

Press Release

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VOLVO XC90

OVERVIEW:

- High quality, flexible and innovative 7-seat as standard interior, with 64 seating configurations
- Two high-performance petrol engines - V8 (315PS) and a 3.2-litre in-line six-cylinder (238PS) - and the D5 turbodiesel (185PS).
- Premium 7-seat SUV which achieves a sub 225g/km of CO₂ in the D5 manual and Geartronic.
- Sporty R-DESIGN package introduced in May 2008.
- Car-like driveability with AWD (All Wheel Drive) with Instant Traction™ and 218mm of ground clearance for all-terrain ability.
- Active, SE, R-DESIGN SE, SE Lux, and the Executive trim levels available.
- R-DESIGN features dynamic chassis settings, stiffer anti-roll bars, firmer shock absorbers and sport tuned speed-dependent steering.
- Innovative safety, including Roll-Over Protection System (ROPS), Roll Stability Control (RSC), BLIS, WHIPS, SIPS, IC, DSTC, EBD etc.
- Fully crash-tested at the Volvo Safety Centre - including compatibility with smaller cars.
- Higher standard specifications than rival SUVs from other premium brands.
- Oeko-tex standard compliant, emissions-free interior.

The Volvo XC90 revolutionised the premium SUV market when it was launched in 2003. With its modern design, powerful engines, Roll-Over Protection System (ROPS) and seven-seat capability with up to 64 seating configurations, it rapidly became one of Volvo's best-selling models. It is produced at Volvo's Torslanda plant in Gothenburg, Sweden.

With increased refinement, desirability and performance, the Volvo XC90 features elegant exterior styling, a more luxurious and highly-specified interior, and two high-performance petrol engines - Volvo's V8 (315PS) and a 3.2-litre, in-line six-cylinder - the Volvo XC90 has moved further upmarket in the premium SUV sector. The Volvo XC90 is available in Active (D5 only), SE, SE Lux, R-DESIGN SE and Executive trim levels, all offering a high standard specification compared with most other premium brand rivals.

The D5 Geartronic engine was re-homologated in 2008 resulting in the CO₂ figure dropping from 239g/km to 224g/km and so both the D5 manual and Geartronic fall below the key threshold for Vehicle Excise Duty. This also means that the Volvo XC90 is one of only two premium 7-seat SUVs to achieve a sub-225g/km figure.

The Volvo XC90 features AWD (All Wheel Drive) with Instant Traction™, with an electronic BorgWarner coupling system to maximise traction between front and rear axles, yet despite its substantial off-road abilities, it is as easy, responsive and rewarding to drive as any regular Volvo saloon or estate model.

In order to optimise safety in the Volvo XC90 and, in particular, reduce the risk of a roll-over, Volvo has fitted as standard a Roll-Over Protection System (ROPS) with Roll Stability Control (RSC) technology. This uses a gyro-sensor to register the car's roll speed and roll angle to instantly calculate the terminal angle and risk of a roll-over, and automatically activate the DSTC (Dynamic Stability and Traction Control) anti-skid system, if required, to help the driver maintain control.

For added protection, Volvo has also reinforced the XC90's roof structure with extremely tough Boron steel, which is four to five times stronger than normal steel. In addition, the side Inflatable Curtain (IC) protects all three rows of seats and has been designed to stay inflated longer in case of multiple roll-overs, and to help keep occupants inside the vehicle. As you would expect, the Volvo XC90 scores highly in a variety of international safety ratings, including pedestrian protection test ratings.

Volvo has also considered the XC90's crash compatibility with other, smaller cars, and designed a lower cross-member - concealed behind the front spoiler - at the height of a bumper in a conventional car to impact with and activate its crumple zones as intended.

DESIGN CONCEPT

- Designed to reflect customers' AWD/all-terrain requirements in a premium package.
- Complements Volvo XC70 and XC60 in Volvo's XC (Cross Country) Range.
- Five trim levels available: Active, SE, new R-DESIGN SE and SE Lux, plus Executive.
- Ground clearance of 218mm.

At the front, the traditional Volvo V-shaped bonnet incorporates a grille with a wide chrome surround and three-dimensional mesh inserts, plus a large Volvo 'iron mark' badge. The front bumper has a degree of colour-coding and an extended skidplate built into it. The Volvo XC90 is also distinguished by 18in alloy wheels (standard on SE and SE Lux) and colour-coded side mouldings, door handles and wheelarch mouldings with black stone protectors. In line with the rest of the Volvo range, the Volvo XC90 also features large, body-coloured door mirrors, which incorporate the side indicator lights.

The muscularity of the Volvo XC90 is matched by rounded corners front and rear, a gently sloping (split) tailgate and shorter roof section to promote a smoother, non-aggressive impression and help the vehicle to look more compact and desirable.

The Volvo XC90's 'cockpit forward design' enables the passenger compartment to be as far forward as possible with a more steeply raked windscreen than in most other SUVs. This has allowed Volvo to make a seven-seat SUV yet still within modest overall body dimensions.

The Volvo XC90's tailgate is gently sloping rather than vertical to clearly state that this is not a regular Volvo estate car. The resulting shorter roofline also helps the vehicle appear smaller and gives it a sporty stance.

For added convenience, the tailgate is split so the lower section can be used as a seat or table; it is strong enough to be stood upon when loading items onto the roof, and the upper section is not too large, heavy or high when opened.

