Ecotec 1.8L I-4 VVT

ECOTEC 1.8L I-4 VVT (2H0)

Overview

As part of GM's small-displacement, power-dense four-cylinder engines, the Ecotec 1.8L is helping GM deliver more efficient yet fun-to-drive vehicles. It delivers an excellent balance of performance and efficiency. This compact inline four-cylinder engine combines competitive output, with sophisticated technologies such as dual continuous variable cam phasing (DCVCP), variable-geometry intake manifold, electronically controlled thermostat, engine oil cooler, with low maintenance, low emissions and outstanding fuel economy.

Product Highlights

Cylinder Block

- The 1.8L's cylinder block is based on the proven hollow-frame concept. Gray cast iron provides an extremely durable foundation, optimized with a deep skirt that minimizes both wear and vibration. A structural aluminum oil pan further reduces noise, vibration and harshness, increasing the powertrain's rigidity and ensuring efficient heat transfer from the block. The 1.8L block supports greater loads than that used in previous generation engines, and it improves the overall rigidity of the engine/transmission assembly.

Less Reciprocating Mass

- Like the pistons, other reciprocating components in the 1.8L were developed for an optimum mix of strength, balance and low weight. The result is less reciprocating mass inside the engine, increasing efficiency and enhancing the tactile feeling of performance as the engine builds revs.
- The steel connecting rods incorporate a larger, forged I-beam cross section for added strength, without increasing weight.

Floating-Pin Pistons with Oil-Spray Cooling

- The 1.8L pistons apply a floating-pin design. The wrist pins, which attach the piston to the connecting rod, "float" inside the rod bushing and pin bores in the piston barrel. Compared to a conventional fixed pin assembly, in which the connecting rod is fixed to the piston's wrist pin and the pin rotates in the pin bore, the floating pins reduce stress on the pin. They allow tighter pin to pin-bore tolerances and reduce noise generated as the piston moves through the cylinder. The benefit is less engine wear, improved durability and quieter operation.
- The 1.8L's pistons also have oil-spray cooling. Each piston has its own individual directed jet that sprays oil toward its skirt, coating its underside and the cylinder wall with an additional layer of lubricant. The extra lubrication cools the pistons, reducing friction and helping ensure durability. Additional oil on the cylinder walls and wristpin also dampens noise emanating from the pistons.

Variable Valve Timing

- Variable valve timing helps the Ecotec 1.8L deliver optimal performance and efficiency, with reduced emissions. It allows linear delivery of torque, with near-peak levels over a broad rpm range and high specific output (horsepower per liter of displacement), without sacrificing overall engine response or driveability. It also provides another effective tool for controlling exhaust emissions and because it manages valve overlap at optimum levels, it eliminates the need for an Exhaust Gas Recirculation (EGR) system.

Hollow-Cast & Chain-Driven Camshafts

- The pair of camshafts in the Ecotec 1.8L are hollow and lighter than conventional solid shafts. Along with helping reduce the overall weight of the engine, they lower the inertia of the valvetrain, allowing the engine to rev higher and more quickly.

Modified Variable Two Step Runner Length Intake Manifold

- The lateral position of the throttle valve permits an optimum port formation of the single manifold runners in connection with a reduction of the losses in the fresh air section from the air filter to the intake valve.
- The cross-section of the runners is constant over the entire length. The runner length in the power mode is 40 percent of the torque mode. In order to minimize the flow resistance at high speeds, a rotary sleeve was used instead of a flap-switching device. This solution guarantees the maximum possible cross-sectional area in the open position. Another advantage of the rotary sleeve design is that a high tightness can be reached in the closed position.

Improved Lubrication

- To improve thermal management, and to ensure adequate oil supply for the cam phasers and piston jets, a liquid-to-liquid oil cooler is mounted on the exhaust side of the engine block. The cooler is compact and lightweight (less than three pounds), and provides a significant decrease in oil temperature without a decrease in average oil pressure. The oil cooler is cooled by the cooling system via a dedicated coolant passage in the engine block. While the design cools the oil in the normal operating temperature range, it also allows the oil to warm more quickly. That means optimal viscosity and friction reduction sooner after a cold start.
- The oil pump's flow volume is matched to the engine. The pump is packaged in an assembly module with the water pump, timing belt cover and fastening points for accessories. This unique module reduces assembly time and improves build consistency.

