

[ JOHN DEERE

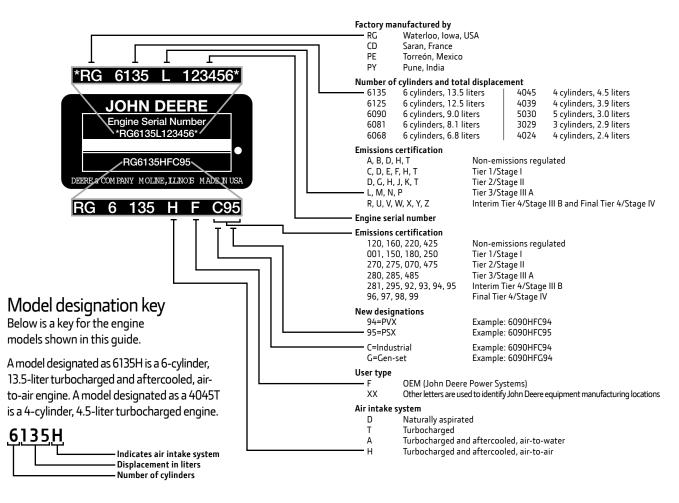
# Off-Highway **Diesel Engine Ratings** Interim Tier 4/Stage III B engines 130 kW (174 hp) and above



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# Engine identification plate



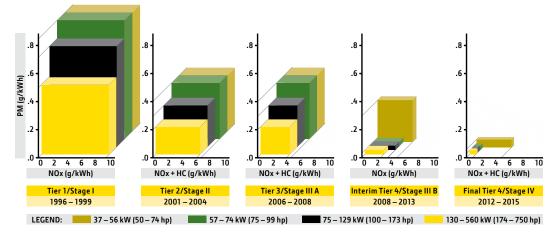
# **Emissions information**

The ultimate in performance, fuel economy, and emissions compliance is available with John Deere engines. To meet emissions regulations, John Deere worked closely with equipment manufacturers to identify engine technologies that best suited their needs.

John Deere engines comply with nonroad emissions regulations for the U.S. Environmental Protection Agency (EPA), the European Union (EU), and the California Area Resources Board (CARB).

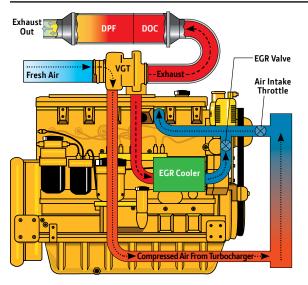


## EPA and EU nonroad emissions regulations: 37 – 560 kW (50 – 750 hp)



# PowerTech PVX 6.8L and 9.0L engines

### Interim Tier 4 PowerTech PVX technology



The concept behind EGR is simple. During certain conditions of engine operation, the EGR valve opens and measured amounts of exhaust gas are routed back into the intake manifold and mixed with the incoming fresh air. Since this process removes oxygen from the air, the exhaust temperatures in the combustion process are lowered and the levels of NOx are reduced.

### Variable geometry turbocharger (VGT)

Varies exhaust pressure based on load and speed to ensure proper EGR flow. The combination of the cooled EGR and VGT provide low-speed torque, quicker transient response, higher-peak torque, and world-class fuel economy.

# Cooled exhaust gas recirculation (EGR)

EGR cools and mixes measured amounts of cooled exhaust gas with incoming fresh air to lower peak combustion temperatures, thereby reducing NOx.

### **Exhaust filters**

These engines will utilize a catalyzed exhaust filter that contains a diesel oxidation catalyst (DOC) and a diesel particulate filter (DPF). Under normal operating conditions, the DOC reacts with exhaust gases to reduce carbon monoxide, hydrocarbons, and some particulate matter (PM). The downstream DPF forces exhaust gases to flow through porous channel walls, trapping and holding the remaining PM. Trapped PM is eventually oxidized within the DPF through a self-activating cleaning process called passive regeneration, utilizing exhaust heat created under normal operating conditions.

# High-pressure common-rail (HPCR) and engine control unit (ECU)

The HPCR fuel system provides variable common-rail pressure and higher injection pressures up to 1,975 bar (29,000 psi). It also controls fuel injection timing and provides precise control for the start, duration, and end of injection.

