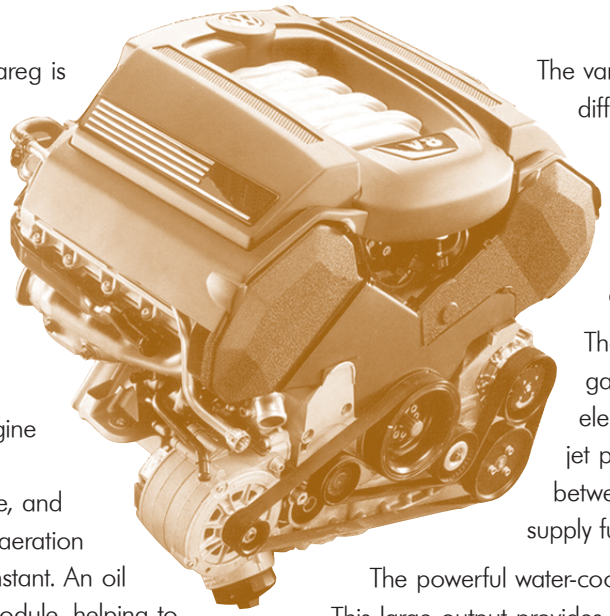
Performance Benefits

"Just what you didn't expect from the Beetle company – a really fearless SUV."

– *Car and Driver, September 2002*

4.2-Liter V8 Engine

The 4.2-liter V8 engine available in the Touareg is a further development of the V8 engine from Audi and is optimized and adapted especially for use off-road. It is powerful with 310 hp at 6200 rpm. The torque is 302 lbs. ft. at 3000 - 4000 rpm.



The 4.2-liter engine block is longitudinally mounted and has been modified to operate at various off-road angles.

The oil system keeps oil supplied to the engine even during extreme off-road climbs. A deep oil pan, oil pump with a drain stage, and spraying tubes work together to prevent oil aeration and to ensure that oil pressure remains constant. An oil cooler module is integrated into the filter module, helping to control the high oil temperatures sometimes associated with off-road driving.

As you would expect to find in a sophisticated luxury vehicle engine, the cylinder heads of the 4.2-liter engine are aluminum and have magnesium valve covers. In addition, this engine has 5 valves per cylinder. Three valves are for intake and two valves are for exhaust.

Each camshaft of the 4.2-liter engine is driven by a toothed belt and has its own camshaft position sensor. Intake camshaft timing can be changed from 0 degrees up to 22 degrees of advance, depending on the engine's operating conditions.

The variable intake manifold provides three different resonance tube lengths to provide more power at higher engine rpm. The 4.2-liter V8 can credit its low-end torque and high-end power to its 5 valves per cylinder, variable intake valve adjustment, and variable intake manifold.

The fuel tank of the Touareg has a 26.4-gallon (100-liter) capacity. It has two internal electrical fuel pumps and two internal suction jet pumps. All of these pumps distribute fuel between the chambers of the fuel tank and supply fuel to the engine.

The powerful water-cooled alternator has a 190-amp output. This large output provides ample amperage for all of the electrical components of the Touareg. The maximum short-term load of this alternator is 300 amps.

4.2L V8 Engine Specifications	
Displacement	4,172 cm^3
Bore	3.33 in. / 84.5 mm
Stroke	3.66 in. / 93 mm
Valves	5 per cylinder, 90°
Compression ratio	11:1
Horsepower	310 hp @ 6200 rpm
Torque	302 torque @ 3000 - 4000 rpm
Engine management	Bosch Motronic ME 7.1.1
Fuel	Premium
Camshaft adjustment	Inlet camshaft adjustment

