NEW GM 6.6L V8 L8T GAS ENGINE

Features best-in-class standard torque, direct injection and variable valve timing, as well as a cast iron engine block for durability.

BY **DAVE HAGEN** PHOTOS © **GENERAL MOTORS COMPANY**

The General Motors 6.6L V8 L8T gasoline engine is currently available in the 2020 Chevrolet Silverado HD and the 2020 GMC Sierra. For 2021, Chevrolet added the L8T to the Low Cab Forward truck and it will offer-up more power and torque than the 6.0L V8 L96 engine which it replaces.

When equipped in the Chevrolet Low Cab Forward truck, the 6.6L V8 L8T produces 350 horsepower at 4,500 rpm and 425 pound-feet of torque at 3,800 rpm. That's a boost of nearly 18 percent horsepower and 14 percent peak torque compared to the outgoing 6.0L L96 V8. The transmission used is the six-speed 6L90-E Hydra-Matic (RPO code MYD) with lock-up converter and overdrive.

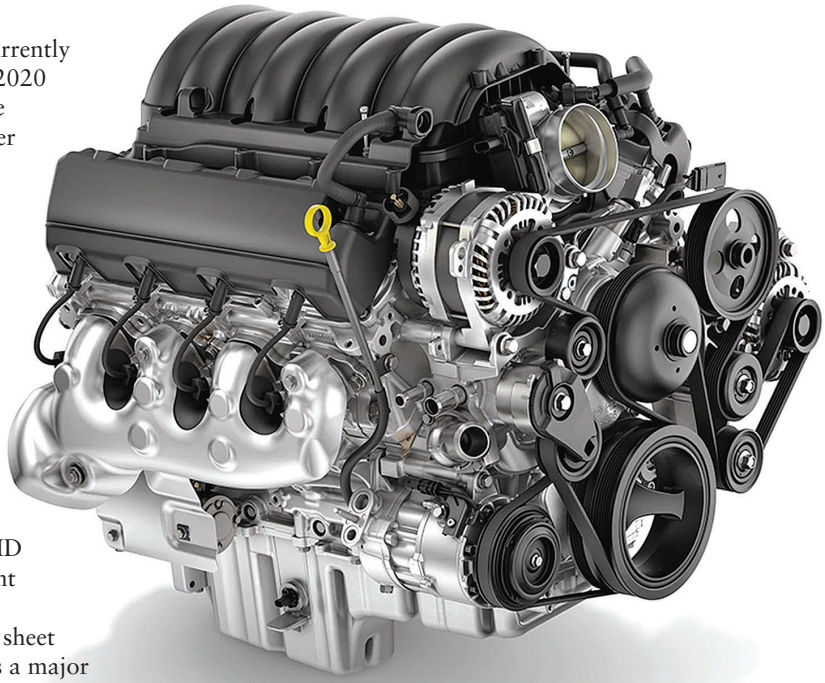
In addition to revamped exterior styling, a freshened features list and the latest tech, the new 2020 GMC Sierra HD and 2020 Chevrolet Silverado HD will also come equipped with a new gasoline powerplant option: the GM L8T 6.6L V8 gasoline engine.

Earlier this year, we shared with you the L8T's spec sheet in our Prosis Pro software, and all told, the new 6.6L is a major improvement compared to the motor it replaces – 6.0L V8 L96. An evolution of the fifth-gen Small Block architecture first seen on the 6.2L V8 LT1, the L8T produces 401 horsepower at 5,200 rpm and 464 pound-feet of torque at 4,000 rpm, which is an 11 percent increase in power and a 22 percent increase in torque compared to the L96. For those keeping score at home, the GM L8T lays down an additional 41 horsepower and 84 pound-feet of torque compared to the 360 horsepower and 380 pound-feet of torque produced by the Vortec L96. Critically, the peak horsepower and peak torque figures on the GM L8T 6.6L V8 arrive 200 rpm sooner than on the L96, which is exactly what you want in a heavy-duty truck application.

