BUILT FOR THE NEXT GENERATION

CAT® TIER 4 FINAL TECHNOLOGIES
With millions of working hours on tens of thousands of units since the Tier 4 Interim product introductions, you can be confident in the quality and value of your Cat® Tier 4 Final investment.

At Caterpillar, we know you’re under constant pressure to do more work at a lower total cost with less environmental impact. Our Tier 4 Final solutions help you do that. We redesigned the product line from the inside out at Tier 4 Interim to accommodate our Tier 4 Final solution. The result is a new generation of engines that meets your high expectations for reliability, performance, fuel efficiency and component life, while producing significantly fewer emissions.

**Systems integration boosts power, saves fuel**

Caterpillar product designers work collaboratively, using advanced modeling and analysis tools to integrate components, systems, electronics and aftertreatment technologies. Our integration experience allows us to optimize power, fuel economy and emissions reduction.

**Integrated manufacturing improves quality**

Our position as the largest vertically integrated manufacturer in our business gives us the power to build premium-quality products. We integrate manufacturing advancement into product designs and use common production processes across the manufacturing base. As a result, we can deliver exceptional quality right from the start.
Tier 4 Final Emissions Reduction
Cat Tier 4 Final engines meet stringent emissions standards and deliver the performance and efficiency that successful businesses demand.

Like all manufacturers of diesel engines, Caterpillar is required to deliver engines that meet government emissions standards that have been phased-in throughout the United States, Canada, Japan and the European Union.

Cleaner Fuel & Oils
The emission regulations require the use of Ultra Low Sulfur Diesel Fuel (ULSD), which contains ≤ 15 parts per million sulfur (mg/kg) as well as low sulfated ash oil in Tier 4 Final engines.
More Powerful, Reliable Engine Electronics

The electronics used in Cat Tier 4 Final engines are more powerful and robust than ever.

- Increased features and connection commonality improve the customer experience and increase quality and reliability.
- Over-foam wiring harness adds to reliability even in the most demanding applications.

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Innovative Air Management

Cat Tier 4 Final engines feature innovative air-management systems that optimize airflow and enhance power, efficiency and reliability. We apply a range of simple, reliable turbocharging solutions, based on engine size and application. This allows us to match turbo performance to rated output for high productivity, excellent fuel efficiency, long life and low operating costs.

Next Generation Fuel System Options

As a key component of Cat Tier 4 Technology, injection timing precisely controls the fuel injection process through a series of carefully timed microbursts. This injection timing provides more control of combustion for the cleanest, most efficient fuel burn. To maximize customer value, Caterpillar engineers specified fuel systems based on the power and performance demands for each engine.

- High-Pressure Common Rail Fuel System with full electronic injection improve precision and control that boost performance and reduce soot for the C7.1 ACERT and C9.3 ACERT.
- Advanced MEUI-C™ injector platforms handle increased injection pressures and more precise fuel rates. These durable injectors enhance responsiveness while controlling soot in the C13 ACERT, C15 ACERT, C18 ACERT, C27 ACERT and C32 ACERT.

Proven Tier 4 Technology

Caterpillar designed Tier 4 Interim products with Tier 4 Final standards in mind. By planning ahead, we were able to minimize design changes and deliver the reliability and performance you demand. Every Tier 4 Final engine is equipped with a combination of proven electronic, fuel, air and aftertreatment components, based on engine size, application and the geographic location in which it will work. Applying proven technologies systematically and strategically lets us meet your high expectations for productivity, fuel efficiency, reliability and service life. The right technologies fine-tuned for the right applications results in:

- Improved Fluid Efficiency: Up to 5% improvement over Tier 4 Interim products (including Diesel Exhaust Fluid consumption).
- High Performance: Across a variety of applications.
- Enhanced Reliability: Through commonality and simplicity of design.
- Maximized Uptime and Reduced Cost: With world-class support from the Cat® Dealer Network.
- Minimized Impact: Of Emission Systems: Designed to be transparent to the operator without requiring interaction.
- Durable: Designs with long life to overhaul.
- Delivering: Better fuel economy with minimized maintenance costs while providing the same great power and response.

High Pressure Common Rail Fuel System

Air Management and Cat NOx Reduction System
Clean Emissions Module (CEM)
The CEM protects interior components, minimizes the aftertreatment footprint and simplifies maintenance.

Ammonia Oxidation Catalyst (AMOX)
In order to ensure sufficient NOx reduction, a small amount of excess Diesel Exhaust Fluid (DEF) is injected into the exhaust stream. This excess DEF may pass through the Selective Catalytic Reduction (SCR) catalyst as ammonia. To prevent excess ammonia from entering the atmosphere, the exhaust gas flows through an Ammonia Oxidation Catalyst (AMOX) where the ammonia reacts with oxygen in the presence of this catalyst to form nitrogen and water.

Selective Catalytic Reduction (SCR)
The SCR system consists of a SCR catalyst, AMOX and the Pump Electronics Tank Unit (PETU). This system uses a small amount of Diesel Exhaust Fluid (DEF) to convert NOx emissions in the exhaust into nitrogen and water. No major redesign was necessary to accommodate this system into Cat machines as the space claim required did not change from our Tier 4 interim design.

- DEF is a solution of urea dissolved in deionized water to produce a concentration that is about 1/3 urea and 2/3 water. DEF used in Cat engine systems must meet the requirements outlined in ISO 22241-1.

