

Off-Highway Diesel Engines

Final Tier 4/Stage IV



JOHN DEERE

Power behind your productivity



John Deere is the power behind your productivity

Feel the performance

John Deere power responds to your every command. It gives you low-end torque to attack heavy loads without stalling or lugging the engine. Fast transient response keeps up with your operators and your operations, while our compact engine designs give you maximum power density.

Run with confidence

John Deere engines start when you need them, work reliably in tough conditions, and help you complete critical jobs on schedule. You also get warranty service wherever you go from a vast John Deere support network that includes more than 4,000 service locations, qualified technicians, and fast delivery of genuine John Deere parts.

You can keep an eye on your machines even when you're not on site. John Deere PowerSight™ technology solutions* integrate OEM engines with the latest monitoring tools to let you remotely track machine location, monitor engine conditions, and perform engine diagnostics.

Manage your bottom line

With low operating costs and proven efficiency, John Deere engines earn their way into your business. John Deere Final Tier 4/Stage IV engines demonstrate lower total fluid consumption compared to the previous Tier. Longer service intervals save you time and money on maintenance. Plus, John Deere engines are known for their long-lasting durability and extra value when it comes time to sell or trade your equipment.

*Not available in all countries.

The benefits of choosing John Deere engines

Experience improved fluid efficiency

If your engine manufacturer isn't talking about diesel exhaust fluid (DEF) consumption, they may not be telling you the total efficiency story. John Deere Final Tier 4/Stage IV engines not only reduce diesel fuel consumption, but they demonstrate exceptionally low DEF consumption as well.

John Deere Final Tier 4/Stage IV engines operate efficiently with ultra-low sulfur diesel as well as B5 to B20 blends, providing optimal performance and fuel-choice flexibility.

Proven off-highway experience

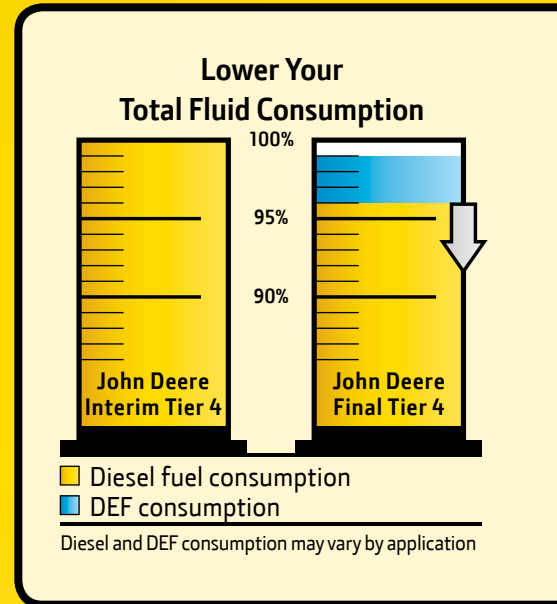
John Deere has millions of hours of field experience with off-highway engine technologies.

- More than 20 million operating hours with series turbocharging
- More than 22 million operating hours with aftertreatment technologies
- More than 100 million operating hours with variable geometry turbocharging (VGT) and cooled exhaust gas recirculation (EGR)
- More than 200 million operating hours with high-pressure common-rail fuel systems

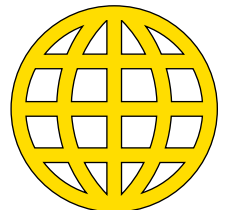
Fully supported

The proven John Deere dealer network of over 4,000 service locations is prepared to fully support customers and their Final Tier 4/Stage IV engines. Experience the power of a worldwide engine support network only from John Deere.

- Superior engineering
- Qualified technicians
- A warranty you can count on
- Fast parts delivery
- Genuine John Deere parts