Unlike the LT1 and its aluminum block, the L8T features an iron block. Although heavier than aluminum, iron construction also tends to be much more durable and robust.

The bore-and-stroke ratio of the GM L8T is set at 103.5 mm x 98 mm, as compared to the 103.25 x 92 mm bore-and-stroke ratio of the LT1.

In the 2020 Chevrolet Silverado HD and 2020 GMC Sierra HD, the GM L8T engine will be mated to the GM 6L90 six-speed automatic transmission, with both two-wheel- and four-wheel-drive on hand to put the power to the ground.



The new 6.6L V8 L8T gas engine produces 401 horsepower at 5,200 rpm and 464 pound-feet of torque at 4,000 rpm.

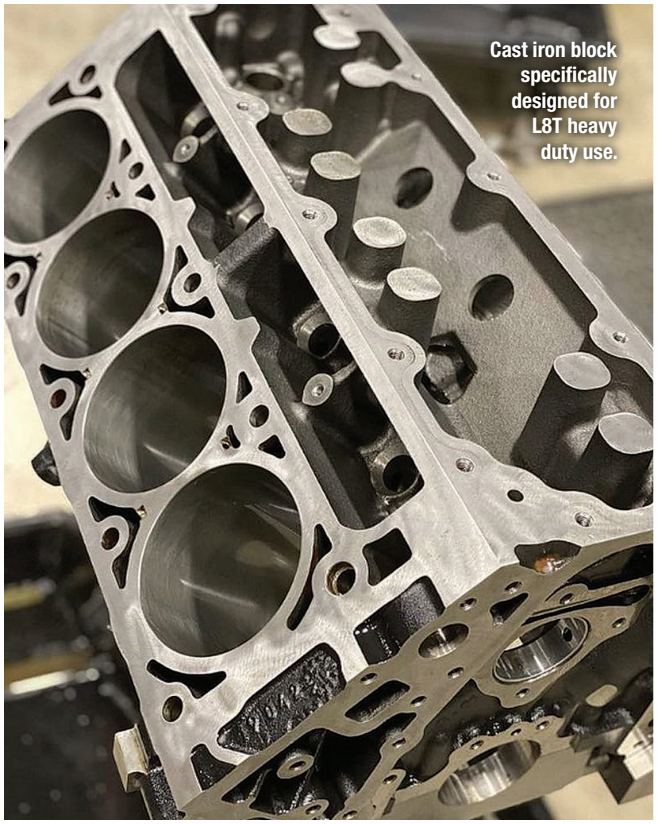
Many have already said they're glad the all-new Silverado HD and Sierra HD finally got an all-new, modern gasoline engine that they deserve. After all, the outgoing L96 engine is nearly 20 years old at this point, so it's about time these workhorses got a proper powerplant under the hood.

LOW-SPEED TORQUE PRODUCER

The L8T is meant for grunt work thanks to an impressive 464 ft/lbs of peak torque that arrives 200 rpms sooner, and is 22 percent more, than GM's previous 6.0L V-8 HD gasoline engines. Direct injection technology provides precise fuel control and enables a higher compression ratio that broadens the torque curve and contributes to a power output of 401 hp. This broad torque band provides a stronger feeling of on-demand power at all speeds

NEW GM 6.6L V8 L8T

BY **DAVE HAGEN**



Cast iron block specifically designed for L8T heavy duty use.

and offers a maximum trailer towing weigh of up to 17,370 pounds.

CAST IRON CYLINDER BLOCK

- Cast iron block specifically designed for L8T heavy duty use.
- Six-bolt, cross-bolted main-bearing caps limit crank flex and stiffen the engine's structure.
- Deep-skirt design, where the block sides extend below the centerline of the crankshaft, helps maximize the block's strength and minimize vibration.
- Incorporates channels for jet-spray piston cooling to help optimize durability.

