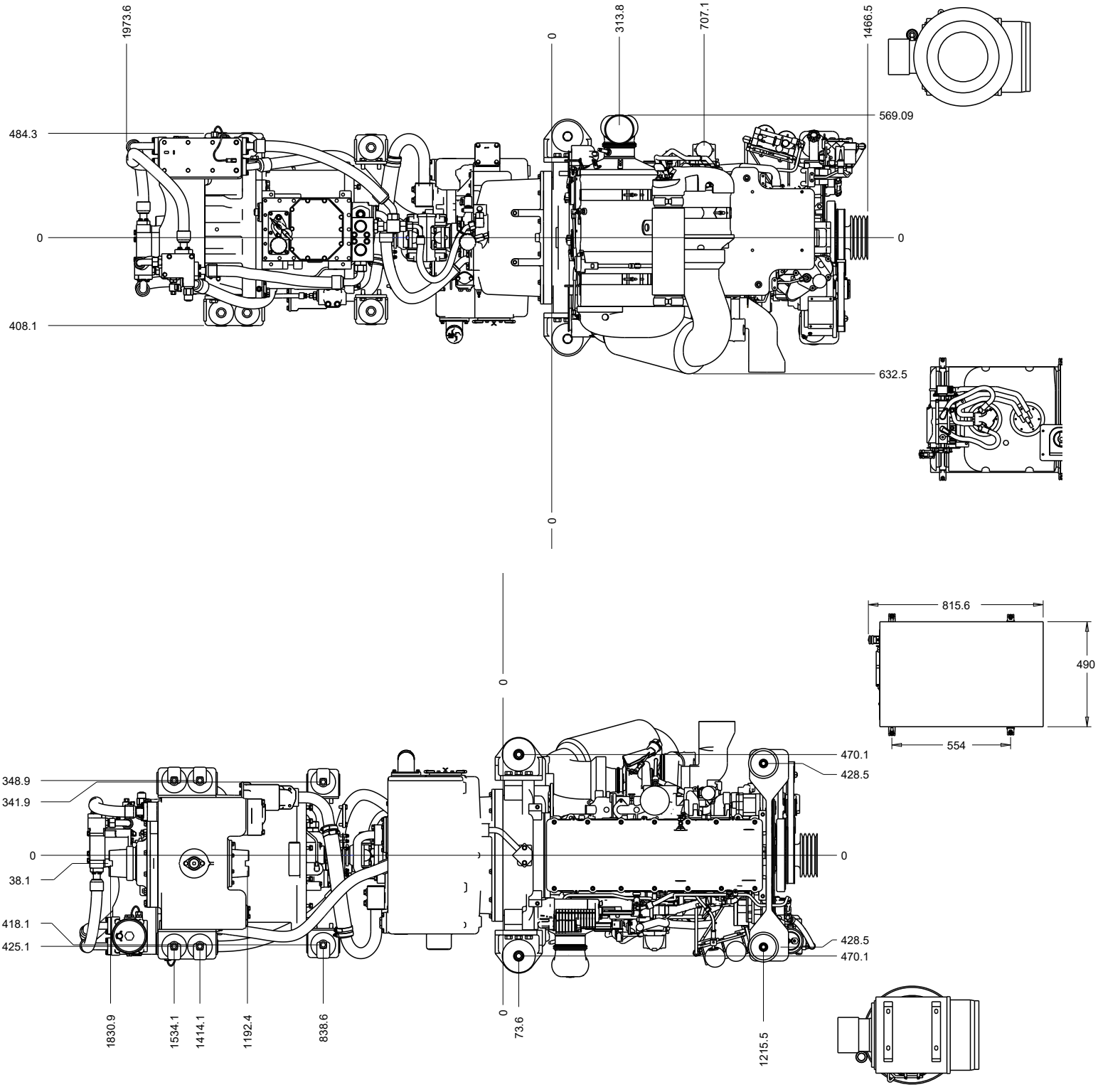
## OIL SYSTEM

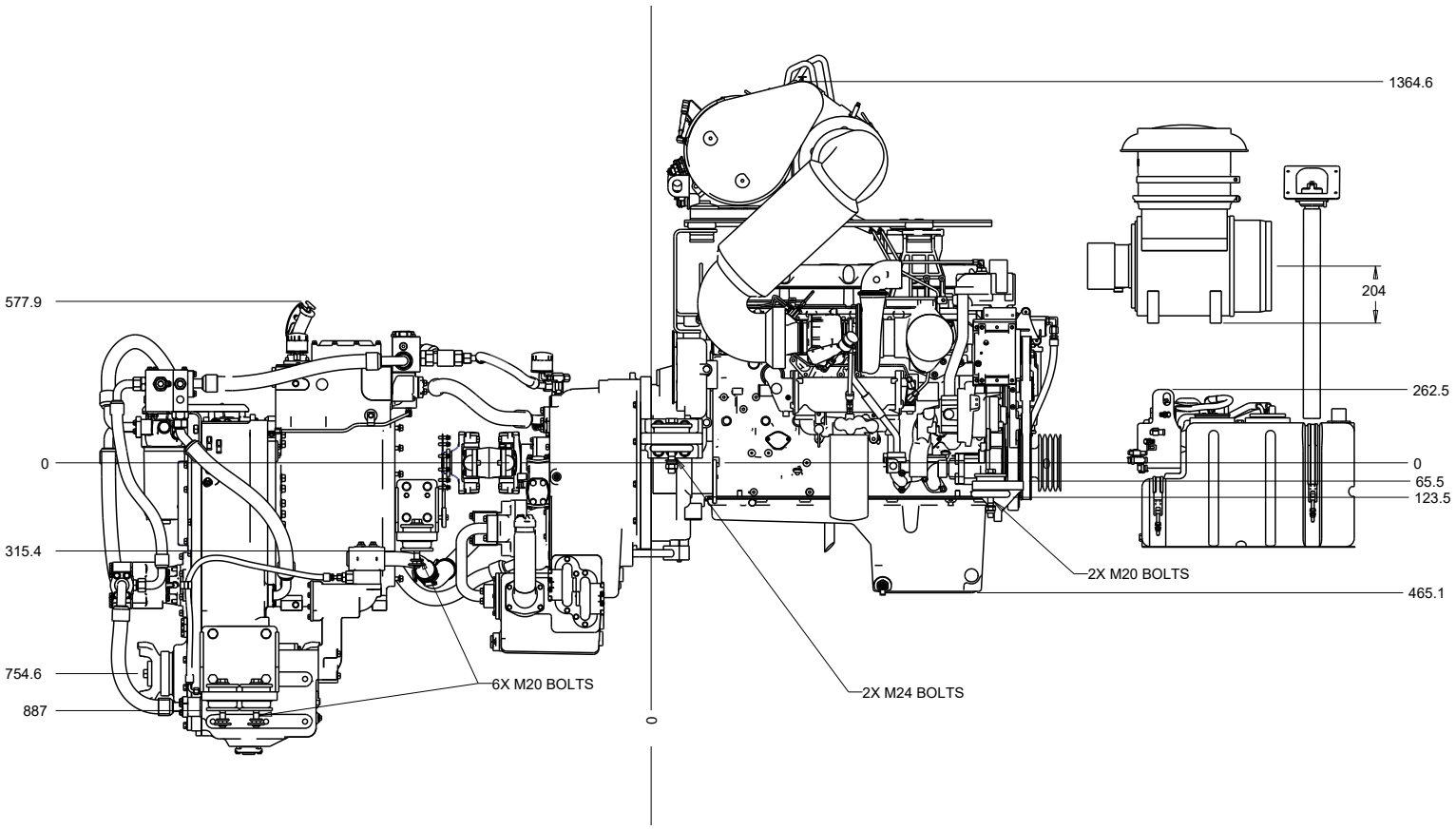
| | | |
|---|---|---|
| Oil | Transmission/Drive Train Oil–4 (TDTO™) | |
| Sump Oil Temperatures | Continuous: 95°C (203°F)<br>Max. Intermittent: 116°C (241°F)<br>Max. Converter Outlet Temperature: 124°C (255°F) | |
| Hydraulic Fill Capacity | 95 L | 20.9 gal |
| Filter Type | 8-Micron Paper Cartridge, Remote Mounted | |