Five trim levels are offered for the Volvo XC90 - Active, SE, R-DESIGN SE and SE Lux and Executive - each with its own subtle variations.

DRIVING DYNAMICS: ENGINES

The Volvo XC90 is available with a choice of three high-performance engines - one diesel and two petrol - all of which produce plenty of power and, especially, torque from low engine speeds and through the mid-range for maximum flexibility and driving pleasure.

Engine:	3.2 Geartronic	V8 Geartronic	D5
Type	3192cc transverse 6cyl, 24v	4414cc transverse 8cyl, 32v	2400cc transverse 5cyl, 20v turbo
Fuel	Petrol	Petrol	Diesel
Power	238PS	315PS	185PS
Torque	320Nm at 3200rpm	440Nm at 3900rpm	400Nm at 2000-2750rpm
0-60mph	8.9 seconds	6.9 seconds	10.3 manual/11.1 Geartronic
0-62mph	9.5 seconds	7.3 seconds	10.9 manual/11.5 Geartronic

Top speed	130 mph	130 mph	121 manual/118 Geartronic
CO ₂ (g/km)	289 Geartronic	322 Geartronic	219 manual/224 Geartronic
Ins group	16E	19E	15E (17E - Executive)
Mpg: Urban	16.4	14.1	26.4/25.4 G
Extra-urban	30.7	28.8	40.9/40.4 G
Combined	23.3	20.9	34.0/33.2 G

Steering	Rack and pinion
Turning circle, m	125 Tyres - 12.5; 255 Tyres - 13.1
Transmission	6-speed manual: D5 6-speed Geartronic: 3.2, V8, D5
Brakes: Front discs Rear discs	17in - 336mm ventilated (D5: 16in - 336mm vent) 308mm
Fuel tank, litres	80 (D5 68)
Load capacity, litres	
2 nd /3 rd row up	249
2 nd row up/3 rd row down	615
2 nd /3 rd row down	1837
Load length: rear seats (2 nd row) up	1830mm 3845mm
Load length: rear seats down	
Dimensions, mm	
Length	4798
Width (excluding mirrors)	1898
Unladen height	1784
Wheelbase	2857
Front track width	1634
Rear track width	1624
Ground clearance, mm	218
Max towing weight braked	2250kg
Max total weight	3.2: 2760kg V8: 2770kg D5: 2740kg manual/2750kg Geartronic
Max payload	3.2: 613kg V8: 577kg D5: 621kg manual/615kg Geartronic
Max roof load	100kg
Max trailer 'noseweight'	90kg

V8

Volvo's first V8 engine offers 315PS and 440Nm of torque (370Nm of which is available from 2000rpm) - enough to provide the Volvo XC90 with stirring performance, as well as a rousing V8 'burble'. The V8 Volvo XC90 has as standard Volvo's six-speed Geartronic automatic transmission, as well as the latest All Wheel Drive (AWD) system with Instant Traction™, and sprints from 0-60mph in just 6.9 seconds, has emissions of 322 g/km and an electronically limited top speed of 130mph.

It is an extremely refined engine, with compact dimensions to enable it to be fitted transversely in the Volvo XC90 - like all Volvos - to help maintain good front crumple zones and leave more space for the passenger compartment.

Its compact design was achieved by positioning the cylinders at 60 degrees with a counter-rotating balancer shaft, rather than the conventional 90 degrees. The left-hand bank of cylinders is also offset slightly relative to the right bank - the opposite of normal V8 design. This has enabled the unit to be designed exactly to match the front-end collision protection structure.

In addition, all the ancillaries, such as the alternator, are fitted directly onto the engine itself without any space-stealing brackets. The starter motor is fitted above the transmission to save space; similarly, the exhaust camshafts are driven by secondary chains running off the inlet camshafts. The result is a V8 engine that is just 754mm long and 635mm wide and weighs just 190kg thanks

to the block and cylinder head being cast in aluminium.

The counter-rotating balancer shaft between the banks makes this engine one of the world's smoothest running V8s.

The 4.4-litre V8 engine is immensely powerful, with a maximum of 315PS and no less than 440 Nm of torque. They jointly satisfy the needs of particularly enthusiastic driving or effortless motorway cruising. There's a massive 370 Nm of torque available around 2000 rpm - the most common rev range in everyday driving.

It is also one of the cleanest V8 engines on the market and meets the American ULEV II (Ultra Low Emissions Vehicle, stage II) standard, which has been possible with the help of:

- Four catalytic converters. Two of these are of close-coupled catalyst type and fitted to one exhaust manifold each. The other two are installed under the car floor.
- Lean air/fuel mixture for lower emissions at cold start.
- Higher idling speed at cold start (about 1250rpm) and optimised ignition for faster warming of the engine and catalytic converters.

The result is extremely low emissions before the catalytic converters are activated - which takes place just 15-20 seconds after the engine is started.

3.2

The new six-cylinder 3.2-litre (3192cc) engine develops 238PS and 320Nm of torque, which translates into a 0-60mph time of 8.9 seconds with emissions of 289 g/km and a top speed of 130mph. It also comes as standard with Volvo's six-speed Geartronic transmission and the latest All Wheel Drive (AWD) system with Instant Traction™.