ALUMINUM HEADS

- Utilizes GM's proven Gen V aluminum head design combined with direct-injection combustion system to maximize airflow at higher rpms for a broad horsepower band, along with strong, low-rpm torque.
- Large, straight and rectangular intake ports feature a slight twist to enhance mixture motion particularly at lower rpms.
- Exhaust valves made of Inconel alloy help dissipate heat to aid in valvetrain reliability.
- The heads' valve seats feature unique copper infiltrated inserts designed to withstand high heat and extreme conditions under load.

DIRECT INJECTION TECHNOLOGY

- Injects fuel only where it is needed, directly into the combustion chamber, promoting precise fuel control, combustion and efficiency.

(continued)

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8:00 - 9:00 am	Meet and Greet
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10:30 - 10:45 am	Morning Break
10:45 - Noon	TECHNICAL SESSION #2
Noon - 1:15 pm	LUNCH & EXHIBITS (Meal provided on-site by the host.)
1:15 - 2:30 pm	TECHNICAL SESSION #3
2:30 - 2:45 pm	Afternoon Break
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NEW GM 6.6L V8 L8T

BY **DAVE HAGEN**

- Fosters a more complete burn of the fuel in the air-fuel mixture.
- Operates at a lower temperature than conventional port injection.
- Improved fuel atomization at cold temperatures enhances ability to start at cold temperatures.

REFINEMENT FEATURES

- The L8T operates with an increased 10.8:1 compression ratio for improved efficiency and broader torque band, all while still utilizing regular 87 octane gasoline.
- The high-pressure fuel pump incorporates "soft stop" control for the pump's internal solenoid to minimize the characteristic "ticking" sound of direct injection systems.
- Large-diameter (8.700 mm) push-rods maximize stiffness to support high-speed valvetrain performance under heavy loads.
- Air induction specific humidity sensor for optimal combustion efficiency regardless of surrounding ambient humidity. A technology first for GM HD engines.

ADDITIONAL FEATURES

- Available dual alternators
- Variable Valve Timing (VVT)
- Electronic throttle control
- Dual-pressure control and variable displacement oil pump
- Oil-jet piston cooling
- Air induction humidity sensor
- PCV-integrated rocker covers
- Dexos2 5W30 engine oil
- Iridium-tipped, extended life spark plugs
- GM developed E93 engine controller
- 58X crank timing

CAMSHAFT AND DRIVE SYSTEM

A billet steel 1-piece camshaft is supported by 5 bearings pressed into the engine block. The camshaft has a tri-lobe forward of the rear journal for actuating the direct injection fuel pump. The CMP actuator is mounted to the front of the camshaft and retained by the CMP solenoid valve. The CMP actuator is driven by the crankshaft sprocket through the camshaft timing chain. The CMP sensor wheel is incorporated into the front face of the CMP actuator with the CMP sensor and CMP actuator magnet mounted in the engine front cover. A timing chain tensioner is mounted to the front of the engine block above the crankshaft sprocket. The externally splined crankshaft sprocket is positioned to the crankshaft by a key and keyway. The crankshaft sprocket external splines drive the oil pump drive gear. A retaining plate mounted to the front of the engine block maintains camshaft location. Camshaft Position Actuator and Solenoid Valve Description

CRANKSHAFT

The crankshaft is made of hardened forged steel. The crankshaft is supported by five crankshaft bearings. The bearings are retained by crankshaft bearing caps which are machined with the engine block for proper alignment and clearance. The crankshaft journals are undercut and rolled. The center main journal is the thrust journal. A CKP 58X reluctor ring is press-fit mounted at the rear of the crankshaft ahead of the 8-bolt flywheel flange. The reluctor ring is

LS ENGINE PARTS



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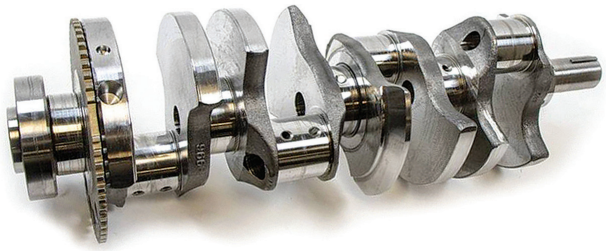
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NEW GM 6.6L V8 L8T

BY **DAVE HAGEN**



Hardened forged steel crankshaft L8T

not serviceable separately. It also features a center counter weighted design.