3.2-Liter V6 Engine

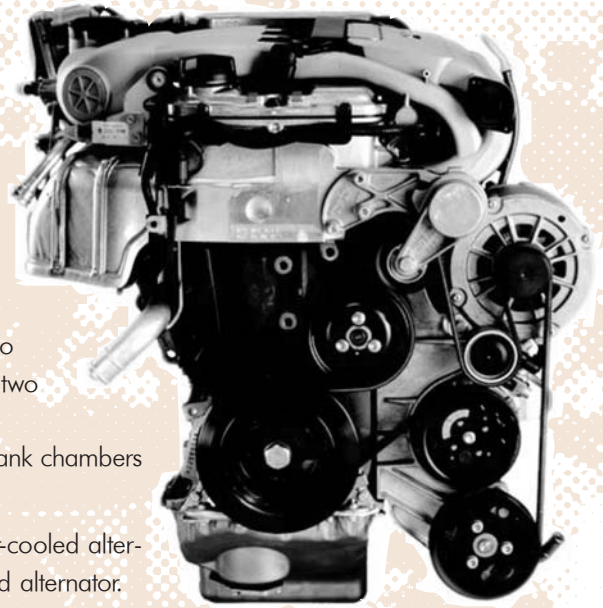
For excellent driving performance, the Touareg is available with a 3.2L V6 engine, an updated version of Volkswagen's venerable 2.8-liter VR6 engine. The increase in displacement results in an impressive and increased power output of 220 hp at 5400-6400 rpm and 225 maximum torque at 3200 rpm.

The Touareg's six-cylinder engine was specially modified for off-road operation. A deeper oil pan and redesigned oil pump ensures that there is always sufficient engine lubrication, even at steep off-road angles. The crankcase gasket on the belt side of the engine has an additional sealing lip to prevent the intrusion of water and dirt into the crankcase. And the belt drive for the auxiliary assemblies has an enlarged pulley loop angle to prevent belt slippage when driving through water.

The cylinder head of the 3.2-liter engine is aluminum and has dual camshafts. The 3.2-liter engine has variable camshaft timing on both the intake and exhaust sides of the engine. This allows the engine control module to adjust the opening and closing time of both the intake and exhaust valves. Valve opening and closing times help determine the power output and flexibility of an engine.

3.2L V6 Engine Specifications	
Displacement	3,189 cm^3
Bore	3.31 in. / 84 mm
Stroke	3.78 in. 95.9 mm
Valves	4 per cylinder, 15°
Compression ratio	11.3:1
Horsepower	220 hp @ 5400-6400 rpm
Max. torque	225 torque @ 3200 rpm
Engine management	Bosch Motronic ME 7.1.1
Fuel	Premium
Exhaust gas treatment	Three-way catalytic converters with constant Lambda regulation

The 3.2-liter V6 engine has a variable intake manifold that controls airflow into the engine. This intake does not change the actual intake runner length as most variable intake manifolds. Instead, it takes advantage of the pressure wave generated at certain engine speeds to produce more power.



By designing the 3.2-liter V6 with adjustable intake and exhaust valve timing and a variable intake manifold, Volkswagen engineers were able to balance even better the need for power with acceptable emissions levels and fuel consumption.

The fuel tank of the Touareg has a 26.4-gallon (100-liter) capacity. It has two internal electrical fuel pumps as well as two internal suction jet pumps. All of these pumps distribute fuel between the fuel tank chambers and supply fuel to the engine.

The 3.2-liter engine has replaced the air-cooled alternator with a higher-capacity water-cooled alternator. This alternator is integrated into the cooling system and has a 190-amp output with a maximum short-term output of 300 amps. The large output provides ample amperage for all Touareg electrical components.

6-Speed Automatic Transmission with Tiptronic®

The Touareg's 6-speed automatic transmission provides drivers with optimized shift quality and an increased level of driving comfort. It can adjust to driving styles ranging from extremely sporty to very economical. In addition, the Tiptronic feature allows the driver to shift gears manually when desired.

Compared to the 5-speed automatic transmission, the 6-speed automatic transmission uses less fuel, emits less exhaust, has a lower noise level, and exhibits significantly improved acceleration.