Built at Bridgend in Wales, the 3.2 is a modern unit, mostly made of aluminium with an efficient design. A straight-six engine is, intrinsically, the most refined and smoothest of all engine configurations. But their length makes them difficult to package transversely. Most straight-six engines would not fit into a car's engine bay crossways; they're too long. Volvo engineers overcame this problem by making the new in-line six-cylinder (SI6) engine extremely compact, and much shorter than the straight-six norm. In fact, it is more compact than Volvo's five-cylinder engines as its ancillary components are neatly positioned behind the engine in the space above the transmission.

The key was a new, unique and highly innovative drive system' known as READ - Rear End Ancillary Drive. All ancillaries, such as power steering pump and air conditioning compressor, are driven by gears at the rear end of the crankshaft. The alternator is direct driven and installed on the engine block. The flywheel damper is now inside the engine.

The result is an extremely short engine, of just 625 mm, or only 3mm longer than Volvo's five-cylinder engine. This substantially increases engine bay space, so the straight-six can be fitted crossways and the excellent crash structure can be configured around it. The SI6 has aluminium block and head and both are structurally optimised to balance low weight and stiffness. Even the camshaft cover is structural, allowing it to incorporate the camshaft bearing caps for further weight reduction. There are twin overhead camshafts and 24-valves (four per cylinder) to provide optimal engine breathing. Engine breathing is further improved by Volvo's patented Cam Profile Switching (CPS) system that features two completely different intake cam profiles machined onto the same camshaft. The engine management system decides which cam profile to use, depending on the engine's running conditions and driver's torque demands. One profile is ideal for low speed/low load driving and offers good torque and excellent fuel economy. The other, which gives longer valve lift, is ideal for enthusiastic driving, at higher speeds. An ingenious two-piece hydraulic valve tappet arrangement alters the cam profiles.

'In principle, Cam Profile Switching creates two engines in one,' says Derek Crabb. 'We can unite widely differing demands on one and the same engine and easily meet the requirements of customers with entirely different wishes. Our focus is just as much on satisfying customers who prioritise performance as those who are more interested in driving comfort and fuel economy.' The SI6 engine also features a continuously Variable Cam Timing (VCT) system, to constantly alter valve overlap to achieve optimum power, efficiency and emissions. The combination of CPS and VCT gives the new straight-six engine an astonishingly broad power and torque band, and

improves both outright performance and the vehicle's driveability.

In addition, the Variable Intake System (VIS) - which varies both intake tract length and, more unusually, plenum volume, through two throttle flap valves - boosts low-end torque and high-end power, further helping the breathing capability of this astonishing engine. For instance, 80 percent of the vehicle's maximum torque is available across the entire rev range, and 256 Nm is on tap all the way from 1400rpm to 6400rpm.

'VIS enables us to exploit the engine's capacity to the maximum and extract the maximum possible power throughout the entire rev range,' says Derek Crabb.

The SI6 engine is also amazingly clean, complying with Euro5 emission control standards, and ULEV (Ultra Low Emissions Vehicle) II standards in the US.

It achieves high performance with good fuel economy thanks to its valve train, with both Variable Cam Timing (VCT) and Cam Profile Switching (CPS) on the intake side. With CPS, the intake valves can be lifted to different heights depending on engine revs and load - a lower lift for economical driving and a higher one for more power, almost creating two engines in one.

D5

Volvo's 2400cc, D5 turbodiesel, which develops 185PS and 400Nm of torque, offers both strong mid-range urge and refinement. It is fitted with a diesel particulate filter as standard, a six-speed manual transmission or (optionally) Volvo's six-speed Geartronic, plus the latest common-rail direct-injection technology. The manual Volvo XC90 D5 gets from 0-60mph in 10.3 seconds and has a top speed of 121mph, whilst achieving an average of 34.0mpg on the combined cycle.

The D5 turbodiesel engine was substantially revised and enhanced in 2005 following technological developments and extensive changes to the performance characteristics. For example, these included:

- 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 atomization 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.
- Faster, electronically controlled throttle moves EGR gases/regulates temperature 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 per cent.
- Maintenance free, coated diesel particulate filter (Euro IV compliant) automatically burns off soot particulates - approximately every 500 miles.

With CO₂ emissions being a hot topic, Volvo were pleased to report that after several updates for in 2008 the D5 Geartronic now boasts a figure of 224g/km down from 239g/km. Together with the 219g/km figure for the D5 manual the engine falls into VED band K. This also means that the Volvo XC90 is one of only two premium 7-seat SUVs to achieve a sub 225g/km figure.

DRIVING DYNAMICS:CHASSIS

- AWD with Instant Traction™ for impressive all-terrain and on-road performance.
- Electronic BorgWarner coupling system maximises traction between front and rear axles.
- Volvo's TRACS anti-spin system also distributes power across the axle.
- R-DESIGN SE Sport model: dynamic chassis settings, stiffer anti-roll bars, firmer shock absorbers and sport tuned speed-dependent steering.
- A new, lighter chassis and new dampers designed to improve drivability was introduced in

2009.

- 218mm ground clearance.
- Car-like driving experience.
- Wide track and long wheelbase for maximum stability.
- Dynamic Stability and Traction Control (DSTC) fitted as standard.
- Sophisticated multi-link rear suspension.
- Load-compensating suspension fitted as standard.