CYLINDER HEADS

The cylinder heads are cast aluminum and have pressed in place powdered metal valve guides and valve seats. The valve rocker arm covers are retained to the cylinder head by 10 perimeter mounted rocker arm cover bolts. Cylinder heads are a high-flow design with offset intake valve rocker arms.

ENGINE BLOCK

The engine block is a cam-in-block deep skirt 90-degree V-configuration with five crankshaft bearing caps. The engine block is cast aluminum. The five crankshaft bearing caps each have four vertical M10 and two horizontal M8 mounting bolts. The camshaft is supported by five camshaft bearings pressed into the block. The left bank of cylinders is number 1-3-5-7 (#1 is front left) and the right bank of cylinders are 2-4-6-8 (#2 is front right) viewed from the flywheel end of the engine. The engine firing order is 1-8-7-2-6-5-4-3.

EXHAUST MANIFOLDS

The exhaust manifolds are a one-piece cast iron design. The exhaust manifolds direct exhaust gasses from the combustion chambers to the exhaust system. Each manifold also has an externally mounted heat shield that is retained by bolts.

INTAKE MANIFOLD

The intake manifold is a one-piece composite design that incorporates brass threaded inserts for mounting the throttle body, and wire harness studs. Each side of the intake manifold is sealed to the cylinder head by eight silicone push in place gaskets. The electronically actuated throttle body bolts to the front of the intake manifold. The throttle body is sealed by a one-piece push in place silicone gasket. The intake manifold covers the direct injected fuel rail assembly, fuel pipes and fuel pump. The manifold absolute pressure (MAP) sensor is installed and retained to the left front of the intake manifold behind the throttle body. The evaporative (EVAP) emission canister purge solenoid valve is mounted left front of the intake manifold below the MAP sensor.

FUEL SYSTEM

The fuel system consists of 8 separate direct injection fuel injectors, two high pressure fuel rails, a high pressure cross-over fuel pipe (connects the two fuel rails), a high pressure fuel feed pipe (connects the cross-over pipe to the high pressure fuel pump), a high pressure fuel pump and a low pressure fuel feed pipe. The injectors are each seated into their individual bores in the cylinder heads with two combustion seals to provide sealing. The high-pressure fuel pump mounts to the rear of the Valve Lifter Oil Manifold in the engine valley.

4260N Spring Compressor

This shop grade air powered valve spring compressor develops up to 350 lbs. of force. Dual stage pneumatic button control operates the compressor using as little as 90 PSI.





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Motion is transmitted to the pump from a tri-lobe on the rear of the camshaft through a hydraulic roller lifter.

OIL PAN

The structural rear-sump oil pan is a one-piece cast aluminum design. Incorporated into the design is the oil filter mounting boss, drain plug opening, baffle, oil deflector, oil pump screen, and oil level sensor. The oil filter bypass valve is in the oil filter assembly. The oil pan is sealed to the oil pump with a silicone push in place gasket and to the engine block with RTV sealant. Dowels are pressed into the pan for aid in alignment to the engine block during assembly.

PISTON AND CONNECTING ROD ASSEMBLY

The pistons are cast aluminum. The pistons use 2 compression rings and 1 oil control ring assembly. The piston is a low friction, lightweight design with a recessed top and barrel shaped skirt. The piston pins are chromium steel and are a full-floating design. The connecting rods are powdered metal. The connecting rods are fractured at the connecting rod journal and then machined for the proper clearance. All applications use a piston with a graphite coated skirt. The piston and pin are to be serviced as an assembly.

VALVE ROCKER ARM COVER ASSEMBLIES

The valve rocker arm covers are cast aluminum and use a pre-molded silicon gasket for sealing. Mounted to each rocker cover are the coil assemblies. Incorporated into the left and right valve rocker arm covers are the positive crankcase ventilation (PCV) fresh air passages. Incorporated into the left cover is the oil fill tube.

