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December 2016

## The Audi SQ7 TDI: first S model of the series

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## At a glance

### **The Audi SQ7 TDI**

#### **Drive system**

- Newly developed 4.0 TDI with eight cylinders, 320kW, maximum 900Nm of torque between 1000 and 3250rpm.
- Sequential charging with two turbochargers, combined with an electric-powered compressor for strong boost at low engine speeds
- 48 volt electrical subsystem to supply the electric powered compressor
- Sports car performance: from 0 to 100km/h in 4.9 seconds, top speed 250km/h (electronically governed).
- Combined consumption 7.2 litres per 100km, corresponding to 190 grams CO<sub>2</sub> per kilometre
- Newly developed eight-speed tiptronic and quattro permanent all-wheel drive

#### **Chassis**

- Electromechanical active roll stabilisation
- Five link suspension front and rear, electromechanical power steering
- Audi drive select and adaptive air suspension standard
- 20-inch wheels standard, optional wheels up to 22 inches
- Optional carbon fibre-ceramic brake discs - Optional driving dynamics package with three components: sport differential, all-wheel steering and electromechanical active roll stabilisation

#### **Driver assistance systems**

- Wide range of driver assistance systems with many new developments – the world's largest selection in the segment (24)
- Standard equipment: hold assist; Audi pre sense (basic/city); parking system, rear; cruise control and speed limiter; attention assist, turn assist, adaptive cruise control, Audi active lane assist, pre sense front, collision avoidance assist, , predictive efficiency assistant, traffic jam assist, Audi side assist, exit warning, pre sense rear, parking system plus, cross traffic assist rear, reversing camera, 360 degree camera, park assist and high beam assist
- Optional: Night vision assistant

#### **Design, body and lighting**

- 5.07 metres long, powerfully masculine formal idiom with sporty touch
- S-specific details on the front, flanks and rear, 12 paint finishes
- Standard LED headlights, optional Matrix LED

- Rear lights with dynamic turn signals
- Multimaterial body with ultra-high-strength steel and aluminium
- Curb weight: 2270 kilograms (without driver)

### **Interior**

- Largest interior in the segment, with seven seats
- Luggage compartment (seven-seat model) 705 to 1890 litres, power tailgate
- Sport seats for driver and front passenger, optional sport seats plus
- Sporty and refined interior, S-specific details, optional Audi design selection Kodiak brown with sport seats plus in Valcona leather and diamond pattern
- Ambient lighting with S-specific 'Sport' profile

### **Display and controls**

- Intuitive MMI control concept including free text search, optional top infotainment system MMI navigation plus with touchpad MMI all-in-touch (control with haptic feedback and MMI centre display)
- Multifunction steering wheel and natural voice control system
- All-digital Audi virtual cockpit and head-up display

### **Infotainment and Audi connect**

- MMI navigation plus with 8.3-inch monitor and LTE module for fast online connection
- Computing power of the modular infotainment platform (MIB2)
- Audi connect with Google services and WI-Fi hotspot
- Audi tablets as a mobile Rear Seat Entertainment system
- Audi smartphone interface for Android and iOS
- Audi phone box with wireless charging
- Sound systems from Bose and Bang & Olufsen with 3D sound

[Full details](#)

## **Setting standards: the Audi SQ7 TDI**

**The Audi SQ7 TDI, the top model of the new Q7 family, is the most powerful and fastest diesel SUV on the market. Its new 4.0 TDI engine features a world first: an electric powered compressor provides outstanding drive-off performance. Yet it consumes just 7.2 litres of fuel per 100 kilometres. The SQ7 TDI also leads the competition in other areas of technology.**

### **Engine**

The all-new 4.0 TDI generates its power from a displacement of 3956cc, combining superior performance with low consumption. With 320kW and 900Nm of torque between 1000 and 3250rpm, the SUV sets new benchmarks in the segment. The V8 diesel engine accelerates the Audi SQ7 TDI from 0 to 100km/h in 4.9 seconds, and on up to an electronically governed top speed of 250km/h. In the combined cycle, however, it consumes just 7.2 litres per 100 kilometres, corresponding to 190 grams CO<sub>2</sub> per kilometre.

The new 4.0 TDI is a biturbo that is supported in the lower range by an electric powered compressor (EPC). Its two exhaust-gas turbochargers feature a variable turbine geometry and produce up to 2.4 bar of boost pressure (relative). The EPC supports the turbochargers whenever the exhaust gas provides too little energy for the rapid development of power.

The electric powered compressor is placed in a bypass downstream of the intercooler, i.e. close to the engine. Instead of a turbine wheel, it houses a compact electric motor. It accelerates the engine's compressor wheel up to 70,000rpm in less than 250 milliseconds. With the support of the electric powered compressor, the power of the 4.0 TDI is always available spontaneously and without delay when the accelerator is depressed, even at low engine speeds. When driving off, the SUV immediately jumps out to a lead of several metres over its competitors. When driving with a focus on comfort, the electric powered compressor technology prevents an unnecessarily large number of downshifts, thus keeping the rev level low. Sporty drivers will appreciate the passing power and immediate delivery of power when exiting a curve.

### **Output up to 13kW: the new 48 volt electrical subsystem**

The power for the electric powered compressor can be as high as 7kW. It is drawn from a 48 volt electrical subsystem, another groundbreaking innovation in the Audi SQ7 TDI. A compact lithium-ion battery in the lower level of the luggage compartment stores around 0.5kWh of energy and delivers a peak output of up to 13kW. A DC/DC converter provides the connection to the 12 volt electrical system, which is supplied with 3kW of power from a novel, efficiency-optimised alternator.