The Volvo XC90 is designed for all types of roads, irrespective of the surface beneath the tyres or the weather conditions. Even though it was never designed to be a serious off-roader, the Volvo XC90 has the versatile combination of electronically controlled BorgWarner All Wheel Drive (AWD) with Instant Traction™ and a generous 218mm of ground clearance for when the going gets tough.

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

The chassis in the Volvo XC90 is designed to give the vehicle the same ride and roadholding characteristics as a passenger car. The suspension is more substantial, however, to handle heavier loads, as well as 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 (1634mm front, 1624mm rear) and a long wheelbase (2857mm between the front and rear axles) make for exceptional stability, so the new Volvo XC90 behaves consistently and dependably, even on curving, twisting and uneven roads.

The XC90 R-DESIGN SE model models features dynamic chassis settings, stiffer anti-roll bars, firmer shock absorbers and sport tuned speed-dependent steering.

The shock absorbers have stiffer rebound rates and the anti-roll bars are stiffer (front +0.5mm; rear +1.0mm) to offer a high level of stability when cornering. The speed dependent steering has also been adapted to offer a quicker steering response. Furthermore, Volvo's self-levelling system, Nivomat, has been fine-tuned to offer great stability and driving control.

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, BorgWarner. It operates independently of driver input, distributing torque automatically between the front and rear wheels for the best possible grip in all conditions.

A '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 the 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 per cent of the power/torque is diverted to the rear wheels to maximise traction, if required.

The XC90 further benefits from Volvo's TRACS anti-spin system and Dynamic Stability and Traction Control (DSTC). TRACS prevents wheel spin by transferring power across the axle if it detects a wheel is losing grip on one side. This means power is automatically and smoothly distributed to the 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.

In addition, the DSTC system increases driving safety on twisty roads and in slippery conditions by using sensors to detect if one of the driven wheels shows any sign of losing traction and cutting

the power to it at lightning speed so it can quickly regain grip. And if the car shows any tendency to skid, the system automatically brakes the relevant wheels to help maintain smooth control.

All Volvo XC90 models benefit from ABS brakes with Electronic Brake Distribution (EBD) and Emergency Brake Assist (EBA) which senses an emergency stop and automatically brings the car to a halt in as short a distance as possible.

DRIVING DYNAMICS: STEERING, BRAKES AND TRANSMISSION

- Power-assisted ZF rack and pinion steering optimised for feedback/response.
- Speed-dependent steering (standard on V8).
- Anti-lock brakes (ABS) with Electronic Brakeforce Distribution (EBD).
- Dynamic Stability and Traction Control (DSTC) with Emergency Brake Assist (EBA).
- Six-speed manual transmission for D5 turbodiesel; six-speed Geartronic optional.
- Six-speed Geartronic transmission standard on V8 and 3.2-litre petrol.
- Geartronic automatic transmission adapts its shift patterns to suit individual driving styles and includes a sequential, manual-shift facility for added control.

The Volvo XC90 is as easy, responsive and rewarding to drive as a regular Volvo saloon or estate model. Its torsionally rigid body, transverse engines and All Wheel Drive combine to create almost even weight distribution (53 per cent front, 47 per cent rear).

The front MacPherson suspension, together with the ZF steering gear, promotes increased precision and sharp response. Speed-sensitive steering is standard on V8 petrol models and optional on the rest of the range.

DSTC, EBD and EBA

The Volvo 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 Volvo XC90s benefit from ABS brakes with EBD (Electronic Brake Distribution) and EBA (Emergency Brake Assist) 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.

Geartronic

Volvo's Geartronic transmission - standard on V8 and 3.2-litre petrol models, optional on the D5 - gives the driver the best of both worlds. Geartronic automatically adjusts its shift points to reflect the driver's style and also offers a manual, sequential-shift facility where the driver is able to choose gears individually by tipping the lever forwards to change up and backwards to change down. 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.

INTERIOR DESIGN

- Innovative and flexible interior.
- Seven individual, forward-facing seats in three rows with 64 seating configurations.
- Centre seat of middle row features integrated child booster cushion and moves forward nearer adults in front of car.
- Higher-quality feel with new materials, upholsteries and luxury detailing.
- Upgraded centre console with new display and aluminium-effect trim.
- Air vents on B-pillars for added comfort of rear passengers.

- Front passenger seat folds forwards to accommodate long loads.

The interior of the Volvo XC90 endorses the car's premium feel, materials used and a high standard of detailing impart an air of luxury and craftsmanship. The driver will appreciate a clear and ergonomically designed instrument panels, which has a typically Scandinavian simplicity of line and functionality: plenty of information from a small number of meticulously designed instruments.

Compared with those found in a normal saloon, the instruments and controls are angled slightly up towards the driver's eyes. Together with the high seating position, this enhances the feeling of control - the single quality that SUV buyers generally prize most highly.

Despite being 25mm shorter than the Volvo V70 premium estate, the Volvo XC90 offers the greatest flexibility in the premium SUV class, with generous interior space housing seven individual, forward-facing seats - all with head restraints and seat belt pre-tensioners.

The middle seat in the centre row has an integrated child booster cushion and also slides forwards independently so it can be positioned directly between the two front seats, thus improving contact between a child and the front seat occupants. What's more, the armrest between the front seats is removable to create more leg room for the passenger in this centre seat. In total, there are 64 different seating configurations.

