

## **DRIVING DYNAMICS**

### **Engines**

#### **In brief:**

The new Volvo S40 is available with a range of high-tech petrol and diesel engines, ranging from a four cylinder 1.6 to 2.5-litre five-cylinder units, which reflect its role as a premium alternative.

Uniquely in this class, the Volvo S40 offers a choice of two transversely mounted five cylinder engines, the most potent of which – the 2.5-litre T5 – boasts a mighty 220bhp. These compact, low-friction engines combine a high level of refinement with low fuel consumption and exhaust emissions.

The T5 is accompanied by another five cylinder unit – the 2.4i with 170bhp. There are also other petrol and diesel engines available, starting with 1.6-litre petrol and diesel engines, a 125bhp 1.8-litre four cylinder petrol engine, plus a new 136bhp, 2.0-litre turbodiesel boasting second generation common rail technology and 320Nm of torque. The diesel models are now Euro IV compliant, which is great news for tax-conscious company car drivers.

#### **In full:**

- 4-cylinder petrol: 1.6, 100bhp with 150Nm at 4,000 rpm.
- 4-cylinder petrol: 1.8, 125bhp with 165Nm at 4,000 rpm.
- 5-cylinder petrol: 2.4i, 170bhp with 230Nm at 4,400 rpm.
- 5-cylinder petrol: T5, 220bhp with 320Nm at 1,500 rpm.
- 4-cylinder diesel: 1.6D, 109bhp with 240Nm at 1,750 rpm.
- 4-cylinder diesel: 2.0D, 136bhp with 320Nm at 2,000 rpm.
- 12,500 miles/1 year service intervals.

The new Volvo S40 is available with a range of high-tech engines that reflect its role as a premium alternative, including a choice of two transversely mounted five cylinder petrol engines – the 2.4i and T5 - providing an unrivalled combination of power and refinement. These are joined by a 1.6-litre petrol and diesel engines, a 1.8-litre four cylinder petrol engine, plus a 2.0-litre 136bhp turbodiesel which boasts second-generation common rail technology for maximum refinement and economy with low emissions. All diesel engines are Euro IV compliant.

Engine:	1.6	1.8	2.4i	T5	1.6D	2.0D
---------	-----	-----	------	----	------	------

Type	1596cc, 20v 4 cylinder petrol	1798cc, 20v 4 cylinder petrol	2435cc, 20v 5 cylinder petrol	2521cc, 20v 5 cylinder petrol (turbo)	1560cc, 16v 4 cylinder turbo diesel	1997cc, 16v 4 cylinder turbo diesel
Power	100bhp	125bhp	170bhp	220bhp	109bhp	136bhp
Torque	150Nm/4000	165Nm/4000	230Nm/4400	320Nm/1500	240Nm/1750	320Nm/2000
0-62mph	11.9 secs	10.9 secs	8.2 manual/ 8.9 Geartronic	6.8 manual/ 7.2 Geartronic	12.0 secs	9.5 secs
Top Speed	115 mph	124 mph	138 manual/ 134 Geartronic	149 manual/ 146 Geartronic	118 mph	130 mph
CO2	171 g/km	172 g/km	203 manual/ 217 Geartronic	208 manual/ 224 Geartronic	129 g/km	148 Euro III 152 Euro IV
Fuel tank	55 litres	55 litres	62 litres	62 litres	55 litres	55 litres
Combined MPG	39.2	39.2	33.2 manual/ 31.0 G'tronic	32.5 manual/ 30.1 G'tronic	57.6	50.4 Euro III 49.6 Euro IV
Ins group	7E	9E	13E	15E	8E	10E
Min Kerbweight	1235 kg	1280kg	1368 kg	1392 kg	1309 kg	1371 kg
Towing limit	1200 kg	1300 kg	1500 kg	1500 kg	1200 kg	1500 kg