Diesel Particulate Filter (DPF)
A DPF traps particulate matter that’s carried in the exhaust stream, preventing it from being released into the atmosphere. Inside the DPF, particulate matter, sometimes referred to as “soot,” is trapped until it is oxidized during regeneration.

Diesel Oxidation Catalyst (DOC)
The DOC uses a chemical process to reduce hydrocarbons and carbon monoxide in the exhaust stream. No maintenance is required because the DOC is a “flow-through” device.

Pump Electronics Tank Unit (PETU)
The PETU is responsible for storing, controlling and supplying the appropriate quantity of Diesel Exhaust Fluid from the DEF tank to the DEF injector. The Diesel Exhaust fluid is used by the SCR system to reduce NOx emissions in the exhaust.
REAL STORIES, REAL RESULTS
WHAT CUSTOMERS ARE SAYING ABOUT CATERPILLAR’S TIER 4 SOLUTION

“‘The difference-maker of the Cat machine is the fuel efficiency of it. Compared to other competitors that we tried, it’s easily hands-down better than what I’d seen of our competitors.”

DERREK HENRY  PEKIN SAND AND GRAVEL

“‘There is absolutely, from an operator’s standpoint, no change, no difference. I couldn’t tell you that (Tier 4) was there.’

DAVID BOYER  STARK EXCAVATING

“‘We don’t worry about the regen capability at all with the Tier 4 we have on this project. It’s in automatic mode and it just takes care of itself the whole time.’

Regarding Regeneration:  “Just keep running the tractor without paying attention to it. It takes care of itself.”

SHAWN HENRY  PEKIN SAND AND GRAVEL

“‘I don’t know how you can improve on this one. It’s the best.’

“I could hire a guy today and he would never even know the machine was going to regen if I didn’t tell him.’

SHAWN HENRY  PEKIN SAND AND GRAVEL

Regarding Regeneration:  “If you buy the Cat, you don’t have to worry about it.”

JEREMY LIVENGOOD  STARK EXCAVATING

“‘Tier 4 is completely providing the performance that we’ve always got from Cat products.’

‘I put all of them to the test. And Cat...by far...by far...beat them in every aspect you can think of.’

Shawn Henry  PEKIN SAND AND GRAVEL

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JEREMY LIVENGOOD  STARK EXCAVATING
We believe that part of our commitment to our customers is to understand your needs and your business. We know that maintenance, service and support are critical not just to power and performance but to achieving the lowest total cost of ownership. Your Cat dealer is dedicated to delivering value for the life of your machine.

World-class Service and Support
The Cat® Dealer Network supports your machine and your operations.

The parts commonality built into the Tier 4 Final line of machines enables common service tooling and parts stock coverage, further enhancing the value that product support can deliver. With industry-leading parts availability, cost-saving Reman options and Cat® Certified Rebuild programs, you can keep your machine performance high and your operating costs lower.

Cat dealers also offer Customer Support Agreements and fleet and business management expertise that can help you reduce overall costs and manage your business even more effectively...

Basic oil and filter change intervals remain at 500 hours. Engines are required to use Ultra Low Sulfur Diesel (ULSD) fuel and also accommodate up to B20 biodiesel when blended with ULSD.*

New emissions standards drive new service intervals and maintenance activity:

CEM aftertreatment is designed with a removable center section to allow easy access to the DPF for ash servicing.

- DPF ash servicing:
  - Maintenance free (C7.1 ACERT)
  - 5,000 hours (C9.3)
  - DPF clean and replace
  - Cat Reman DPF

*Refer to Caterpillar Machine Fluids Recommendations SE B6250 for more information.

Controlling owning and operating costs is one of your highest priorities. That’s why Caterpillar engineers designed Tier 4 Final products to work efficiently and economically over a long life cycle. Testing and analysis results for Tier 4 Final products, along with customer feedback, confirm that operating costs have been reduced across the product line. This reduction is due to improvements in fluid efficiency and serviceability, both of which offset the costs associated with aftertreatment maintenance.
## TIER 4 FINAL ENGINE PRODUCT LINE

For more information on these technologies see pages 8 and 9.

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<thead>
<tr>
<th>Power</th>
<th>Fuel System</th>
<th>Air System</th>
<th>NOx Reduction Technology</th>
<th>PM Reduction Technology</th>
<th>Regeneration Technology</th>
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<tbody>
<tr>
<td>89–225 bkW</td>
<td>Common Rail</td>
<td>Single or Series Turbochargers</td>
<td>Cat NOx Reduction System** and Selective Catalytic Reduction*</td>
<td>DOC/DPF***</td>
<td>Passive Regeneration with backpressure valve</td>
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<td>(120–302 bhp)</td>
<td>180–251 bkW</td>
<td>High-Efficiency Turbocharger</td>
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<td>267–380 bkW</td>
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<td>(358–510 bhp)</td>
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</tbody>
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* Also referred to as SCR
** Also referred to as NRS
*** Diesel Oxidation Catalyst/Diesel Particulate Filter
**** Also referred to as DOS
For reliable performance, long life, excellent fuel efficiency and reduced emissions, see your Cat dealer and choose Cat Tier 4 Final machines. Let us help you meet your economic and environmental objectives, so you can build an even stronger business...today and in generations to come.