# 4-valve cylinder head

The 4-valve cylinder head provides excellent airflow resulting in greater low-speed torque and better transient response time by utilizing a cross-flow design (6.8L) and a U-flow design (9.0L).

# Air-to-air aftercooled

This is the most efficient method of cooling intake air to help reduce engine emissions while maintaining low-speed torque, transient response time, and peak torque. It enables an engine to meet emissions regulations with better fuel economy and the lowest installed costs.

# Compact size

- Lower installed cost
- Mounting points for Tier 4/Stage III B engine models same as Tier 3/Stage III A engine models

# Engine performance

- Multiple rated speeds to further reduce noise and improve fuel economy
- Higher level of peak torque (6.8L)
- Transient response time equal to or better than Tier 3/Stage III A
- Low-speed torque equal to or better than Tier 3/Stage III A
- Optional power bulge equal to or better than Tier 3/Stage III A

# John Deere electronic engine controls

- Faster engine control unit (ECU) manages both the engine and the exhaust filter
- Full authority electronic controls
- Four times the memory, twice the RAM and double the processing speed
- The input/output capability has increased 40%

# Additional features\*

- Glow plugs (6.8L)
- Gear-driven auxiliary drives
- 500-hour oil change
- Self-adjusting poly-vee fan drive
- R.H. and L.H. engine-mounted final fuel filters (6.8L)
- Single-piece low-friction piston (9.0L)
- Optional rear PTO (9.0L)
- Low-pressure fuel system with "auto-prime" feature
- Directed top-liner cooling (9.0L)

\*Available on all PowerTech PVX engines unless noted

# PowerTech PVX 6.8L engines



- Power range: 138 187 kW (185 250 hp)
- Power bulge up to 10%
- Peak torque up to 35%
- Low-speed (1000 rpm) torque up to 126% of rated speed torque
- Torque rise up to 33% faster
- Transient response that meets or exceeds Tier 3/Stage III A
- World-class fuel economy
- Lower rated speeds to reduce noise and improve fuel economy
- Cold-starting capabilities that meet or exceed Tier 3/Stage III A
- Maintained compact size and same mounting locations

#### Interim Tier 4/Stage III B PowerTech PVX 6.8L engines

Engine	odel power s		Rated speed	Pe pov	ak ver	Peak power	Pe tor	ak que	Peak torque
model			(rpm)	kW	hp	(rpm)	Nm	lb-ft	(rpm)
6068HFC94	138	185	2400	138	185	2200	741	547	1600
6068HFC94	138	185	2400	152	204	2200	741	547	1600
6068HFC94	138	185	2200	152	204	2000	809	596	1600
6068HFC94	138	185	2000	152	204	1800	890	656	1600
6068HFC94	149	200	2400	149	200	2200	800	590	1600
6068HFC94	149	200	2400	164	220	2200	800	590	1600
6068HFC94	149	200	2200	164	220	2000	873	644	1600
6068HFC94	149	200	2000	164	220	1800	961	708	1600
6068HFC94	168	225	2400	168	225	2200	902	666	1600
6068HFC94	168	225	2400	185	248	2200	902	666	1600
6068HFC94	168	225	2200	185	248	2000	984	726	1600
6068HFC94	168	225	2000	185	248	1800	1025	756	1600
6068HFC94	187	250	2400	191	255	2200	1004	741	1600
6068HFC94	187 250		2200	191	255	2000	1025	741	1600
6068HFC94	187	250	2000	191	255	1800	1025	741	1600

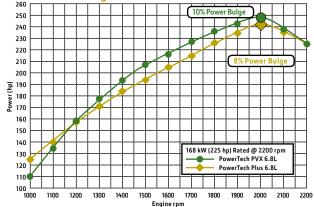
Bo	Bore Stroke		Len	gth	Wi	dth	Hei	ght	Weight		
mm	in	mm	in	mm	in	mm	in	mm	in	kg	lb
106	4.2	127	5.0	1161	45.7	716	28.2	1147	45.2	730	1614

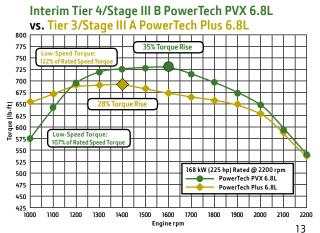
Ratings are subject to change.