Steering	Rack and pinion
Turning circle, m (ft)	16in: 10.6 (34.9) 17in: 10.8 (35.4) 18in: 11.3 (37.1)
Transmission	5 speed manual: 1.6, 1.6D, 1.8, 2.4i 6 speed manual: 2.0D, T5 Geartronic: 5 speed 2.4i, T5
Brakes: Front discs:  Rear discs:	1.6, 1.8, 1.6D: 15in – 278mm Ventilated 2.4i, T5, 2.0D: 16in – 300mm Ventilated 280mm (all models)
Fuel Tank litres (gallons)	1.6, 1.8, 1.6D, 2.0D: 55 (12.1) 2.4i, T5: 62 (13.6)
<u>Load capacity:</u> litres (cu ft) Rear seats up Rear seats down Load length: rear seats up Load length: rear seats down	357 (12.6) 883 (31.2) 976mm 1745mm
<u>Dimensions:</u> (mm) Length Width (excluding mirrors) Unladen height Wheelbase Front track width Rear track width	4468 1770 1452 2640 1535 1531

(Full technical data, prices and options information available in price lists, downloadable at [www.media.volvocars.co.uk](http://www.media.volvocars.co.uk))

### 2.4i and T5

Accommodating the five cylinder powerplants within the Volvo S40's compact structure was no mean feat. Although the engines are based on the low-friction units found in larger Volvo saloons, they have been extensively revised and repackaged. The new generation is called RNC, with the C indicating Compact. Most of the engine's external components have been redesigned - the exhaust manifold outlets are now angled down towards the engine block, for example, and the manifolds on the T5 model are cast together with the turbo unit housing to reduce space.

These changes result in a series of engines that are 200mm slimmer and 25mm shorter than those found in larger Volvo models. They are also substantially lighter, to the benefit of both the driving dynamics and fuel consumption. Despite the changes, the technical merits of the engines are undiminished. Both five cylinder engines, the 2.4i and 2.5-litre T5, are available with optional Geartronic transmission, and boast four-valves per cylinder and dual overhead camshafts, together with Variable Camshaft Timing (CVVT) to maximise the torque at low engine speeds and to reduce exhaust emissions.

The five cylinder 2.4i (2435cc) engine is normally aspirated and boasts 170bhp. This peak occurs at 6000rpm, while the maximum torque of 230Nm is on offer at 4400rpm. When equipped with a manual gearbox, it takes just 8.2sec to reach 62mph from rest and the top speed is 138mph. The 2.4i consumes a gallon of unleaded petrol every 22.8, 42.8 or 33.2 miles on the urban, extra-urban and combined cycles, respectively.

The performance flagship of the new Volvo S40 range is the 2521cc T5. Equipped with a light-pressure turbo, it generates a potent 220bhp at 5000rpm. The peak torque output of 320Nm is available all the way from 1500-4800rpm, proving that top-end thrust need not be achieved at the expense of mid-range flexibility. The manual T5 can advance from 0-62mph in just 6.8sec and will reach 149mph. But despite its high-performance, it still achieves an excellent 32.5mpg for the combined cycle.

### 1.6 and 1.8

The choice of petrol engines for the new S40 also includes 1.6-litre and 1.8-litre petrol units. Both offer good performance and economy. The 1.6 provides 100bhp and 145Nm of torque, while the larger 1.8-litre offers 125bhp and 160Nm of torque.

### 1.6D and 2.0D

Performance and economy are also words closely associated with the new 1.6 and 2.0-litre turbodiesel engines. Developed in conjunction with Ford Motor Company and PSA Peugeot

Citroen, they feature second generation common rail technology delivering an unbeatable combination of power, refinement and frugality. The 2.0D has a maximum power output of 136bhp, peak torque of 320Nm at just 2000rpm, covers the 0-62mph increment in 9.5sec, and can go on to reach 130mph.