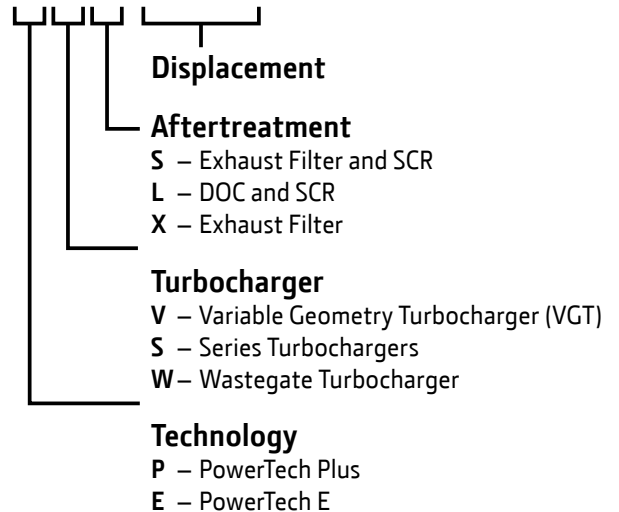
4,000+
SERVICE LOCATIONS
WORLDWIDE





Final Tier 4/Stage IV engine identification

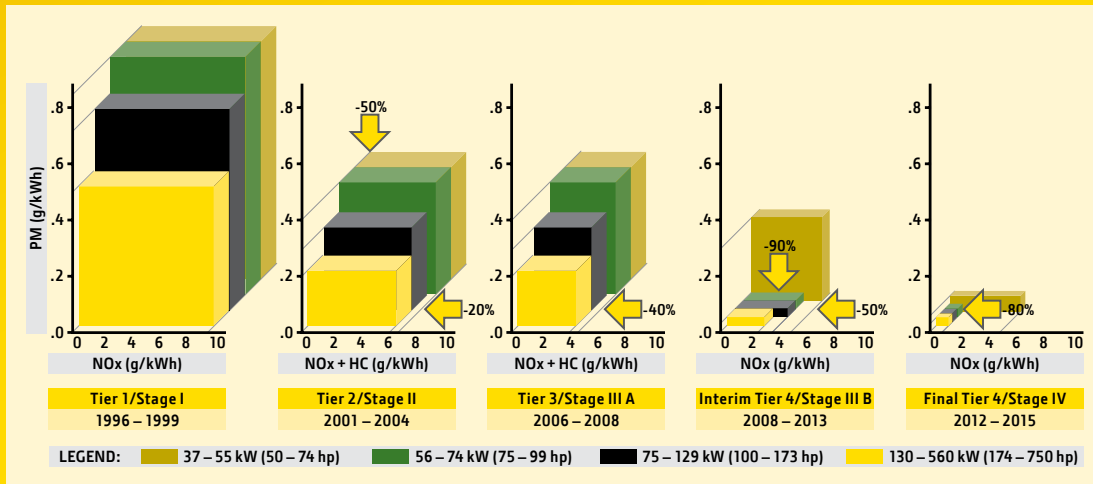
PowerTech PSS 6.8L



Meeting Final Tier 4/Stage IV regulations

John Deere is continuously developing and testing technologies to meet emissions regulations. To meet the additional 80 percent reduction in NOx required by Final Tier 4/Stage IV regulations, we added a selective catalytic reduction (SCR) system to our proven PowerTech™ engine platform in engines 56 kW (75 hp) and above. We'll continue to tailor our Final Tier 4 engine solutions to fit the variety of off-highway applications and customer requirements.

EPA and EU nonroad emissions regulations: 37 – 560 kW (50 – 750 hp)



NOx – Nitrogen oxides, which react in the atmosphere with hydrocarbons
 HC – Hydrocarbons, a by-product of combustion
 PM – Particulate matter, a non-gaseous product of combustion

Industrial Engine Power Ratings

Engine	Power Ratings	Turbocharging	Cooled EGR	Exhaust Filter	PM Aftertreatment	SCR	Power Range
PowerTech EWX 2.9L	36 – 55 kW (48 – 74 hp)	Wastegate	No	Yes	DOC/DPF	No	37-55 kW (50-74 hp)
PowerTech EWX 4.5L	55 kW (74 hp)	Wastegate	No	Yes	DOC/DPF	No	55 kW (74 hp)
PowerTech PWL 4.5L	63 – 104 kW (85 – 140 hp)	Wastegate	Yes	No	DOC	Yes	63-104 kW (85-140 hp)
PowerTech PSS 4.5L	93 – 129 kW (125 – 173 hp)	Series	Yes	Yes	DOC/DPF	Yes	93-129 kW (125-173 hp)
PowerTech PVS 6.8L	104 – 187 kW (140 – 250 hp)	VGT	Yes	Yes	DOC/DPF	Yes	104-187 kW (140-250 hp)
PowerTech PSS 6.8L	168 – 224 kW (225 – 300 hp)	Series	Yes	Yes	DOC/DPF	Yes	168-224 kW (225-300 hp)
PowerTech PSS 9.0L	187 – 317 kW (250 – 425 hp)	Series	Yes	Yes	DOC/DPF	Yes	187-317 kW (250-425 hp)
PowerTech PSS 13.5L	309 – 448 kW (414 – 600 hp)	Series	Yes	Yes	DOC/DPF	Yes	309-448 kW (414-600 hp)

kW 0 37 75 112 149 186 224 261 298 336 373 410 448
 hp 0 50 100 150 200 250 300 350 400 450 500 550 600



Questions about emissions technology?