The third row features two separate seats, offering full comfort for children or for adults of modest build. Unlike some rivals, these do not take up valuable space or have to be clumsily removed, but instead they neatly and simply fold away individually out of sight into the boot floor when not in use, so are always on hand.

Both the second and third rows of seats can be folded down to create an entirely flat luggage compartment floor no less than 3845mm long and 1127mm wide, with a volume of 1837 litres. In addition, the front passenger seat also folds forwards to accommodate extra-long loads. Even with all seven seats in use, there is still a useful amount of load space for the family - 249 litres, to be precise.

QUALITY AND EQUIPMENT

- Higher standard specification than many other premium brand rivals.
- Active, SE, R-DESIGN SE and SE Lux variants, plus Executive models.
- Hard disk-based RTI satellite navigation system with RDS-TMC.
- High Performance Sound audio system with MP3/WMA compatibility and auxiliary input for i-Pod connection fitted as standard.
- World-class Dynaudio Premium Sound audio system available, with Dolby Pro Logic II Digital Surround Sound™, 5x130w amplifier, aux input (MP3/WMA compatible) and 12 Dynaudio speakers (standard on Executive).
- Extensive range of options and accessories available, including Active Bending headlights, DVD-based rear seat entertainment with option to view Freeview and a Park Assist camera.
- Rear seat headphone sockets available (standard on Executive).
- Premium upgrade available on all engine and trim variants (except from Executive).

In the Volvo XC90 considerable importance has been attached to providing a comprehensive standard specification to reflect the upmarket ambience of the car itself.

Luxurious touches such as the use of high-quality materials and upholsteries, and satin chrome inlays for the controls are matched by a high level of standard equipment on all models.

Hi-fi enthusiasts can upgrade to the Executive model's Dynaudio Premium Sound system with Dolby Pro Logic II Surround Sound™ and 12 Dynaudio speakers. It includes a 6xCD, FM and AM radio, 5 x 130w amplifiers, as well as MP3/WMA compatibility and an auxiliary jack input to enable customers to connect personal I-Pod players.

The Volvo XC90 is available in Active (D5 only), SE, R-DESIGN SE and SE Lux variants, plus Executive trim levels.

The standard specification of the 'Active' model includes:

- Alarm with immobiliser
- Rear Park Assist
- Electronic Climate Control (ECC) with Air Quality System (AQS) and pollen filter
- Information centre
- Leather gear knob
- Load cover
- Steering wheel remote audio controls
- High Performance Sound audio system with CD, 4x40w amplifier and 8 speakers
- MP3/WMA compatibility
- Auxiliary input for MP3/i-Pod connection
- Key-integrated remote control central locking with deadlocking system
- 17in alloy wheels
- Front fog lights
- DSTC (Dynamic Stability and Traction Control) with EBA (Emergency Brake Assist)
- RSC (Roll Stability Control)
- Marstrand textile/vinyl upholstery
- Cross Brushed Aluminium trim
- Electronic All Wheel Drive with Instant Traction™
- Load-compensating suspension
- Rear skid plate
- Active Bending Headlamps
- Cruise Control

Upgrading to the 'SE' specification adds:

- Body-coloured wheelarches
- Body-coloured mirrors, door handles and side rubbing strips
- Electric driver's seat (with memory) and door mirror memory
- Leather-faced upholstery
- 18in alloy wheels
- Rain sensor - automatic windscreen wiper activation
- Autodimming Rear View Mirror with Compass
- Power folding door mirrors with ground lights

R-DESIGN offers the SE specification, plus:

- Larger 19in alloy wheels
- Front and rear skid plate
- Extended body coloured wheel arch extenders
- Exterior trim with a satin silver finish, rather than the standard chrome
- Unique sill mouldings in brushed stainless steel
- Roof rails are not fitted - for a sleeker appearance, although available
- Active Bending lights with Headlamp Cleaning System
- R-DESIGN badge in front grille and branding on steering wheel
- Unique quad exhaust endpipes
- Silver-matt finish to door mirror caps
- Unique leather-faced upholsteries embossed with R-DESIGN logo: Off Black with Cream inlay or Calcite with Off-Black inlay.
- Sports gear knob & steering wheel
- R-DESIGN instrument dials, floor mats and aluminium sports pedals
- Lowered Sports Chassis

The new 'SE Lux' offers the same specification as the SE but adds:

- Chronograph instrument dials
- Brushed aluminium roof rails
- Soft leather upholstery
- 18in alloy wheels
- Active Bending Headlamps and cleaning system
- Power driver and passenger seats
- Heated front seats
- Sanded Silver Aluminium trim
- Luxury floor mats

The 'Executive' represents the ultimate Volvo XC90 with the following additional specification:

- Active Bending headlamps
- Dynaudio Premium Sound audio system with 6xCD autochanger and Dolby Pro Logic II with digital Surround Sound™, 5x130w amplifier and 12 speakers
- Extended body-coloured wheelarches
- 19in alloy wheels
- Silver front skidplate
- Chromed wide tailpipe cover
- Satin chrome door mirror caps
- Chromed C-pillar with 'Executive' badge
- Executive ventilated soft leather upholstery with massage function and door inserts with contrast piping
- Executive soft leather extra padded front door armrests
- RTI satellite navigation system with RDS-TMC and Europe data on hard disk
- Integrated GSM telephone
- Rear seat headphone sockets
- Executive Nubuck trimmed floor mats
- Metallic paint
- Unique matt silver grille
- Walnut wood trim in door panels, centre console and gear lever knob
- Volvo On Call

A comprehensive range of optional items includes a DVD-based rear-seat entertainment systems with the ability to watch Freeview channels, as well as many of the features from the top-of-the-range Executive model, such as Active Bending headlights, which feature a unique design and a facility to change the headlamp beam pattern for driving in mainland Europe, integrated telephone, an upgraded, hard disk-based RTI satellite navigation system with TMC (Traffic Message Channel), rear headphone sockets and the Dynaudio Premium Sound audio system.