But while the 2.0D's acceleration is petrol-like, its economy underlines the value of diesel power. The Euro IV compliant 2.0D returns an excellent average of 49.6mpg on the Combined cycle or a maximum of 61.4mpg on the extra-urban, and its carbon dioxide emissions are 152g/km. This is not only great news for the environment; it also provides company car drivers with useful tax savings.

The smaller 1.6-litre turbodiesel also offers strong and flexible performance, with 109bhp and plenty of flexibility provided by 240 Nm of torque from 1750 rpm. It offers the best fuel consumption of the range, with 67.3mpg recorded on the extra urban cycle, 57.6mpg on the combined, and 45.6mpg on the urban.

## **DRIVING DYNAMICS**

### **CHASSIS**

#### **In brief:**

- **68% greater torsional rigidity than original model.**
- **Dynamic Stability Traction Control (DSTC) standard.**
- **Sophisticated multi-link rear suspension.**
- **Wheelbase increased by 78mm to 2640mm.**
- **Front track increased by 63mm, rear by 57mm.**
- **Dynamic chassis and Rally Bar (front strut stiffener) fitted to Sport and SE Sport models (except 1.8), and all T5 versions.**

The engineers tasked with developing the all-new Volvo S40 were asked to create a sporty car with a high level of active safety. But, by adopting a holistic approach to the chassis design, the engineers surpassed even their toughest targets.

The torsional rigidity of the new model is 68% greater than that of the original Volvo S40, which helps maximise the performance of the new multi-link rear suspension. The front and rear tracks are also been increased to improve stability and the active safety is enhanced by the standard fit Dynamic Stability and Traction Control system (DSTC).

**To maximize driving pleasure, a dynamic chassis and Rally Bar (front strut stiffener) are standard on Sport models (except 1.8), and all T5 variants.**

**“A modern Volvo should obey the driver’s slightest command – immediately and without fuss,” says Peter Ewerstrand, the Volvo S40 project manager. “It should be as enjoyable to drive as it is safe. We had particularly high ambitions for the Volvo S40 and we’re more than pleased with the result. This is a car you’ll truly look forward to driving whenever you get the chance.”**

In full:

The engineers brief for the all-new Volvo S40 was to develop a car that would combine an engaging, dynamic driving experience with a high level of active safety. With the development of a sophisticated new suspension system, a high level of torsional rigidity, a wide track and the latest electronic stability systems, Volvo’s technicians have met their ambitious target.

“A modern Volvo should obey the driver’s slightest command – immediately and without fuss,” says Peter Ewerstrand, the Volvo S40 project manager. “It should be as enjoyable to drive as it is safe. We had particularly high ambitions for the all-new Volvo S40 and we’re more than pleased with the result. This is a car you’ll truly look forward to driving whenever you get the chance.”

The body of the new model is 68 per cent stiffer than its predecessor thanks to advanced body design and the use of high strength materials, including Ultra High Strength Boron Steel. This high level of torsional rigidity allows the suspension to do its job properly and its provision was integral to the Volvo S40’s design. It benefits not only the ride and handling characteristics, but also its crash-worthiness.

To maximize driving pleasure a dynamic chassis and Rally Bar (front strut stiffener) is fitted to Sport models (except 1.8) and all T5 variants.

A further contribution to the Volvo S40’s exceptional stability is provided by the wide track and long wheelbase. The front track of the new model is 63mm wider than that of the original Volvo S40, while the rear track has grown by 57mm. This helps improve the car’s balance, enabling it to cope with high cornering forces, while providing clear and consistent feedback to the driver. The wheelbase has also grown by 78mm to 2640mm and this contributes to a balanced weight distribution with a low minimal moment of inertia. In

practical terms, this enhances the steering response and helps ensure that the Volvo S40 responds in a controlled, predictable manner in all circumstances, making a major contribution to active safety.