Our Frequently Asked Questions page is a great place to start. For even more detailed information, contact your John Deere engine distributor or dealer.

JohnDeere.com/tier4FAQ



Integrated Emissions Control system

The John Deere Integrated Emissions Control system for Final Tier 4/Stage IV is optimized to meet emissions regulations while delivering improved performance, uptime, and efficiency.

To meet increasingly stringent emissions regulations, John Deere has followed a carefully planned approach. We have systematically adopted new technologies and integrated them with our field-proven solutions to meet each regulatory tier.

The downstream DPF forces exhaust gases to flow through porous channel walls, trapping and holding the remaining PM. During normal operating conditions (temperature, load, and speed) the engine's natural heat breaks down the PM and cleans the exhaust filter. An exhaust filter also has the benefit of replacing the muffler in most applications.

Final NOx reduction through SCR

We use selective catalytic reduction (SCR) combined with our proven engine platform to achieve Final Tier 4/Stage IV emissions compliance. This technology utilizes a urea-based additive, sometimes referred to as diesel exhaust fluid (DEF) to reduce NOx — converting it to nitrogen and water vapor.

Why did John Deere wait to deploy SCR? We didn't need it before now. Our advanced cooled EGR system met all previous NOx requirements without the need for SCR and a second fluid. We are adding SCR at a time when the infrastructure for DEF is more established. SCR has been successfully used in on-highway applications, and the components are now more developed for off-highway applications.



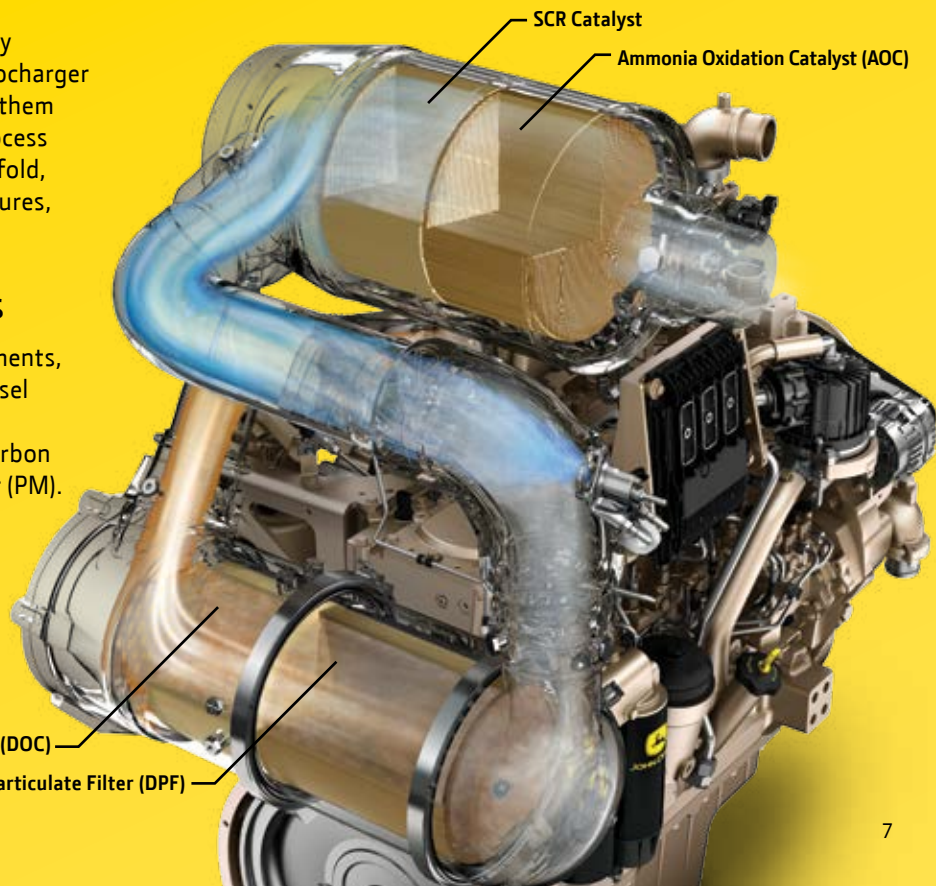
Cooled EGR system

NOx reduction through cooled EGR

John Deere was the first engine manufacturer to widely commercialize cooled EGR and variable geometry turbocharger technologies in off-highway applications, introducing them with the start of Tier 3/Stage III A regulations. This process reroutes cooled exhaust gas back into the intake manifold, which reduces oxygen levels, lowers exhaust temperatures, and reduces levels of NOx.

