

DRIVING DYNAMICS

ENGINES

In brief:

The XC90 is available with a choice of powerful petrol and diesel engines producing plenty of power and, especially, torque from low engine speeds and through the mid-range, for maximum flexibility and driving pleasure.

Volvo has also ensured that the XC90 offers class leading emissions and fuel economy. The new D5 (185bhp) diesel engine has received extensive modifications for 2006 to enhance power delivery, refinement, performance and emissions. A DPF (diesel particulate filter) with oxidising coating is now standard and the engine is Euro IV compliant.

In Full:

The XC90 is available with a choice of three powerful, turbo engines: one diesel and two petrol:

- **T6:** transverse 6-cylinder, 24 valve, 2.9-litre petrol engine with twin turbochargers. 272bhp and 380 Nm of torque from 1,800-5,000 rpm.
- **2.5T:** transverse, 5-cylinder, 2.5-litre turbo petrol engine. 210bhp and 320Nm of torque at 1,500-4,500 rpm.
- **New D5:** transverse 5-cylinder, 2.4-litre common rail turbodiesel engine with standard DPF (diesel particulate filter) with oxidising coating. Now with 185bhp and 400 Nm of torque from 2,000-2,750 rpm. Euro IV compliant.

All engines produce plenty of power and, especially, torque from low engine speeds and through the mid-range for maximum flexibility and driving pleasure.

Volvo has also ensured the XC90 offers class leading emissions and fuel economy. The petrol T6 achieves up to 29.4mpg on the extra urban cycle with emissions of 309 g/km, while the D5 diesel registers 37.7mpg on the same cycle, with emissions of 242 g/km.

Both engines come from Volvo's car range, but they have been re-profiled to suit XC90. In particular, the petrol engine produces more torque from lower down the rev range.

Engine	T6	2.5T	D5 (Euro IV)
Type:	2922cc transverse 6 cyl/24v turbo	2521cc transverse 5 cyl/20v turbo	2401cc transverse 5 cyl/20v turbo
Fuel	Petrol	Petrol	Diesel
Power	272 bhp	210 bhp	185 bhp
Torque (Nm at rpm)	380 Nm at 1,800 – 5,000 rpm	320 Nm at 1,500 - 4,500 rpm	400 Nm at 2,000 – 2,750 rpm
0-62mph manual/auto	n/a		
9.3 geartronic	9.5 manual		
9.9 geartronic	10.9 manual		
11.5 geartronic			
Top speed manual/auto	n/a		
130 geartronic	130 manual		
130 geartronic 118 geartronic	121 manual		
CO2 g/km	n/a		
304 geartronic	269 manual		
282 geartronic	219 manual		
239 geartronic			
MPG man/auto			
Urban			
Extra urban			
Combined			
-/15.4			
-/29.7			
-/22.2			
18.8/17.4			
31.7/30.4			
25.2/23.9			
26.4/23.7			
40.9/38.2			
34.0/31.4			

T6

The six-cylinder engine is the same unit that powers Volvo's executive saloon, the S80 T6. It has a parallel turbo system – two small and highly efficient turbochargers installed alongside each other, driven by and feed three cylinders each. It is equipped with Continuously Variable Valve Timing (CVVT) on both the inlet and exhaust sides.

CVVT adjusts valve timing to suit the engine's current revs and load, and it thus exploits the engine more effectively, reducing fuel consumption and emissions. One of the most important

results is that maximum torque is available from just 1800 rpm, compared with the 2000 revs/minute of the version in the S80.

2.5T

The five-cylinder 2.5-litre turbo petrol engine joined the XC90 range in 2004 to offer something between the T6 and D5. With a low-pressure turbo, the 2521cc unit offers 210bhp with 320Nm of torque available from 1,500 – 4,500 rpm.

It offers similar performance to the larger T6 engine, achieving 0-62mph in 9.5 seconds with emissions of 269 g/km.