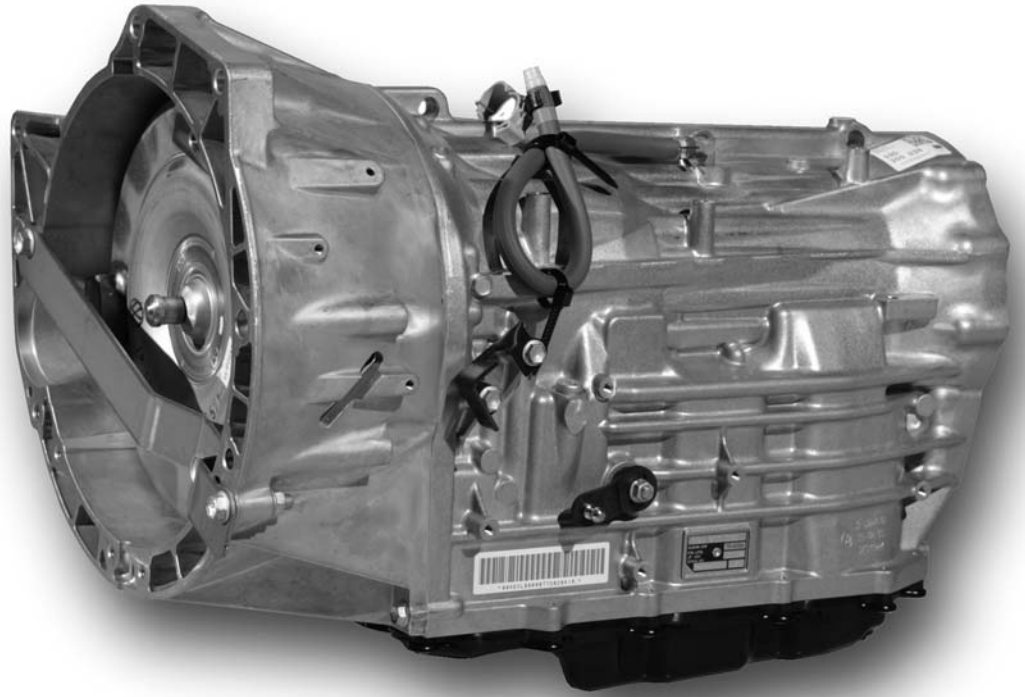
Other features of the transmission include the adaptive feature found in other Volkswagen automatic transmissions. The transmission control module monitors driving conditions, including off-road low range operation and driving style, and selects a shift strategy most appropriate for the driver's style and terrain.

This transmission does not require special care; the automatic transmission fluid is filled for life.

A hill holder function in the transmission prevents the Touareg from rolling back when stopped on a steep grade, permitting hills to be approached with confidence.

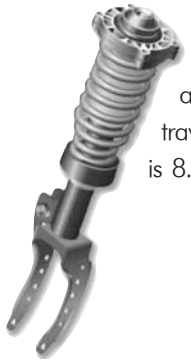
The selector lever has the following positions: Park, Reverse, Neutral, Drive, and Sport. The selector lever console and the multi-function indicator show the selected position.

Tiptronic allows the driver to switch from automatic mode and control transmission gear changes. When the selector is moved through the gate to the right, the driver may then move the selector forward to upshift and backward to downshift as conditions dictate.



Steel Suspension

The Touareg's independent steel spring suspension is an intricately designed system, forming the basis for excellent street and off-road handling. The front suspension boasts a dual-wishbone system with upper aluminum links and lower steel links. The rear suspension of the Touareg also has a 4-link independent system with forged aluminum links at the top and steel wishbones below. This type of suspension provides optimal wheel placement over a variety of road surfaces.



Coil springs surround the struts at all four wheels. The struts are designed to allow for high spring compression and great rebound travel, providing ample suspension travel for off-road operation. Maximum ground clearance is 8.3 inches (212 mm).

The Touareg utilizes a front and rear subframe with high-volume rubber bushings, providing excellent isolation from suspension noise and vibrations.

The wheel bearings have special seals to protect them from dirt and water intrusion.

This running gear develops outstanding handling characteristics in the Touareg. And when it comes to comfort, even luxury sedans have nothing on this Volkswagen.



Air Suspension

A unique feature that sets the Touareg chassis apart from other SUVs is its optional air suspension system. Unlike a truck frame with stiff springs, this system provides the highest levels of comfort and handling for both on-road and off-road driving. Ground clearance control and damping are automatic, or controlled by the driver, allowing the dynamic performance of a sports car and excellent off-road handling.

Ground Clearance and Damping

Ground clearance is automatically adjusted to one of five levels depending on vehicle speed. Lowering the vehicle at highway speeds improves control and reduces wind resistance.

Conditions	Clearance
Under 3 mph (5 km/h) / loading level	6.3 inches (160 mm)
Over 78 mph (126 km/h) / high speed level I	7.5 inches (190 mm)
Under 50 mph (81 km/h) / street level	8.7 inches (220 mm)
Under 43 mph (70 km/h) / off-road level	9.4 inches (240 mm)
Under 12 mph (20 km/h) / Xtra level	11.8 inches (300 mm)

At 112 mph (180.2), the vehicle is lowered again by 0.4 inches (10 mm).