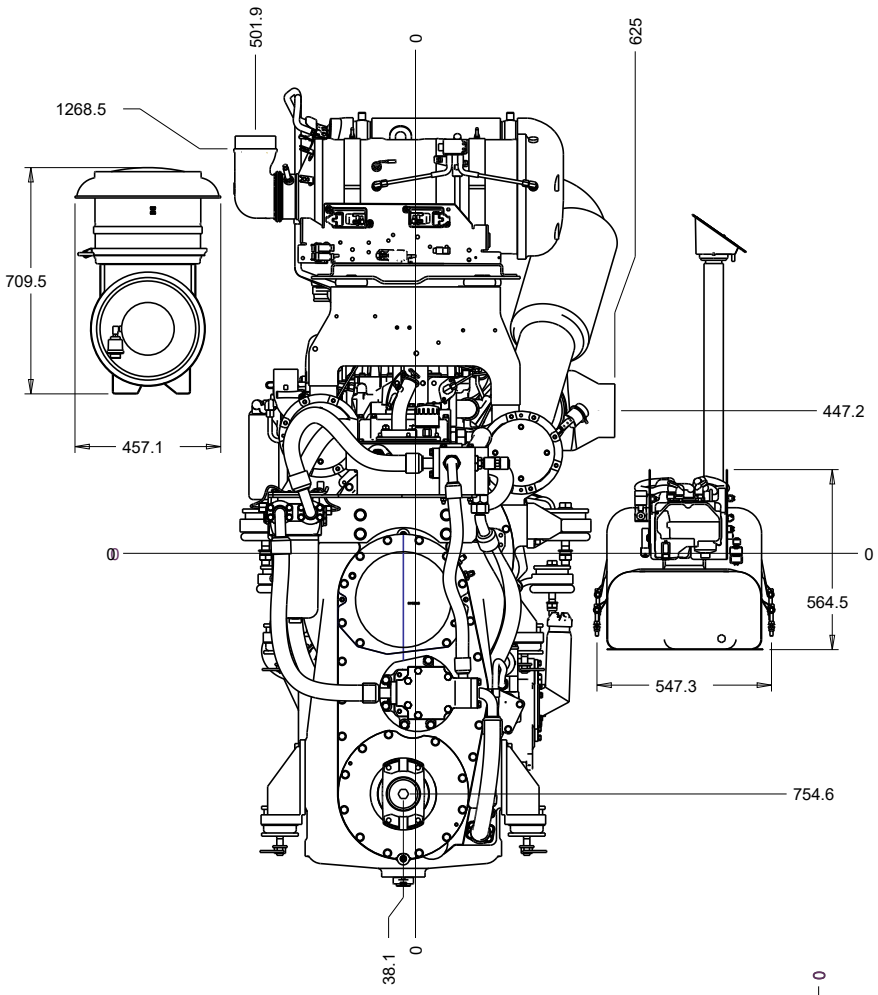
## GEAR RATIOS (STANDARD)