6.6L V8 L8T SPECIFICATIONS FOR HD3500

TYPE:	6.6L V8
DISPLACEMENT:	403
ENGINE ORIENTATION:	Longitudinal
COMPRESSION RATIO:	10.8:1
VALVE CONFIGURATION:	Overhead (push-rod layout)
VALVES PER CYLINDER:	Two
ASSEMBLY SITE:	Tonawanda, NY
VALVE LIFTERS:	Hydraulic Roller
FIRING ORDER:	1 8 7 2 6 5 4 3
BORE X STROKE:	103.250 X 98.000 MM
FUEL TYPE:	Regular 87 Octane
HORSEPOWER:	401 hp (299kW) @5200 rpm*
TORQUE:	464 ft/lbs (629Nm) @4000 rpm*
MAXIMUM ENGINE SPEED:	5,600 rpm
EMISSIONS CONTROL:	Catalytic Converter, three-way catalyst, PCV
BLOCK:	Cast Iron
CYLINDER HEAD:	Cast Aluminum
INTAKE MANIFOLD:	Composite
EXHAUST MANIFOLD:	Stainless Steel
MAIN BEARING CAPS:	Cast Nodular
CRANKSHAFT:	Forged Steel
CAMSHAFT:	Billet Steel
CONNECTING ROD:	Forged Powder Metal

*As tested in Chevrolet HD Silverado





NEW GM 6.6L V8 L8T

BY **DAVE HAGEN**

VALVE TRAIN

Motion is transmitted from the camshaft through the hydraulic roller valve lifters and tubular pushrods to the roller type rocker arms. The nylon valve lifter guides position and retain the valve lifters.
The valve rocker arms are mounted on individual pedestals or pivot supports that are incorporated into the cylinder heads. Each rocker arm is retained by a bolt. Valve lash is net build.

In the world of heavy-duty pickups, specs are king. These are the machines used for a lot of work and finding a setup that matches the needs of a customer isn't always easy. Today, GM's cross-town rival, Ford Motor Company, announced the ratings of its new 7.3L V8 engine for the 2020 Ford Super Duty F-250 and F-350, allowing us to finally compare it with the latest GM 6.6L L8T V8 gasoline engine cradled by the 2020 Silverado HD and Sierra HD. The chart below is a look at the Ford Super Duty's standard 6.2L V8 and line up all three for a side-by-side-by-side comparison.

The GM Performance Group, as well as aftermarket companies have already started developing performance enhancing components for the L8T and by the time you're reading this article, there most likely be a turbo kit available for purchase. There are other performance GM engines currently in the works, rumor has it there will be a LT6 and LT7 engine built for the 2024-year model Corvettes. Those engines, however, represent an all-new, sixth generation DOHC V8 engine family that's derived from the 4.2L Cadillac Blackwing engine (RPO Code LTA). The LT6 will be a naturally aspirated version of the twin-turbo LT7 that will be used in the C8 Z06. Stay tuned, more change is on the way.■

GM 6.6L V8 L8T compared to Ford 7.3L Godzilla & 6.2L V8

	GM 6.6L L8T V8	Ford 7.3L Godzilla V8	+ / – GM V8 Ratings	+ / – GM V8 RPM	Ford 6.2L V8
Aspiration:	Atmospheric	Atmospheric	—	—	Atmospheric
Displacement:	6.6L	7.3L	-0.7	—	6.2L
Configuration:	OHV V8	OHV V8	—	—	SOHC V8
Power (hp @ RPM):	401 @ 5200	430 @ 5500	-29	-300	385 @ 5750
Torque (lb-ft @ RPM):	464 @ 4000	475 @ 4000	-11	—	430 @ 3800



AERA Technical Specialist Dave Hagen has over 44 years of experience in our industry. As an ASE-certified Master Machinist, Dave specialized in cylinder head work and complete engine assembly for the first 17 years of his career. For more information, email: dave@aera.org.