### Engine performance curves

#### Power curves







# PowerTech PVX 9.0L engines



- Power range: 187 224 kW (250 – 300 hp)
- Power bulge up to 10%
- Peak torque up to 38%
- Low-speed (1000 rpm) torque up to 123% of rated speed torque
- Torque rise up to 20% faster
- Transient response that meets or exceeds Tier 3/Stage III A
- World-class fuel economy
- Lower rated speed to reduce noise and improve fuel economy
- Cold-starting capabilities that meet or exceed Tier 3/Stage III A
- Maintained compact size and same mounting locations

#### Interim Tier 4/Stage III B PowerTech PVX 9.0L engines

Engine	Rated power		Rated speed	Peak power		Peak power	Pe tor	Peak torque	
model	kW	hp	(rpm)	kW	hp	(rpm)	Nm	lb-ft	(rpm)
6090HFC94	187	250	2200	192	257	2000	1120	826	1600
6090HFC94	187	250	2200	206	276	2000	1120	826	1600
6090HFC94	187	250	2000	206	276	1800	1232	909	1600
6090HFC94	205	275	2200	210	281	2000	1224	903	1600
6090HFC94	205	275	2200	226	303	2000	1224	903	1600
6090HFC94	205	275	2000	225	302	1800	1305	963	1600
6090HFC94	224	300	2200	227	304	2000	1305	963	1600
6090HFC94	224 300		2200	235	316	2000	1305	963	1600
6090HFC94	224	300	2000	235	316	1800	1305	963	1600

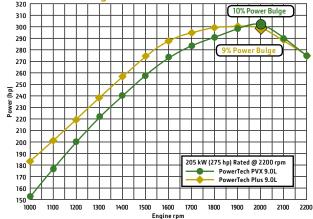
Bo	Bore Stroke		Len	gth	Wi	dth	Hei	ght	Weight		
mm	in	mm	in	mm	mm in		in	mm	in	kg	lb
118	4.6	136	5.4	1230	48.4	800	31.5	1340	52.8	902	1989

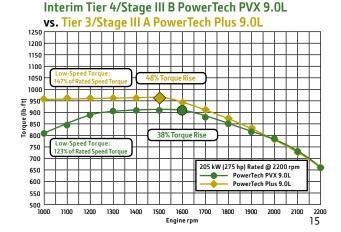
Ratings are subject to change.

# Engine performance curves

#### **Power curves**







# PowerTech PSX 6.8L, 9.0L, and 13.5L engines

Interim Tier 4 PowerTech PSX technology

Exhaust Out PF DOC Fresh Air Fresh A

### Series turbochargers

In series turbocharging, fresh air is drawn into the lowpressure turbocharger (fixed geometry), where air pressure is boosted. This pressurized or boosted air is then drawn into the high-pressure turbocharger (VGT), where air intake pressure is further raised. The high-pressure air is then routed to a charge air cooler, where the air is cooled and then routed to the engine's intake manifold.

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 reliability. Series turbocharging also delivers higher power density, improved low-speed torque, and improved high altitude operation.

# Cooled exhaust gas recirculation (EGR)

EGR cools and mixes measured amounts of cooled exhaust gas with incoming fresh air to lower peak combustion temperatures, thereby reducing NOx.

# **Exhaust filters**

These engines will utilize a catalyzed exhaust filter that contains a diesel oxidation catalyst (DOC) and a diesel particulate filter (DPF). Under normal operating conditions, the DOC reacts with exhaust gases to reduce carbon monoxide, hydrocarbons, and some particulate matter (PM). The downstream DPF forces exhaust gases to flow through porous channel walls, trapping and holding the remaining PM. Trapped particles are eventually oxidized within the DPF through a selfactivating cleaning process called passive regeneration, utilizing exhaust heat created under normal operating conditions.