Advanced Cooling System

- The 1.8L features an electronically controlled thermostat in a lightweight, heat-resistant plastic housing. The electronic thermostat allows more precise temperature control than a conventional thermostat, and can be opened and closed by the engine control module (ECM), rather than at a default coolant temperature. The 1.8L's cooling circuit was developed using extensive Computational Fluid Dynamics analysis. The result is appropriate engine cooling with the least amount of coolant volume—and weight.

Stainless Steel Exhaust Manifold with Close-Coupled Catalytic Converter

- The stainless steel manifold is lighter than conventional cast iron. It reduces friction and smoothes the flow of air so exhaust gas can be rapidly expelled.
- The close-coupled catalyst substantially lowers emissions during cold starts, or the brief period when an engine operates at its highest emissions level. Because the exhaust ports and exhaust manifold heat more rapidly than any part of an engine, moving a smaller catalytic converter closer to the manifold allows the catalyst to heat more quickly. So positioned, the catalyst achieves light-off—the temperature at which exhaust emissions are most efficiently oxidized—sooner.

Specifications

Type:	1.8L I-4 Fam1 Gen3 (2H0)
Displacement:	1796cc (110 ci)
Engine Orientation: L (longitudinal) T (transverse)	T
Compression ratio:	10.5:1
Valve train configuration:	V configuaration, Dual Overhead Camshafts (DVCVP)
valves per cylinder:	4
Assembly site:	St. Gotthard - Hungary
Valve lifters:	Direct acting tappet with hydraulic lash adjuster
Firing order:	1 - 3 - 4 - 2
Bore x stroke:	80.50 x 88.2 mm
Fuel system:	Sequential fuel injection
Fuel Type:	95 (91 - 98) RON with E0 to E10
Engine Mass (kg/lbs)	119 kg (262 lbs)
Applications:	Horsepower: hp (kW)
Opel Astra	140 hp (103 kW) @ 6300 rpm SAE Certified
Opel Zafira	140 hp (103 kW) @ 6300 rpm SAE Certified
Opel Insignia	140 hp (103 kW) @ 6300 rpm SAE Certified
Opel Small SUV	140 hp (103 kW) @ 6300 rpm SAE Certified
Chevrolet Orlando	140 hp (103 kW) @ 6300 rpm SAE Certified
Applications:	Torque: lb-ft. (Nm)
Opel Astra	129 lb.-ft. (175 Nm) @ 3800 rpm SAE Certified
Opel Zafira	129 lb.-ft. (175 Nm) @ 3800 rpm SAE Certified
Opel Insignia	129 lb.-ft. (175 Nm) @ 3800 rpm SAE Certified
Opel Small SUV	129 lb.-ft. (175 Nm) @ 3800 rpm SAE Certified
Chevrolet Orlando	129 lb.-ft. (175 Nm) @ 3800 rpm SAE Certified
Maximum Engine Speed:	6500 rpm
Emissions Summary:	EURO 5
	MATERIALS
Block:	Cast Grey Iron (hollow frame)
Cylinder head:	Cast Aluminum
Intake manifold:	Composite
Exhaust manifold:	Fabricated Stainless Steel Maniverter 4-1 with close coupled catalyst
Crankshaft:	Cast Nodular Iron
Camshaft:	Cast Chilled Iron
Connecting rods:	Forged Steel
Additional features:	Double Continuous Variable Cam Phasing (DCVCP) Varible Two Step Runner Length Intake Manifold Electronic Throttle Control Electronic Controlled Cooling System Cylinder Selective Adaptive Knock Control Engine Oil Cooler with Individual Piston Cooling Jets Coil on Plug High Energy Ignition Extended Life Coolant

	3 Layer Sheet Metal Cylinder Head Gasket Belt Driven Camshaft Long life (60000 km) spark plugs