### Suspension

The advanced, independent suspension system employs spring struts at the front, the geometry of which has been carefully calculated to provide quick and precise steering response, enhancing the car's sports appeal. The rear suspension is a sophisticated multi-link system. This permits a small degree of passive rear wheel steering when cornering, which helps to maximise stability and control. Anti-roll bars also feature at both ends.

### DSTC, EBD and EBA

The S40's carefully honed mechanical set-up is supported by the Dynamic Stability and Traction Control (DSTC) system, which is standard on every model, and prevents wheelspin or the risk of skidding 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 S40's benefit from ABS brakes with EBD (Electronic Brake Distribution) and EBA (Electronic Brake Assist) 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 TRANSMISSIONS**

#### **In brief:**

- **Electro-hydraulic power steering system delivers driver feedback.**
- **Ventilated disc brakes all-round.**
- **Anti-lock brakes with Electronic Brake Force Distribution (EBD).**
- **Emergency Brake Assist (EBA).**
- **T5 uses six-speed manual gearbox from Volvo S60 R.**
- **Geartronic transmission available for 2.4i and T5 models.**
- **2.0D fitted with six-speed manual as standard.**

**The Volvo S40's electro-hydraulic power steering system has been tuned to maximise driver feedback and control, to help the driver place the car accurately on the road.**

**As you'd expect from Volvo, an anti-lock braking system is fitted as standard, and the ventilated disc brakes are also equipped with Electronic Brakeforce Distribution (EBD) and Emergency Brake Assist (EBA). EBD varies the braking performance between the front and rear wheels to minimise stopping distances, while EBA automatically applies maximum braking performance when an emergency stop is required.**

**Normally aspirated Volvo S40's are fitted with a five-speed manual gearbox, but the flagship T5 and 2.0-litre turbodiesel models boast six forward ratios.**

**An adaptive five speed Geartronic transmission is available as an option on all five cylinder petrol models.**

In full:

- Electro-hydraulic power steering system delivers driver feedback.
- Ventilated disc brakes all-round.
- Anti-lock brakes with Electronic Brake Force Distribution (EBD).
- Emergency Brake Assist (EBA).
- T5 uses six-speed manual gearbox from Volvo S60 R.
- Geartronic transmission available for 2.4i and T5 models.
- 2.0D fitted with six-speed manual as standard.

The new Volvo S40 uses an electro-hydraulic power steering system that has been developed to optimise driver feedback and response. This helps the driver place the car accurately on the road and to assess the available grip.

Ventilated disc brakes are fitted at the front. The disc size is adapted to engine power and wheel rim size, up to a maximum diameter of 16.5in. As you'd expect from Volvo, an anti-lock braking system is fitted as standard and this is joined by Electronic Brakeforce Distribution (EBD), which constantly distributes braking power between the front and rear wheels to ensure maximum retardation regardless of the road conditions or how the car is laden.

Every Volvo S40 is also equipped with Emergency Brake Assist (EBA). This system automatically senses when an emergency stop is required and adjusts the braking pressure so that the car comes to a halt in the shortest possible distance.

The normally-aspirated petrol engines and the 1.6 diesel are mated to a new generation of Volvo's five-speed manual gearbox. This unit has been modified with the introduction of a triple synchromesh to provide faster, more positive changes.

The T5 engine uses the six-speed manual gearbox that was developed for the awesome Volvo S60 R and V70 R. The ratios have been carefully matched to the engines characteristics so as to combine strong acceleration with a high top speed. The gearbox has triple synchromesh and a reassuringly direct shift action.

Both the five cylinder petrol engines can also be specified with the five-speed Geartronic transmission that is used in Volvo's larger models. The system is fully adaptive – it automatically adjusts its shift patterns according to an individual's driving style and can be shifted into 'manual' mode if required.

The Volvo S40 2.0D is also fitted with a six-speed manual, (although this is not the same unit as that fitted to the T5). The ratios have been chosen to complement the diesel's 320Nm of torque and to provide effortless pull throughout the engine range.