Customers can also opt for the ultimate upgrade with a Premium package. The Premium upgrade is designed to complement the existing high level of specification on every model by adding Satellite Navigation System (RTI) and Dual Band Integrated GSM Telephone and Volvo On Call. Premium is available on all trim and engines variants, apart from Executive.

Volvo owners can also personalise their car by choosing options such as dark-tinted rear windows, third-row seating air conditioning, or a rear entertainment system. Many are conveniently grouped together, such as the Winter, Communications and Family Packs:

Winter Pack:	Heated front seats, headlamp cleaning system, luxury floor mats
Communications Pack:	Dual-band integrated GSM telephone with handset, RTI navigation system with RDS-TMC, remote control and Europe data on hard disk, Volvo On Call
Family Pack	Power Child Locks Rear Doors, Dark Tinted Rear Windows, Rear Headphone Sockets and 3 rd Row Air Conditioning

Rear-seat entertainment

Rear-seat passengers have access to their own headphone socket and control unit for the audio system, located conveniently in the C-post. There they can plug in their headphones and simultaneously listen to either a CD or the radio, so they are not limited to what's coming through the speakers. This means that parents and children can each enjoy their different tastes in music at the same time - making long trips in a Volvo XC90 much more enjoyable.

Rear-seat entertainment options include a choice of DVD-based twin screen systems. The factory option offers a DVD player in the front armrest with two seven-inch screens in the head restraints of the front seats. Alternatively, there are two other options offered as an accessory fit: a twin-screen system with a DVD fitted in the boot that can take 10 DVDs at a time, or a roof-mounted single screen that is lowered on powered hinges. They can be remote-controlled and used with wireless headphones to avoid disturbing other passengers. The DVD players play ordinary CDs as well. A Digital TV option is also available to supplement the RSE system, this enables passengers to watch Freeview channels.

RTI with RDS-TMC

Volvo's RTI (Road and Traffic Information) satellite navigation system works from a hard disk-based system (instead of DVD) which is easy to use and calculates routes quickly. The system

offers a choice of 'Easy' or 'Advanced' modes, according to the driver's needs.

The system also features RDS-TMC (Traffic Message Channel) which displays up-to-date information on traffic problems. It has a large colour screen that rises from the top of the dashboard to be safely positioned in the driver's view. Controls on the rear side of the steering wheel make it easy for the driver to use the system while driving, or there's a remote control unit for passengers to use.

Volvo On Call - advanced telematics

Volvo On Call is a valuable personal safety feature using advanced telematics. The system uses an integrated GSM telephone with a built-in GPS unit for satellite positioning, and ensures help is always close at hand.

Volvo On Call - safety package: Volvo On Call comes with a standard safety package. If an airbag or seat belt pre-tensioner is triggered in the event of an accident, Volvo On Call automatically calls the Emergency Services via BT999 and can also provide data of your location.

Alternatively, pressing the red 'SOS' button on the integrated GSM telephone will put you straight through to the Emergency Services.

Also, if the car breaks down or you need help, pressing the Volvo On Call button will put you straight through to a Volvo On Call operator who is only a call away at any time of day to offer personal services such as route guidance, or to guide roadside assistance to you.

Volvo On Call - security package: An optional Volvo On Call security package offers the added benefits of a remote door unlock facility, theft notification and vehicle tracking.

Accessories

There's also a vast range of accessories to accommodate the needs of every Volvo XC90 owner.

A Park Assist Camera uses the car's RTI navigation screen to display what's going on behind when reversing, as well as showing 'help lines' of the car's planned path, which could be especially useful to customers reversing to hitch up to a trailer. The wide range of load-carrying systems includes ski and roof boxes, bike racks and surf board holders, roof protection ribs and towbars - all designed to ensure the car can accommodate the hobbies, interests and busy lives of Volvo owners.

Warranty

This quality assurance package is backed up by a comprehensive warranty. The standard mechanical warranty is three years/60,000 miles (whichever is soonest), there's a three-year, unlimited-mileage warranty on the paintwork and eight years' cover against rust perforation. In addition, all Volvos are covered by one year's free RAC cover, which provides full breakdown and recovery assistance, anywhere in Europe, 24 hours a day.

SAFETY

- ROPS (Roll-Over Protection System).
- RSC (Roll Stability Control).
- Special Boron steel reinforced roof structure.
- SIPS (Side Impact Protection System) with side airbags and IC (Inflatable Curtain) airbags for front and rear passengers.
- Twin front 'intelligent' airbags.
- Seven three-point seat belts with pre-tensioners.
- WHIPS (Whiplash Protection System) for front seats.
- BLIS (Blind Spot Information System) available.
- Water-repellent glass available for door mirrors (standard on SE Lux and Executive) and (laminated) side windows.

- Lower cross-member for increased car-to-car crash compatibility.