# High-pressure common-rail (HPCR) and engine control unit (ECU)

The HPCR fuel system provides variable common-rail pressure, multiple injections, and higher injection pressures up to 1,975 bar (29,000 psi). It also controls fuel injection timing and provides precise control for the start, duration, and end of injection. (6.8L & 9.0L)

# Electronic unit injector (EUI) and engine control unit (ECU)

The EUI fuel system provides higher injection pressures up to 2,275 bar (33,000 psi). It also controls fuel injection timing and provides precise control for start, duration, and end of injection. (13.5L)

# 4-valve cylinder head

The 4-valve cylinder head provides excellent airflow resulting in greater low-speed torque and better transient response time by utilizing a cross-flow design (6.8L and 13.5L) and a U-flow design (9.0L).

# Air-to-air aftercooled

This is the most efficient method of cooling intake air to help reduce engine emissions while maintaining lowspeed torque, transient response time, and peak torque. It enables an engine to meet emissions regulations with better fuel economy and the lowest installed costs.

# Compact size

- Lower installed cost
- Mounting points for Tier 4/Stage III B engine models same as Tier 3/Stage III A engine models

# Engine performance

- Multiple rated speeds to further reduce noise and improve fuel economy
- Higher level of peak torque
- Transient response time equal to or better than Tier 3/Stage III A
- Low-speed torque equal to or better than Tier 3/Stage III A
- Optional power bulge equal to or better than Tier 3/Stage III A

# John Deere electronic engine controls

- Faster engine control unit (ECU) manages both the engine and the exhaust filter
- Full authority electronic controls
- Four times the memory, twice the RAM and double the processing speed
- The input/output capability has increased 40%

# Additional features<sup>\*</sup>

- Glow plugs (6.8L)
- Gear-driven auxiliary drives
- 500-hour oil change
- Self-adjusting poly-vee fan drive
- R.H. and L.H. engine-mounted fuel filters (6.8L)
- Single-piece low-friction piston (9.0L and 13.5L)
- Optional rear PTO (9.0L and 13.5L)
- Low-pressure fuel system with "auto-prime" feature
- Directed top-liner cooling (9.0L and 13.5L)

\*Available on all PowerTech PSX engines unless noted

# PowerTech PSX 6.8L engines



- Power range: 168 187 kW (225 – 250 hp)
- Power bulge up to 10%
- Peak torque up to 35%
- Low-speed (1000 rpm) torque up to 122% of rated speed torque
- Torque rise up to 33% faster
- Transient response that meets or exceeds Tier 3/Stage III A
- World-class fuel economy
- Lower rated speeds to reduce noise and improve fuel economy
- Cold-starting capabilities that meet or exceed Tier 3/Stage III A
- Maintained compact size and same mounting locations

#### Interim Tier 4/Stage III B PowerTech PSX 6.8L engines

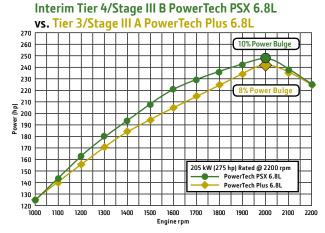
Engine	Rated power		Rated speed			Peak power			Peak torque	
model	kW	hp	(rpm)	kW	hp	(rpm)	Nm	lb-ft	(rpm)	
6068HFC95	168	225	2200	185	248	2000	984	726	1600	
6068HFC95	95 187 250		2200	191	255	2000	1025	756	1600	

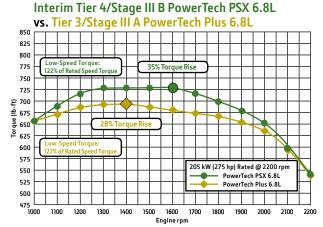
E	Bore Stroke		Len	gth	Wi	dth	Hei	ght	Weight			
mm	۱	in	mm	in	mm	mm in		mm in		in	kg	lb
106	5	4.2	127	5.0	1161	45.0	768	30.2	1144	45.0	750	1653

Ratings are subject to change.