PM reduction through exhaust filters

To achieve Interim Tier 4/Stage III B emissions requirements, we added a catalyzed exhaust filter that contains a diesel oxidation catalyst (DOC) and a diesel particulate filter (DPF). The DOC reacts with exhaust gases to reduce carbon monoxide, hydrocarbons, and some particulate matter (PM).



Diesel Oxidation Catalyst (DOC)

Diesel Particulate Filter (DPF)

PowerTech EWX

Compact, powerful, and cost-effective

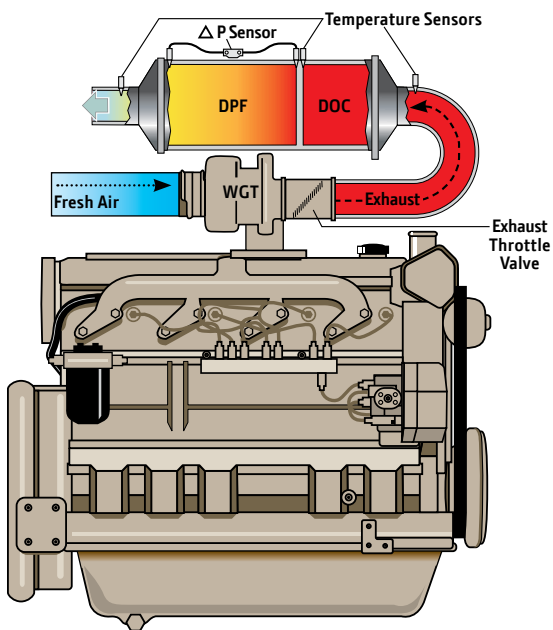
Our straightforward PowerTech EWX 2.9L and 4.5L engines have 2-valve cylinder heads, high-pressure common-rail fuel systems, full authority electronic controls, and proven exhaust filters. These compact, cost-effective engines don't require cooled EGR or SCR. They use simple wastegate turbocharging to maintain transient response and peak torque in all operating conditions.



PowerTech EWX Engines

PowerTech EWX 2.9L	36 – 55 kW (48 – 74 hp)
PowerTech EWX 4.5L	55 kW (74 hp)

PowerTech EWX Final Tier 4 technology



PowerTech EWX engines meet Final Tier 4 and Stage III B regulations.
PowerTech EWX 4.5L engine configuration shown.

PowerTech PWL

Efficiency, performance, and simplicity

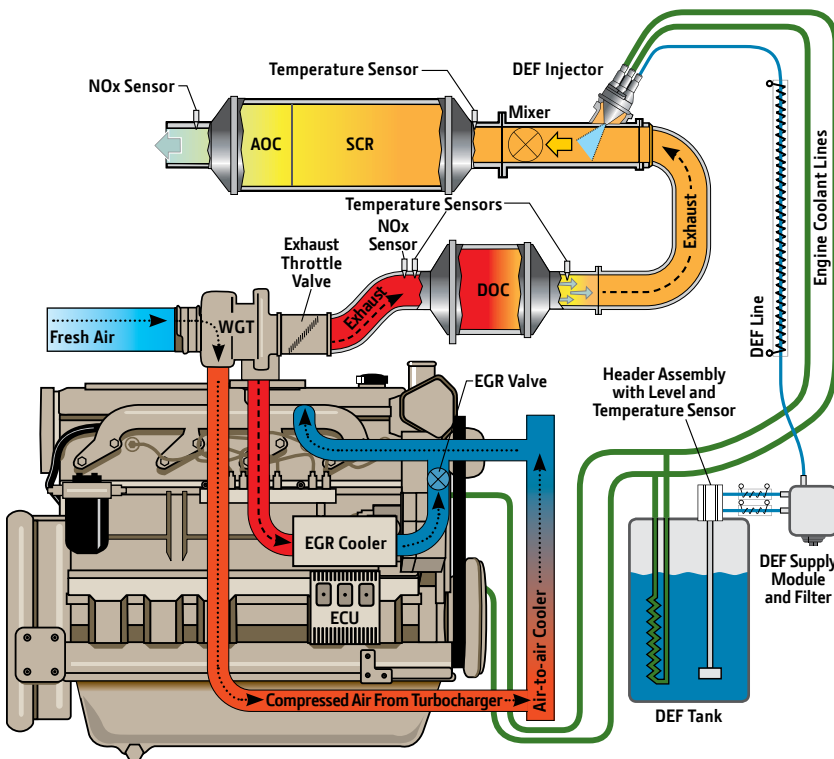
Our PowerTech PWL 4.5L engines combine advanced combustion technologies, enhanced engine calibration, and simple wastegate turbocharging. Pairing our proven PowerTech Plus technology with a DOC and SCR system, these engines offer a compact power solution. PowerTech PWL engines produce near-zero levels of PM without a filter thanks to an optimized combustion system and engine calibration. Remaining PM and other hydrocarbons are oxidized passively in a flow-through DOC without the need for regeneration.