Like all Volvo models, the XC90 features a comprehensive safety package designed to protect occupants in a wide variety of accidents. Given the higher centre of gravity of an SUV, however, there has been a greater focus on the increased potential for roll-over accidents.

Roll-Over Protection System

Volvo's Roll-Over Protection System (ROPS) tackles the problem from two directions:

- A stability-enhancing system, Roll Stability Control (RSC), minimises the risk of the new Volvo XC90 rolling over in the first place.
- Increased protection is provided for occupants if the vehicle does roll over.

Owing to its higher centre of gravity, an SUV may have a higher risk of rolling over in certain critical situations compared with a conventional car. That is why the centre of gravity in the Volvo XC90 has been kept as low as possible compared with most SUVs. In fact, it is just 89mm higher than that of the Volvo XC70.

However, this does not mean that Volvo has compromised on one of the properties that SUV buyers value so highly: a commanding seating position.

Roll Stability Control

In order to help reduce the risk of a roll-over situation, Volvo has developed an active stability-enhancing system known as Roll Stability Control (RSC). The system uses a gyro-sensor to register the car's roll speed and roll angle and instantly calculates the terminal angle and roll-over risk.

If there is an obvious risk of rolling over, the DSTC (Dynamic Stability and Traction Control) anti-skid system is activated and responds by reducing the engine's power and braking one or more wheels as necessary until the car understeers and stability is regained.

This significantly helps reduce the risk of a roll-over accident initiated by extreme manoeuvres and is the only active stability-enhancement system to measure the car's roll angle.

Special Boron steel in a reinforced roof structure

If the Volvo XC90 experiences a roll-over, the passive safety systems kick in. The goal is to reduce the risk of occupants' heads coming into contact with the car's interior roof panel or sides. So, Volvo has reinforced parts of the roof structure in the Volvo XC90 with extremely tough Boron steel, which is four or five times stronger than normal steel.

All seven seats are equipped with seat belt pre-tensioners to hold the occupants securely in place. In an accident, the pre-tensioner pulls the seat belt firmly across the occupant's body in order to help provide maximum protection.

To help prevent the head from striking the car's sides, the Volvo XC90 is equipped with Volvo's Inflatable Curtain (IC). IC also helps prevent the occupants or any limbs from being thrown from the car in an accident. In the Volvo XC90, the IC protects all three rows of seats.

The Volvo XC90's IC is specially adapted to stay fully inflated for longer to offer maximum protection in a roll-over scenario. If the occupant's head is resting against the window at the moment of inflation, the curtain will slip between the glass and the occupant's head.

Compatibility

The problem of compatibility - when an SUV collides with a car that sits closer to the road surface - was another important focus throughout the development of the Volvo XC90.

A typical SUV has a high ground clearance and thus often comes with high-positioned bumpers. This may create a greater risk of damage to the oncoming car and more serious injuries to its passengers as the lower car's protective beams and crumple zones simply slip below the front of the SUV without being activated.

In order to reduce the risk of this type of injury, the Volvo XC90's front suspension subframe is supplemented with a lower cross-member neatly concealed behind the front spoiler and positioned at the height of the beam in a conventional car.

The lower cross-member strikes the oncoming car's protective structure, activating its crumple zone as intended so the occupants can be given the maximum level of protection.

Considerable attention has also been given to the safety of pedestrians, cyclists and other relatively unprotected road-users. The entire front of the car features clean, gentle and smooth lines, and there are no protruding parts that may cause injuries.

The engine in the Volvo XC90 is installed low in the vehicle. As a result, the bonnet has no less than 80mm of deformation space before there is any contact with the engine below it. It thus serves as a soft, impact-absorbing 'bumper', reducing the risk of serious injury if a pedestrian is thrown onto the bonnet.

High safety level in the third row of seats

The Volvo XC90's third row of seats provides a high level of passenger safety. There is generous space behind it, so collision force in a rear-end impact can be effectively absorbed and dissipated.

The occupants of the rearmost seats sit just above the rear axle, which is the optimum position in terms of side-impact safety. These seats also feature seat belt pre-tensioners, head restraints and protection from the Inflatable Curtain.

WHIPS, Volvo's award-winning Whiplash Protection System, is fitted in the two front seats of the new Volvo XC90. WHIPS is activated in the event of a rear-end collision from speeds as low as 9mph, helping to reduce trauma on the spine and neck and thus reducing the risk of injury.

Child safety

An integrated booster seat is standard in the centre seat of the middle row, as are ISOFIX mounting points, and Volvo also offers a passenger airbag cut-off switch to enable child seats to be carried in the front of the car.

Water-repellent glass

This glass is also available for (laminated) side windows.

On the side windows, the WRG gathers water together as pearls of moisture that are easily blown away by the wind, leaving a dry glass panel with unobstructed visibility. Since it is more difficult for dirt to fasten onto dry surfaces, it is also easier to keep the windows cleaner. The WRG treatment requires that the windows be laminated.

Whiplash protection

Volvo was the first car manufacturer to improve driver comfort by studying ergonomics and introducing adjustable lumbar support seat backs in 1964. After nearly 40 years of continuous research, crash-testing and innovation, it can also claim that its seats can reduce whiplash injuries by 50 per cent.