The driver can also adjust the suspension (ground clearance) manually by using the level adjustment knob on the center console.

The Touareg's damping system increases driving comfort in all driving situations. The job of the damping system is to absorb and reduce road shocks while maintaining continuous contact with the road. Ideally, damping is regulated so that the vehicle body "hangs on a sky-hook" and floats above the road with almost no disruptive movements. Damping control can be adjusted using the damper adjustment switch on the control panel on the gearshift casing. There are three settings.

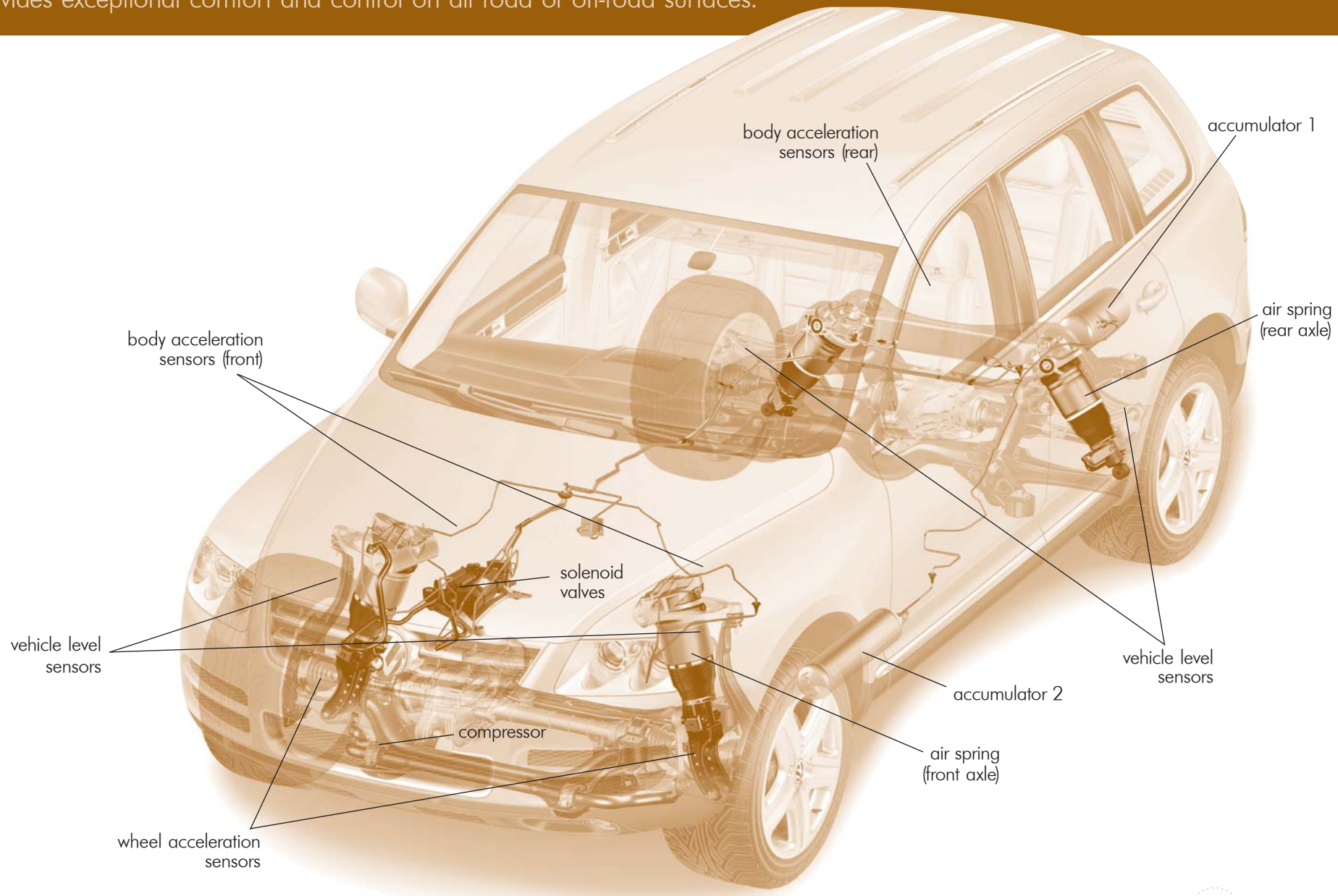
Damper Setting	Description
Sport	Hard suspension; detection of fast curves will automatically set the system to Sport, regardless of driver request
Auto	Middle suspension; automatically detects the terrain and adjusts the suspension accordingly
Comfort	Soft suspension; a setting that smooths lower speed bumps