PowerTech PWL Engines

PowerTech PWL 4.5L 63 – 104 kW (85 – 140 hp)

PowerTech PWL Final Tier 4 technology



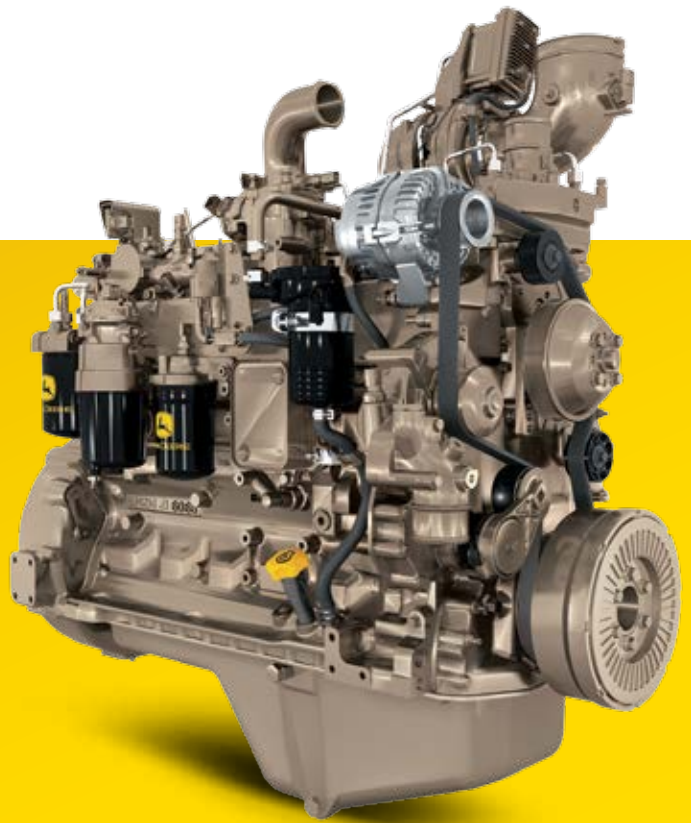
Wastegate turbocharger

Wastegate turbochargers are designed to develop more airflow at lower engine speeds to improve low-speed torque. The wastegate control device bleeds off a portion of the exhaust flow at higher engine speeds. Wastegate turbos deliver improved transient response and higher peak torque without compromising engine envelope size.