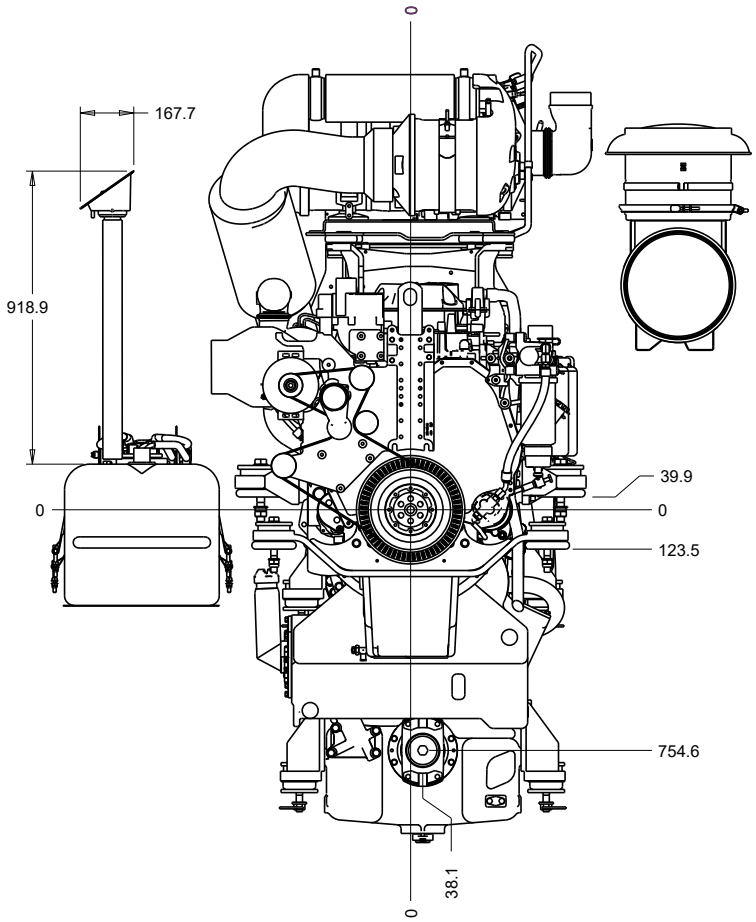
| | | |
|---|---|---|
| Forward | 1F<br>2F<br>3F<br>4F | 5.945<br>3.323<br>1.867<br>1.057 |
| Reverse | 1R<br>2R<br>3R<br>4R | -5.675<br>-3.172<br>-1.782<br>-1.009 |

# DIMENSIONS


1973.6
0
313.8
707.1
1466.5
484.3
569.09
0
0
408.1
632.5
0
815.6
490
554
0
348.9
341.9
0
38.1
418.1
425.1
470.1
428.5
0
428.5
470.1
1830.9
1534.1
1414.1
1192.4
838.6
0
73.6
1215.5


1364.6
204
262.5
577.9
0
65.5
123.5
315.4
2X M20 BOLTS
465.1
754.6
6X M20 BOLTS
887
2X M24 BOLTS
0


501.9
0
625
1268.5
709.5
457.1
447.2
0
0
564.5
547.3
754.6
38.1
0


0
167.7
918.9
0
39.9
0
123.5
754.6
38.1
0




SERVICE & SUPPORT

# WE'RE PREPARED WITH EVERYTHING YOU NEED.

**By supporting your engine and operations, the Cat dealer network protects your relationship with your customers.**

- Market-leading warranty
- Common service tooling and parts stock coverage
- Industry-leading parts availability
- Extended Service Contracts
- Customer Value Agreements
- Cat® Financial
- Reman options and Cat® Certified Rebuild programs

## REMOTE ASSET MONITORING SERVICES THAT MAKE A DIFFERENCE

Combining equipment, technology, and services to help build your success.

### CONNECT WITH MORE VALUE, LESS STRESS.

**Increase Uptime and Reduce Operating Costs**

- Know the location, health, and efficiency of your equipment
- Advanced Proactive Diagnostics
- Receive expert recommendations
- Reduce costs through preventive maintenance, fleet optimization, and equipment lifecycle management

**Now there's an easier way to monitor and manage your assets, no matter where they're located.**

Enroll in connected services, and let our expertise turn your data into insights that can improve your profitability.



# CAT® POWER MODULES

## C13B & TR43-M44



**For more information, contact OEM Solutions:**
oem_solutions@cat.com | www.cat.com/oemsolutions

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