# Engine performance curves

#### Power curves





# PowerTech PSX 9.0L engines



- Power range: 242 317 kW (325 425 hp)
- Best-in-class power density
- Power bulge up to 10%
- Peak torque up to 38%
- Low-speed (1000 rpm) torque up to 130% of rated speed torque
- Torque rise up to 20% faster
- Transient response that meets or exceeds Tier 3/Stage III A
- World-class fuel economy
- Lower rated speeds to reduce noise and improve fuel economy
- Cold-starting capabilities that meet or exceed Tier 3/Stage III A
- New compact size

#### Interim Tier 4/Stage III B PowerTech PSX 9.0L engines

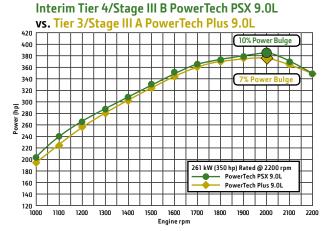
		_	_						
Engine	Rated power		Rated speed	Pe pov		Peak power	Pe tor	ak que	Peak torque
model	kW	hp	(rpm)	kW	hp	(rpm)	Nm	lb-ft	(rpm)
6090HFC95	242	325	2200	247	332	2000	1444	1065	1600
6090HFC95	242	325	2200	266	357	2000	1444	1065	1600
6090HFC95	242	325	2000	266	357	1800	1590	1173	1600
6090HFC95	261	350	2200	267	359	2000	1564	1154	1600
6090HFC95	261	350	2200	287	385	2000	1564	1154	1600
6090HFC95	261	350	2000	287	385	1800	1683	1241	1600
6090HFC95	280	375	2200	286	384	2000	1671	1232	1600
6090HFC95	280	375	2200	308	413	2000	1671	1232	1600
6090HFC95	280	375	2000	301	403	1800	1683	1242	1600
6090HFC95	298	400	2200	298	400	2000	1685	1243	1600
6090HFC95	298	400	2200	316	424	2000	1685	1243	1600
6090HFC95	298 400		2000	301	403	1800	1683	1241	1600
6090HFC95	317	425	2200	317	425	2000	1685	1243	1600

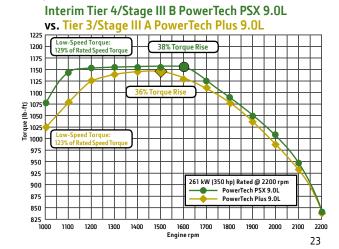
Bo	Bore Stroke		Len	gth	Wi	dth	Hei	ght	Weight		
mm	in	mm	in	mm	mm in		mm in		in	kg	lb
118	4.6	136	5.4	1230	48.4	800	31.5	1340	52.8	1052	2319

Ratings are subject to change.

### Engine performance curves

#### Power curves





# PowerTech PSX 13.5L engines



- Maintained power range: 261 448 kW (350 600 hp)
- Best-in-class power density
- Power bulge up to 13%
- Peak torque up to 38%
- Low-speed (1000 rpm) torque up to 133% of rated speed torque
- Torque rise up to 40% faster
- Transient response that meets or exceeds Tier 3/Stage III A
- World-class fuel economy
- Lower rated speeds to reduce noise and improve fuel economy
- Cold-starting capabilities that meet or exceed Tier 3/Stage III A
- Compact size

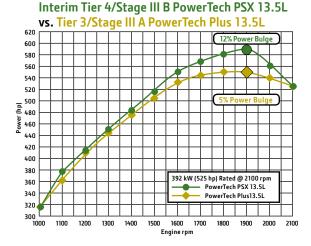
#### Interim Tier 4/Stage III B PowerTech PSX 13.5L engines