PowerTech PVS

More power, torque, and fluid economy

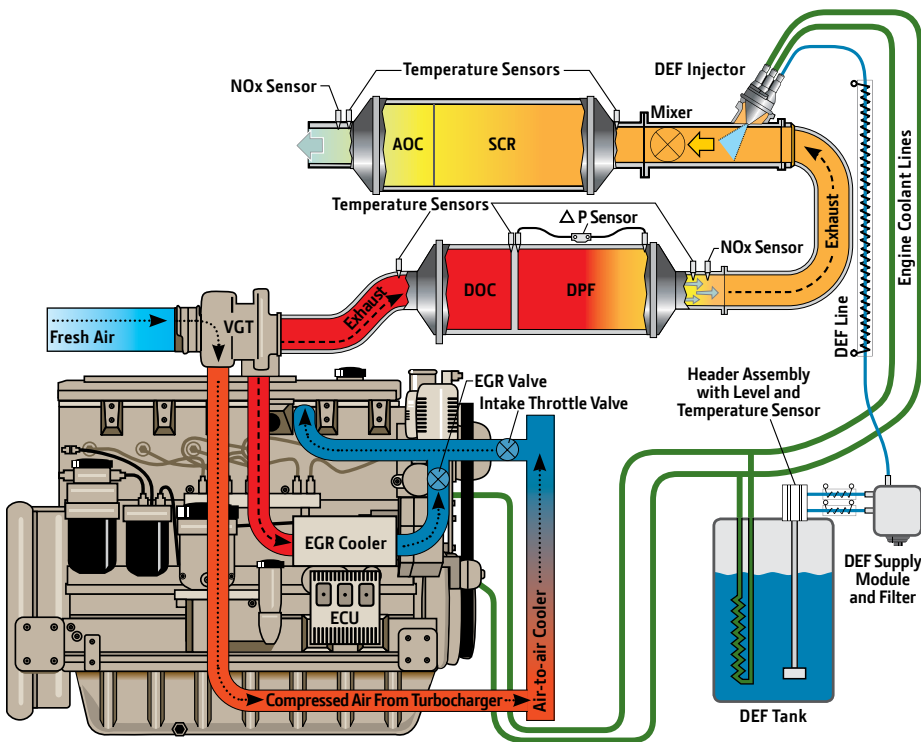
PowerTech PVS 6.8L engines provide reliable power for a wide range of applications. They utilize our proven PowerTech Plus technology with variable geometry turbocharging (VGT) and an SCR system to improve combustion efficiency, reduce emissions, enhance performance, and improve fluid economy.



PowerTech PVS Engines

PowerTech PVS 6.8L	104 – 187 kW (140 – 250 hp)
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PowerTech PVS Final Tier 4 technology



Variable geometry turbocharger

VGT tailors the amount of recirculated exhaust gas that mixes with the fresh air. Precise electronic controls open or close the variable vanes in the turbocharger depending on engine load and speed. The optimized airflow generates more boost while maximizing low-speed torque, accelerated response, peak torque, and fluid economy.