Seventy per cent of personal injuries in car accidents include whiplash, but Volvo's research shows this risk can be reduced by half with 'WHIPS' - the Volvo Whiplash Protection System, first introduced at the launch of the S80 in 1998, and now standard in all Volvo front seats.

Volvo's WHIPS seats significantly reduce the force on the spine and head by absorbing energy from the impact and offering superior support thanks to the combination of an innovative moving support mechanism in the seat back and a fixed head restraint design permanently at the right height and position.

In practice, the WHIPS seat mechanism bends backwards with the occupant's body - first in parallel and then in a short reclining movement.

Volvo's traffic accident research team compared real-life whiplash injuries from Volvos with and without WHIPS, and the results point to a clear conclusion: WHIPS reduced short-term and long-term (of more than a year) injuries by 33 per cent and 54 per cent respectively, while whiplash injuries in women were reduced by as much as 50 per cent and 75 per cent, respectively.

All Volvo car head restraints were placed in the highest category in the 'New Car Whiplash Rating' published by the Thatcham Motor Insurance Repair Research Centre. Static tests were carried out to measure the design and position of head restraints in 500 car models.

Like Volvo, the Swedish insurance company, Folksam, also compared real-life accidents, and showed that WHIPS seats reduced whiplash injury by 40 per cent. In 2003, Folksam crash-tested seats from a number of different manufacturers' cars, and Volvo seats were considered the best. An overall whiplash injury reduction in the region of 50 per cent was thought possible, if all cars had seats as good as Volvo's.

SECURITY

- Electronic immobiliser fitted as standard.
- Alarm and deadlock system operated from remote control key fob.
- Home Safe and Approach lighting system fitted to every model.
- Laminated and dark-tinted side windows available.
- Level sensor available.
- Volvo On Call telematics.

Volvo's passion for safety also extends to issues of personal security. The Volvo XC90 is fitted as standard with a wide range of features designed to protect occupants from burglary, theft and assault. An electronic immobiliser makes it impossible to start the car without the right key, while the outer lock cylinder rotates, making it difficult to break in to. If the thief does manage to get in, via a window, for example, the deadlock system makes it impossible to open a door from the inside. The availability of laminated side windows can also make it harder for thieves to gain access to a Volvo XC90, while dark-tinted rear windows protect the car's contents and aid personal security.

The deadlock system is activated by the remote control key fob, allowing the driver to open the car as they approach. This system can also be used to access the tailgate independently of the doors, which is a useful deterrent to opportunist thieves.

The same remote control system also switches on the alarm system, which is fitted as standard to the Volvo XC90. The alarm is triggered if anyone attempts to open the doors, the bonnet or the tailgate. It also reacts to movement inside the car or if a window is broken.

An important contribution to personal security is provided by the Home Safe and Approach lighting system. By pressing a button on the remote controller when approaching the car, the driver is able to turn on the inside lights, the side marker lights and the lights in the rear-view mirrors. On leaving the car, a tweak of the headlight stalk activates the dipped beam headlamps for 30, 60 or 90 seconds (programmable by a Volvo dealer), lighting a path to the door. It's a simple system that offers considerable peace of mind.

ENVIRONMENT

- 'Clean inside and out' environmental commitment.
- Interior trim materials conform to Oeko-Tex standards and are allergen-free.
- Air Quality System (AQS) ensures cleaner air inside than out.
- 85 per cent of the car can be recycled.
- Volvo produces an annual Corporate Sustainable report, which is available at www.volvocars.com/citizenship

Environmental care is one of Volvo's core values so, when developing its SUV, Volvo paid particular attention to emissions and fuel economy.

"We know that some people are uncomfortable about the fact that SUVs produce higher emissions and consume more fuel than most passenger cars," says Hans Wikman, the Volvo XC90 Project Director.

Healthier inside

While most of us are aware of vehicle emissions and air quality issues, how many drivers know that the air inside their cars may also be harmful? Or that the metals, textiles and leathers used in car interiors can emit volatile substances, which activate allergies and skin conditions?

Many motorists don't realise their car could be increasing their risks of asthma, eczema, headaches, eye irritation or even a heart attack. In recent years, the number of people suffering from allergies and other forms of hypersensitivity has been growing rapidly.

Volvo's 'Clean inside and out' programme to create emissions-free cars is a healthy solution to the problem.

The interior of the Volvo XC90 complies with a strict standard called Oeko-Tex, which sets maximum levels for dangerous substances contained in textiles and trim materials. All the leather upholstery and trim fitted to the Volvo XC90 meets strict Oeko-Tex standards.

Furthermore, the leather is tanned using natural plant substances and the components on the Volvo XC90 that most frequently come into contact with the skin - the door handles, ignition key and safety belt locks - are also compliant with Oeko-Tex and allergen-free.

Clean air

The Volvo XC90 takes further care of the environment inside the passenger compartment and reduces the risk of allergy-related problems with its Electronic Climate Control (ECC) with automatic Air Quality System (AQS).

AQS consists of a filter featuring a particle trap and an active carbon filter, removing particles such as pollen and unpleasant odours from the incoming air, and has a sensor that automatically activates the air recirculation function if the concentrations of substances such as nitrogen oxide, carbon monoxide and hydrocarbons in the air entering the cabin are too high.

Corporate Citizenship

Volvo's annual Corporate Sustainability reports, along with information on all Volvo Car's environmental activities, are available at www.volvocars.com/citizenship.

Ends

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