How Air Suspension Works

In the air suspension system, the control unit for the self-adjusting suspension gathers information from the level adjustment knob, the damper adjustment switch, the four vehicle level sensors, the two wheel acceleration sensors and the three body acceleration sensors to determine the correct ride height and damper setting.

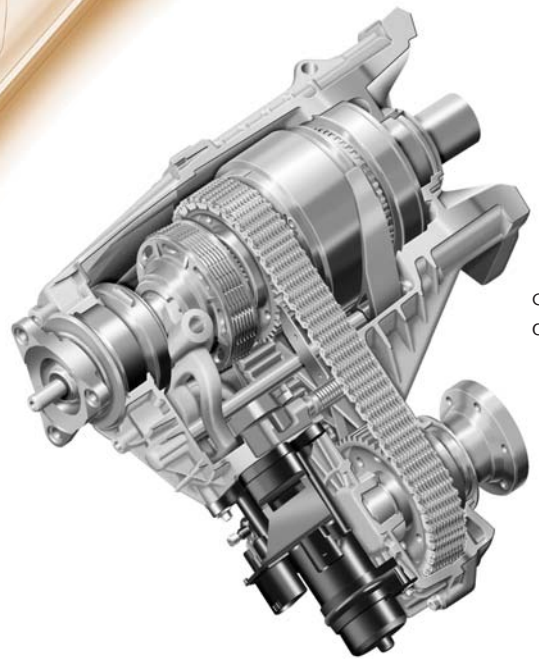
The four vehicle level sensors continuously measure the space between axle and body to keep the level between the front and rear axles even. As soon as the level deviates from the set position, the air volume of the suspension is corrected by means of solenoid valves, a compressor and two accumulators. The Touareg's four air-spring absorbers essentially consist of air-spring bellows, a roller piston, and the regulated hydraulic absorber.

Maximum occupant comfort, minimum noise transmission from the road to the vehicle interior, and optimum driving safety are requirements that place heavy demands on suspension designers. In the Touareg, Volkswagen designers have excelled. Touareg's advanced air suspension provides exceptional comfort and control on all road or off-road surfaces.



4XMOTION®

The Touareg's engine power is transmitted to the wheels via the continuous 4XMOTION four-wheel drive. Different from the 4MOTION® vehicles, the Touareg with 4XMOTION provides driver-controlled low-range gear and differential lock controls — "HIGH" for road driving and "LOW" for cross-country driving. Also, the Touareg does not have a Torsen differential. Instead, a planetary gear set in the transfer case serves as the center differential between the front and rear axles.



center differential

low-range gear and center differential lock control

On the Road

4XMOTION provides 50:50 distribution of power to the front and rear axles until wheel slippage triggers up to 100% power flow to the proper axle for more grip. When wheel slippage occurs due to aquaplaning or a wet spot on one side of the lane, for example, the multi-disc lock of the center differential increases the flow of power to the axle with more grip. A four-wheel electronic differential lock (EDL) also supports this adjusted power distribution. The result is that the four-wheel drive equally enhances both handling and active safety. The Touareg thus handles like a luxury sedan and its driving behavior is extremely safe and controllable. Curve stability is outstanding even under unfavorable road conditions.

The driver-controlled low-range gear is also a standard feature. When low-range is selected, the planetary gear reduces the final drive to 2.7:1.

On steep, declining stretches (more than 20%), the automatic hill descent assist (HDA) is activated when the driver's foot is removed from the accelerator at less than 10 mph (16 km/h).

The 4XMOTION four-wheel drive system guarantees not only outstanding off-road characteristics, but also a high degree of safety and the dynamic attributes of luxury sedans and sports cars. Here, too, Volkswagen's SUV philosophy makes itself felt.