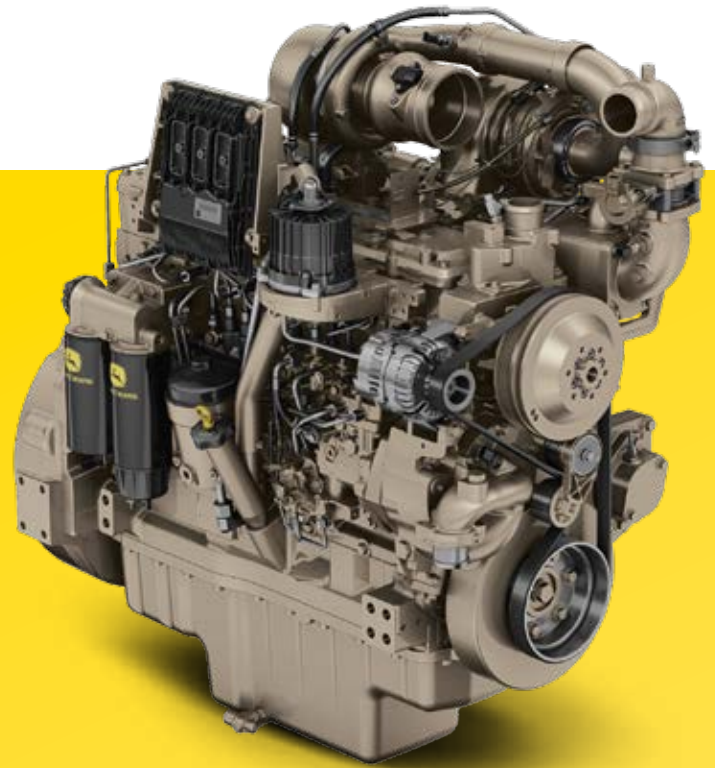


VGT delivers power and efficiency

PowerTech PSS

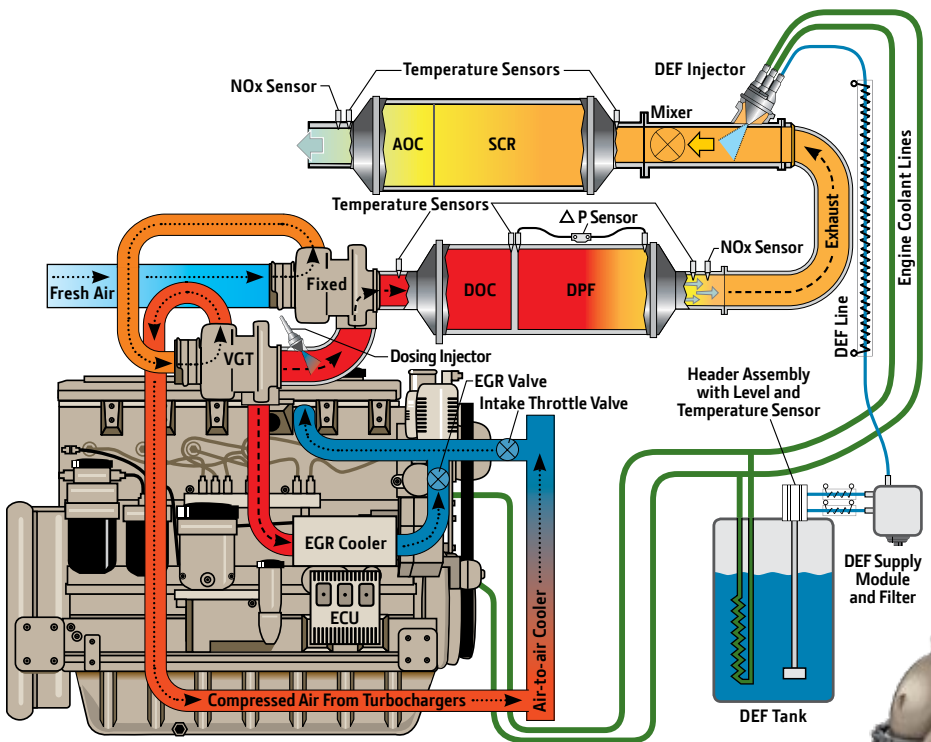
Best power density, performance, and fluid efficiency

For ultimate performance in off-highway applications, PowerTech PSS 4.5L, 6.8L, 9.0L, or 13.5L engines can do almost any job. They can handle steep grades at high altitudes and deliver faster acceleration without lugging. Along with proven PowerTech Plus technology and an SCR system designed specifically for off-highway applications, all displacements feature series turbochargers that improve performance and responsiveness.



PowerTech PSS Engines	
PowerTech PSS 4.5L	93 – 129 kW (125 – 173 hp)
PowerTech PSS 6.8L	168 – 224 kW (225 – 300 hp)
PowerTech PSS 9.0L	187 – 317 kW (250 – 425 hp)
PowerTech PSS 13.5L	309 – 448 kW (414 – 600 hp)

PowerTech PSS Final Tier 4 technology



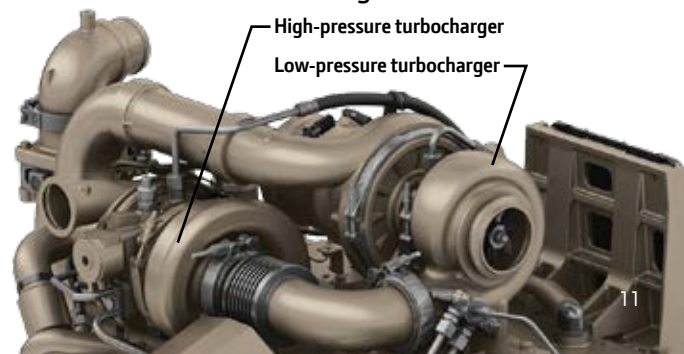
PowerTech PSS 9.0L and 13.5L engine configuration shown.

Two are better than one

Series turbocharging delivers higher power density, improved low-speed torque, and improved high-altitude operation. By splitting the compression of the charge air between two turbochargers, both can operate at peak efficiency and at slower rotating speeds. This lowers stress on turbocharger components and improves durability.

Here's how series turbocharging works. Fresh air is drawn into the low-pressure turbocharger (fixed geometry), where air pressure is boosted. This pressurized or boosted air is then drawn into the high-pressure turbocharger (VGT or WGT), where air intake pressure is further raised. The high-pressure air is then routed to an air-to-air aftercooler, where the air is cooled and then routed to the engine's intake manifold.

Series turbochargers



Aftertreatment operation and maintenance

Continuous exhaust filter cleaning

The John Deere exhaust filter is integrated into the engine design and electronics to provide a seamless operator experience. The engine control unit (ECU) and exhaust temperature management (ETM) system work together to continuously regenerate the exhaust filter using a natural cleaning process sometimes referred to as passive regeneration. If natural filter cleaning cannot be achieved based on temperature, load, and speed, then PM must be removed using an automatic cleaning process, sometimes referred to as active regeneration. In most cases, filter cleaning does not impact machine operation or require operator involvement. Higher pressures created by our Final Tier 4/Stage IV high-pressure fuel system extend intervals between automatic cleanings.