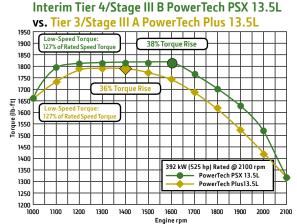
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	ingine			Rate		Rat spe			<sup>D</sup> ea	ak ver	Pea pov		t	Pe or	ak que			eak rque
r	nodel		k١	N	hp	(rp	m)	k٧		hp	(rpi	m)	Nr	n	۱b	-ft	(r	pm)
613	35HFC9	5	26	51	350	2100		272	2	365	190	00	) 1638		1208		1	600
613	SHFC9	5	26	51	350			297	7	399	190	)0	163	38	12	08	1	600
613	5135HFC95		26	261 350		190	)0	297	7	399	170	)0	18	10	13	55	1	600
613	35HFC9	HFC95		298 400		210	)0	311	1	417	190	00	187	70	13	79	1	600
613	SHFC9			8	400	210	00	340	D	456	190	00	187	70	15	25	1	600
613	35HFC9	5	29	8	400	190	00	340	D	456	170	)0	206	57	15	25	1	600
	35HFC9		31	7	425	210		330	כ	443	190	00	198	39	14	67	1	600
613	35HFC9	5	31	7	425	210	)0	36	1	485	190	)0	198	39	14	67	1	600
613	35HFC9	5	31	7	425	190	00	36	1	485	170	)0	219	99	16	62	1	600
613	SHFC9	5	33	36	450	210	00	350	ר כ	469	190	)0	210	)5	15	53	1	600
613	35HFC9	5	33	36	450	210	)0	376	5	505	190	)0	210	)5	15	53	1	600
613	SHFC9	5	33	36	450	190	00	376	5	505	170	)0	232	27	17	16	1	600
613	SHFC9	5	37	3	500	210	00	389	9	521	190	)0	234	41	17	27	1	600
613	SHFC9	5	37		500			418		560	190	00	0 2341		1727			600
613	35HFC9	5	37	73	500	190	00	418		560	170	)0			19	08	1	600
	SHFC9		39	92	525	210		408		548	190	00	24	57	18	12		600
613	SHFC9	5	39	92	525	210	00	439	91	589	190	00	24	57	18	12		600
613	SHFC9	5	39	92	525	190	00	439	9	589	170	)0	266	50	19	62	1	600
613	SHFC9	5	41	0	550	210	00	427	7	573	190	)0	257	73	18	98	1	600
613	SHFC9	5	41	0	550	210	00	459	9	616	190	00	257	73	18	98	1	600
	SHFC9		41		550	190		454	4	608	170		266	50		62		600
	B5HFC9		44		600	210		46	0	617	190		266			62		600
			_			_							_					
B	Bore S		Stro	Stroke		Length			Wie		lth		Height		: V		Veig	ght
mm	mm in m		n	in	ı I	mm ir		ı m		m	in	m	m in		ı	kg		lb

5.2 165 6.5 1305 51.4 873 34.4 1550 61.0 1542 3400

### Engine performance curves

#### **Power curves**





# Interim Tier 4/Stage III B FAQ for engines 130 kW (174 hp) and greater

# Q: How will John Deere meet Interim Tier 4/Stage III B regulations?

**A:** John Deere Power Systems will achieve compliance with Interim Tier 4/Stage III B emissions regulations by starting with our proven Tier 3/Stage III A PowerTech Plus engine platform that includes cooled exhaust gas recirculation (EGR) for NOx control with the addition of an exhaust filter for reducing particulates. Our PowerTech M and PowerTech E 2.4L engines below 56 kW (75 hp) meet Interim Tier 4 regulations without the addition of an exhaust filter.



# **Q:** How will John Deere Interim Tier 4/Stage III B engines stand out from the competition?

**A:** John Deere is an innovator in the commercial application of cooled EGR and variable geometry turbocharger (VGT) technologies for off-highway use. Throughout Tier 3/Stage III A, John Deere has gained experience with these technologies over a wide range of applications and has established a proven record of reliability; other engine manufacturers are just now considering adopting these technologies for off-highway applications. John Deere engines have a strong reputation of performance, durability, and reliability, and we are designing our new engines to exceed those expectations. These new engines will also feature more power and increased performance, world-class fuel economy, reduced noise, and low overall operating costs.

# Q: When will the Interim Tier 4/Stage III B engines be available?

**A:** Engines will be available in limited production quantities starting in early 2010. Regular production delivery begins in January 2011. Interim Tier 4-compliant engines less than 56 kW (74 hp) are available and in production today.