D5

In the UK, the majority of Volvo XC90 customers choose the performance, economy and range of a diesel engine. And from the 2006 model year, Volvo now offers a new, extensively modified version of its refined 2.4-litre, five-cylinder turbodiesel: the D5. Power delivery, refinement, performance and emissions are all enhanced compared to the original D5. The D5 also has the option of a new, high torque six-speed Geartronic available.

The new D5 Euro IV engine received a significant power boost from 163bhp to 185bhp, now boasting the same levels of torque as the high performance S60 R, with 400 Nm available from just 2000 rpm. This flexible performance provides a potential top speed of 121 mph, with 0-62mph now possible in 10.9 seconds (compared to the previous D5's 12.2 seconds).

These enhancements have been achieved as a result of customer feedback and achieved by the following technological developments and extensive changes to performance characteristics of the D5 diesel engine - see following details:

- New electronic glow plug system for faster starting.
- More advanced injection process with 7 spray holes (instead of 5) in each injector for complete fuel atomisation and more efficient combustion and enhanced performance.
- New, larger and more efficient turbocharger with electronic control for faster/more precise control of charge pressure; plus larger compressor wheel, new cambered vanes for improved response at all speeds, and reduced turbo lag.
- Turbo centre housing now water cooled to provide continued cooling after engine stops.
- Improved flow of air/exhaust gases for optimal flow and reduced drop of pressure.
- More powerful engine management system with more sensors to improve regulation.
- EGR (Exhaust Gas Recirculation) system modified for improved flow/regulation.
- New, more effective cooling system for EGR.
- New, faster, electronically controlled throttle moves EGR gases/ regulates temp better.

- Air swirl in combustion chamber is now infinitely variable for more efficient combustion.
- Increased volume for combustion chambers, and consequently a lower compression ratio.
- Larger catalytic converter with oxygen sensor for more precise emissions control.
- NOx emissions reduced by 50%
- Maintenance free, coated diesel particulate filter (Euro IV compliant) automatically burns off soot particulates approximately every 500 miles.
- Low emissions superior to Euro IV control standard requirements:

	<u>Euro IV requirement</u>	<u>D5 (S60 example)</u>
CO (Carbon monoxide)	0.500 g/km	0.207 g/km (58% better than required)
NOx (nitrogen oxide)	0.250 g/km	0.187 g/km (25% better than required)
Particulates	0.025 g/km	0.001 g/km (96% better than required)

CHASSIS

In brief:

The Volvo XC90 uses a wide track and long wheelbase for maximum stability and a car-like driving experience.

The XC90 is designed for all types of roads, irrespective of the surface beneath the tyres or the weather conditions.

Even though the XC90 was never designed to be a serious off-roader, it has the versatile combination of electronically controlled Haldex AWD (all-wheel drive) with Instant Traction™ and generous ground clearance – 218mm – for when the going gets tough.

A high seating position gives the XC90 driver a feeling of safety and greater awareness of the road ahead, as well as the knowledge that he or she can control the car with the help of instant, well-weighted response from the chassis, engine and brakes.

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The chassis in the Volvo XC90 is designed to give the vehicle the same ride and roadholding characteristics as a passenger car.

In the XC90, however, the suspension is more substantial to handle heavier loads, the higher ground clearance and all-terrain possibilities.

The rear multi-link suspension is well isolated, with the dampers and springs attached directly to the subframe. This results in a quieter ride as road and transmission noise is largely filtered out before it reaches the bodywork.

A wide track (1634 mm front, 1624 mm rear) and a long wheelbase (2857 mm between the front and rear axles) make for exceptional stability, with the XC90 behaving consistently and dependably even on curving, twisting and uneven roads.