Extended ash service interval

Ash, which is a by-product of inorganic solids found in engine oils and fuel additives, will eventually accumulate in the DPF and reduce filter performance.

Field experience has shown that John Deere DPFs in many applications can run as long as 15,000 hours before needing ash service. That's more than three times the minimum — meaning less hassle, less maintenance costs, and more uptime.

If or when you eventually need ash service, there are several options for ash removal. See your John Deere engine distributor or dealer for details.

Engine oils, diesel fuels, and DEF

Engine oil type and diesel fuel have always played a role in emissions. For Final Tier 4/Stage IV, operators also need to be mindful of the use of diesel exhaust fluid (DEF).

With the introduction of exhaust filters, the type of engine oil used can have a significant impact on the proper functioning and ash service life of these devices. Ash, a by-product of inorganic solids, will collect in the exhaust filter over time as a result of the combustion process. The use of oils meeting API CJ-4 and ACEA E9 standards, both with reduced trace metals content, are required in order to reduce ash accumulation and increase exhaust filter service life for Final Tier 4/Stage IV engines.

The type of diesel fuel used can also have a significant impact on emissions control devices. The EPA requires the use of diesel fuel with a sulfur content of less than 15 ppm (ultra-low sulfur diesel or ULSD) in Tier 4 engines, and the EU requires a sulfur content of less than 10 ppm in Stage IV engines. Diesel fuels with higher sulfur content can damage aftertreatment components.

DEF is used in SCR systems to remove NOx from engine exhaust. The best way to ensure you are getting high-quality DEF is to purchase DEF through your John Deere dealer.



Packaging will vary worldwide.

Acronyms used in this brochure

AOC	Ammonia oxidation catalyst
DEF	Diesel exhaust fluid
DOC	Diesel oxidation catalyst
DPF	Diesel particulate filter
ECU	Engine control unit
EGR	Exhaust gas recirculation
ETM	Exhaust temperature management
NOx	Nitrogen oxides
OEM	Original equipment manufacturer
PM	Particulate matter
ppm	Parts per million
SCR	Selective catalytic reduction
ULSD	Ultra-low sulfur diesel
VGT	Variable geometry turbocharger
WGT	Wastegate turbocharger



Questions about emissions technology?

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JohnDeere.com/tier4FAQ

Customer support



The power of a worldwide support network

With John Deere, you never have far to go to find expert assistance and advice. Get service when and where you need it at any of our 4,000+ service locations worldwide. For additional parts information or to find the nearest John Deere engine distributor or service dealer, visit JohnDeere.com/dealer.

Qualified John Deere technicians

Only John Deere service technicians have the expertise to ensure top performance of your John Deere engine. They receive ongoing training about the latest diagnostic and service techniques.

Fast parts delivery

You can count on genuine John Deere parts. Our worldwide parts distribution system has overnight delivery available in most areas of the world. For even faster service, our dealers keep many maintenance and replacement parts in stock to get you back to work quickly.

Application integration support

John Deere Power Systems is one of the few companies that integrate entire powertrain systems — from the engine and electronics to the drivetrain components. Our highly trained distributors have experience integrating engines, drivetrain components, and electronics into a wide variety of applications. We also provide equipment manufacturers with product and engineering support to maximize performance and fuel economy while meeting emissions regulations.

A warranty you can count on

Equipment operators can't afford downtime or unexpected repairs. That's why we offer a 2-Year/2,000-Hour Warranty, with unlimited hours in the first year, on our OEM industrial and marine engines. This warranty takes effect the date that the engine component is delivered to the first retail purchaser. In addition, extended warranties are available under certain conditions. Be sure to register your engine and take full advantage of the John Deere service and support network.



Scan this code to register online, or visit JohnDeere.com/warranty.

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With JDParts, shopping for replacement parts or maintenance products for your OEM engine just became as easy as opening your computer or using your smartphone. No matter the time of day or your location, JDParts gives you access to the parts you need in just a few clicks.

- Order online through your dealer 24/7/365
- Pick up orders as early as the next day from your John Deere OEM service dealer
- Available home delivery
- Access to complete parts catalog with product images
- Access to local John Deere OEM service dealer pricing and inventory



Uncompromising performance, when you need it most

To learn more about Final Tier 4 technologies and get an inside look at our engines, visit JohnDeere.com/tier4



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