**Cooled EGR** 

#### Q: Why cooled EGR and exhaust filters?

A: John Deere has determined that cooled EGR, combined with exhaust filter technology, is the right choice to meet these regulations because it is a simpler, proven and less costly technology. Like the cooled EGR system and the VGT, the exhaust filter was specifically designed to meet the demands of off-highway applications. The exhaust filter also has the benefit of replacing the muffler in most applications.

Exhaust filter



2 Diesel Particulate Filter (DPF)

#### Q: Does the John Deere solution require urea?

A: Urea, a second fluid, is required for an alternative NOx reduction system called selective catalytic reduction (SCR). The SCR system injects liquid urea into the exhaust stream to reduce NOx. While it is effective, it also requires that the vehicle or machine be fitted with a separate tank, a sophisticated urea injection system, and a tamper-proof diagnostic system required by regulation. Since urea freezes, heating systems for the tank and delivery lines are required. In addition, currently urea is not conveniently available in many parts of the world, especially for off-highway applications, which creates availability and storage concerns. Most importantly, operation of John Deere's cooled EGR solution does not require operator intervention. The operator doesn't have to deal with the cost and hassle of a second fluid. SCR may be an appropriate technology for the future when the technology is more developed for off-highway applications; however, for Interim Tier 4/Stage III B, the cooled EGR and exhaust filter technology approach provides the proven, best value product to the end-user. Since the John Deere Interim Tier 4/Stage III B solution does not use SCR, urea is not required.

#### Q: What performance changes will John Deere Interim Tier 4/Stage III B engines have?

A: With our Tier 3/Stage III A PowerTech Plus engines, John Deere Power Systems was able to achieve record fuel economy gains over our Tier 2/Stage II models and achieve best-in-class fuel economy. John Deere was also able to maintain or improve other performance characteristics, such as cold-weather starting, transient response time, power bulge, peak torque, and low-speed torque. Because John Deere Interim Tier 4/Stage III B engines continue to use the same technologies as our Tier 3/Stage III A engines, our Interim Tier 4/Stage III B engines will maintain similar performance and fuel economy leadership in the offhighway industry.

# Q: Will serviceability and service intervals change with Interim Tier 4/Stage III B engines?

**A:** Much of the current engine maintenance schedule remains unchanged. The oil change interval will be the same interval offered for Tier 3/Stage III A engines at either 500 hours or 250 hours. One noticeable difference will come with the addition of the exhaust filter. The regulations require an exhaust filter minimum service interval of 4,500 hours for engines 130 kW (174 hp) and greater and 3,000 hours for engines less than 130 kW (174 hp). The John Deere exhaust filter design allows for higher hour exhaust filter service intervals to maximize vehicle uptime.

# Q: What will John Deere do to meet Final Tier 4/Stage IV regulations?

A: John Deere is developing and testing the technologies it will adopt to achieve Final Tier 4/Stage IV emissions regulations. Final Tier 4/Stage IV emissions regulations for engines 130 kW (174 hp) and greater begin in January 2014. Technologies such as cooled EGR, VGT, and exhaust filters will likely be the foundation for meeting Final Tier 4/Stage IV regulations. We are constantly evaluating emerging technologies for their effectiveness and for their ability to provide reliable and durable products in an off-highway setting. And as with engine configurations that meet previous emissions tiers, we'll continue to tailor our Final Tier 4/Stage IV engine solutions to fit the variety of off-highway applications customers use them in.

Visit www.JohnDeere.com/tier4 for more information.



# Conversions

- Torque rise = maximum torque torque at rated speed
- Power bulge = maximum power power at rated speed

# Customer support

With John Deere, you never have far to go to find expert assistance and advice. The more than 4,000 service locations throughout the world give you peace of mind that you can get service when and where you need it.

We have centralized parts warehouses in the United States and Europe, plus numerous worldwide depots that employ overnight parts shipping — so you'll never have to wait long for parts.

In addition, John Deere service personnel are highly trained technicians who stay on top of changing engine technologies and service techniques.

John Deere dealers and distributors are your best source for service, knowledge, and engine accessories. They're one of the many reasons to specify John Deere engines in your equipment.







# Worldwide locations

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