STEERING, BRAKES AND TRANSMISSION

In brief:

- **Speed Sensitive System (standard T6).**
- **Emergency Brake Assistance (EBA).**
- **Intelligent Haldex Electronic AWD with Instant Traction™.**
- **DSTC and TRACS.**
- **2.5T: 6-speed manual gearbox or 5-speed Geartronic.**
- **New D5: 6-speed manual gearbox or new high-torque 6-speed Geartronic.**
- **T6: 4-speed Geartronic transmission standard.**

The XC90 is as easy, responsive and rewarding to drive as any regular Volvo saloon or estate model. Its torsionally rigid body, transverse engines and all-wheel drive combine to give an almost even weight distribution (53 per cent front, 47 per cent rear).

The front MacPherson suspension and new ZF steering gear promote increased precision and sharp response. Speed Sensitive Steering is standard on T6 petrol models and optional on other models.

The XC90's braking system is designed and tested to help stop the vehicle safely, even when it is fully loaded with seven people and luggage.

Geartronic transmission is standard on T6 models and optional on the rest of the range. The 2.5T engine is offered with a six-speed manual transmission as standard, or the option of a 5-speed Geartronic. The D5 has a six-speed manual unit, and for 2006 also has the option of a new six-speed Geartronic.

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DSTC, EBD and EBA

The XC90's braking system is designed and tested to help stop the vehicle safely, even when it is fully loaded with seven people and luggage, and is backed by sophisticated traction and stability control systems. Dynamic Stability and Traction Control (DSTC) is standard on every model and prevents wheelspin by either braking the wheel that has lost traction (up to 25mph) or, at speeds above 25mph, by reducing engine power and using extra sensors to detect the onset of a skid. The system then automatically slows the appropriate wheel to restore control. It ensures that the driven wheels get exactly as much power as they can transfer to the road.

All XC90s benefit from ABS brakes with EBD (Electronic Brake Distribution) with an optimised brake system and EBA (Emergency Brake Assistance) which monitors how quickly the brake pedal is pressed, and determines if the driver is panic-braking. When this occurs, the brake pressure is boosted to maximum in the shortest possible time, to reduce the stopping distance.

AWD with Instant Traction™

The Volvo XC90's AWD (all-wheel drive) system has the latest electronic system developed in conjunction with the Swedish specialist, Haldex. It operates independently of driver input, distributing torque automatically between the front and rear wheels for the best possible grip in all conditions.

For 2006 model year, a new 'pre-charged' function uses a non-return valve within the coupling making 80Nm of torque instantly available to the rear wheels if the sensors detect any slippage. It feeds more power to the rear wheels as the car pulls away to improve acceleration. Once moving, power is balanced between front and rear, reducing drive to rear wheels when not needed, and helping to reduce fuel consumption.

The intelligent AWD system uses a variety of sensors to monitor the road surface and the steering wheel, brake and accelerator pedal positions. In normal driving conditions on dry roads, 95 per cent of the power is distributed to the front wheels. However, for off-road work, or if the sensors detect slippage, between 5 and 65 percent of the power/torque is diverted to the rear wheels to maximise traction, if required.

Compared with previous Volvo all-wheel drive systems based on a viscous coupling differential, the new Haldex AWD system has a much quicker response - without the driver noticing.

In addition, the power is distributed between right and left wheels by 'TRACS' - Volvo's traction control system. TRACS intervenes, when necessary, by braking a wheel if it starts to spin and to increase the power to the wheel with the best traction. This means power is automatically and smoothly distributed to any wheels with the best traction at any given time.

TRACS is deactivated during braking so the brake and ABS systems can function effectively, for high stability and shorter braking distances.

Geartronic

With Volvo's Geartronic transmission, the driver gets the best of both worlds: on the one hand, the transmission can be left to take care of gearchanging entirely automatically, or the driver can over-ride the system to change gears when required.

The automatic transmission is adaptive, which means that it monitors the driver's driving style and adjusts the gearchanging pattern accordingly. It also features a "W" setting for winter driving on slippery surfaces when it will start in a higher gear to avoid wheelspin and loss of control.

The Volvo XC90 T6 has 4-speed Geartronic transmission as standard, while a five-speed Geartronic is available with the 2.5T engine. Also, for 2006, a new high-torque six-speed Geartronic was introduced with the new D5 engine.