Off the Road

In off-road terrain, 4XMOTION provides commanding propulsion using the basic structure of the front and rear axle differentials, combined with a center differential, which is flanged onto the rear of the transfer gearbox. The center differential can be locked using the control knob. When lock is selected, an electric motor activates a multi-disc clutch, locking the planetary gear set, directing an equal amount of torque to the front and rear axles. The center differential lock is a standard feature. For serious off-roading, some models also come with a rear differential lock. Now up to 100% of the torque can be used by the one wheel that still has traction!

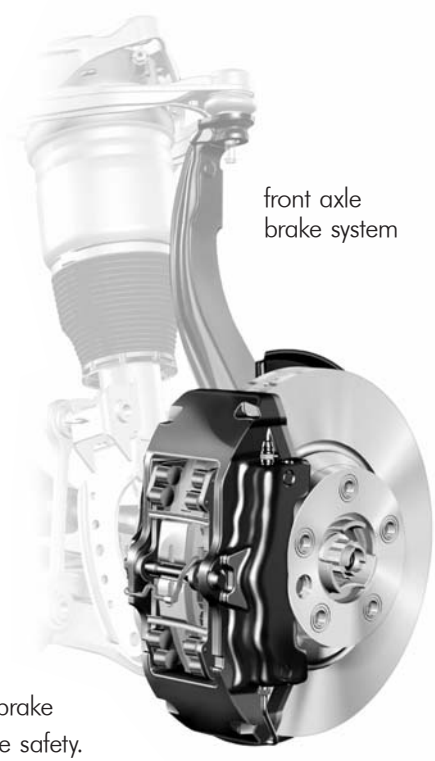
EDL

The electronic differential lock (EDL) distributes the drive force to the wheels with traction. With EDL, it is much easier starting off from a stopped position when the wheels are on surfaces with differing amounts of grip, such as snow or loose gravel. If a wheel starts to spin, it is braked and the power is diverted to the other wheels via the differential.

Brake System

The brake system is built to provide superior stopping power under a wide variety of situations, giving the Touareg a high level of active safety. Fixed caliper brakes form the mechanical component and state-of-the-art electronic features round out the system. When parked, a dual servo drum brake that is built into the rear disc brake rotor holds the Touareg securely in place.

Excellent deceleration values during braking are attributed to large front and rear wheel disc brakes. The brake discs are ventilated and the fixed calipers made by Brembo are constructed of aluminum. The Touareg has a brake pad wear indicator for both the front and rear disc brake pads that results in early detection of pad wearout.



front axle
brake system

rear axle
brake system

Intelligent Regulating Systems

As if 4XMOTION®, air suspension, and the Touareg's other performance features weren't enough, an intelligent brake system further enhances both the great handling and active safety. The Touareg comes standard with the following:

ESP
ESP enhances the driver's ability to maintain control of the vehicle. It relies on the ABS, ASR, EBD and EDL traction systems and other sensors to monitor the driver's intended course and the vehicle's actual direction of travel. When there's a conflict, it generates corrective forces to help keep the vehicle on the intended course, helping to prevent skidding. Thus ESP effectively assists the driver during sudden accident-avoidance maneuvers.

Anti-lock braking system (ABS)	Prevents wheels from locking when brakes are applied.
Electronic brake force distribution (EBD)	Allocates the necessary brake force to each of the wheels according to driving and loading conditions.
Electronic stabilization program (ESP)	Senses whether the vehicle is about to depart from its intended path on the road and corrects for over- and understeer, preventing skidding.
Hydraulic brake assistant (HBA)	Identifies the driver's panic braking and automatically applies the full available braking power.
Anti-slip regulation (ASR)	Prevents the driven wheels from spinning by intervening in the engine management system and applying brake pressure to the spinning wheels.
Engine braking assist (EBA)	Prevents a wheel from skidding in case driver sharply changes into a lower gear or very suddenly lifts foot off the accelerator.
Electronic differential lock (EDL)	Makes it possible to drive on road surfaces where each wheel has a different degree of traction by braking the wheel that is spinning. The front or rear differential then sends the power/torque to the wheel with the most traction.
Hill descent assist (HDA)	Keeps vehicle in control when descending a steep hill by means of controlled brake applications.


TOUAREG
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