### **Sequential charging: switching via the Audi valvelift system**

The two exhaust-gas turbochargers, each of which is supplied with fresh air from both cylinder banks, are managed according to the sequential charging principle. Control is via the Audi valvelift system (AVS), which here is making its debut in a TDI engine. Electromagnetic actuators displace contour sleeves on the camshafts so that the exhaust valves are either activated or deactivated.

The exhaust, which each cylinder discharges from both exhaust valves, flows through separate channels within a dual-flow manifold system. Each exhaust valve supplies one of the two turbochargers. At low and intermediate load and rpm, the Audi valvelift system (AVS) keeps one valve closed so that the entire exhaust flow reaches the so-called 'active' turbocharger. If engine speed increases to the range between 2200 and 2700rpm, the respective second exhaust valve is opened. Now the second turbocharger will also be activated.

A recirculation valve ensures that it spins up quickly and reliably. The V8 TDI achieves its maximum output when both exhaust-gas turbochargers are spun up. Additional AVS units are located at the intake camshafts. Here two cam contours with different timings ensure optimal filling of the combustion chamber, both during EPC supported starts and at high engine speeds. At low engine speeds, combustion is stabilised. At high rpm, cylinder filling is optimised for the high specific engine output.

The intake side of the 4.0 TDI is on the outside; the exhaust side with the turbochargers is located in the 90-degree inside V. The short gas paths support the spontaneous response. The common rail system develops fuel

injection pressures up to 2,500 bar – a new top figure for a V diesel. The elevated pressure contributes to increasing the specific engine output while simultaneously achieving low emissions under part load. For a given injection duration, more fuel – and thus more chemical energy – can be injected into the combustion chamber and converted there with high specific efficiency to mechanical energy. Ignition pressure reaches the 200-bar mark in broad sections of the characteristic.

Continuously variable thermal management and sophisticated measures in the crankshaft and camshaft drive reduce friction. The combination of a NO<sub>x</sub> storage-type converter combined with an SCR converter integrated into the diesel particulate filter ensures effective and efficient exhaust treatment. A sound actuator in the exhaust system amplifies the sonorous eight-cylinder sound. The driver can configure the sound via the Audi drive select system.

### **Drivetrain**

The new eight-speed tiptronic is highly efficient. It changes gears extremely quickly and efficiently. An rpm-adaptive torsion damper balances out undesired engine vibrations to enable efficient driving at particularly low engine speeds.

The driver of the SQ7 TDI can have the new eight-speed tiptronic operate in automatic modes D and S or the driver can intervene by tapping on the elegant, flat-shaped selector lever on the console of the centre tunnel or by using the standard-equipped paddles on the steering wheel. In both cases the commands are transmitted electrically – by wire – to the transmission.

The management of the eight-speed tiptronic uses the data provided by the optional MMI navigation plus to compute the best shift strategy on each section of the route. In co-operation with the optional predictive efficiency assistant and the adaptive cruise control, it switches to coasting if this will save fuel. One of the clutch mechanisms then opens at the wheel sets. This automatic coasting at idle can be experienced over a broad speed range between 160km/h and roughly 50km/h.

### **Chassis**

With respect to road behaviour, the Audi SQ7 TDI combines numerous talents, from highly comfortable cruising on the highway to dynamic

handling on a mountain road. The compact and lightweight self-locking centre differential is the heart of the quattro permanent all-wheel drive system, which is purely mechanical. Under normal driving conditions, the centre differential, designed as a planetary drive, distributes the power between the front and rear axles in a 40:60 ratio. If a wheel on one of the axles slips, e.g. when on a slippery surface, the self-locking differential immediately directs the majority of the power to the axle with the better traction. If necessary, up to 85 percent of the drive torque can be directed to the rear axle or up to 70 percent to the front axle.

The chassis adheres to the principle of strict lightweight construction. Its five-link suspensions front and rear are made largely of aluminium. Electromechanical power steering, the Audi drive select dynamic handling system and the adaptive air suspension with S-specific tuning are standard.

The SQ7 TDI rolls standard on 20-inch wheels with size 285/45 tyres. Alternatives range up to 22-inch tyres from the Audi sport line from Audi Sport GmbH. The brakes are big and powerful. Mounted on the front axle are internally ventilated, lightweight discs measuring 400 millimetres in diameter. They are gripped by black (optionally red), six-piston calipers with S logos. A brake system with particularly lightweight and abrasion-resistant carbon fibre-ceramic discs are also available to order.

#### **Innovative technology modules: the driving dynamics package**

Upon request, Audi will equip the SQ7 TDI with a driving dynamics package comprising three technology modules: the sport differential, all-wheel steering and electromechanical active roll stabilisation.

During sporty cornering, the sport differential ensures that steering commands are carried out precisely and stably. The superior control is achieved by means of a variable torque between the wheels of the rear axle.

A software function continuously computes the ideal distribution with respect to handling. When turning into or accelerating in a curve, the majority of the torque is directed to the outside wheel, pushing the car into the curve. Before the rear end can break out, the vehicle is stabilised and thus easily controlled.

Another optional system for the new Audi SQ7 TDI is all-wheel steering. Installed at the rear axle is a steering system with electrical spindle drive and two track rods that turns the rear wheels a few degrees in the same or opposite direction relative to the front wheels, depending on the situation. At low speeds, the rear wheels turn in the opposite direction. The large SUV thus becomes significantly even more agile, and its turning radius smaller by up to one metre – as noticed quite clearly by the driver during manoeuvring and parking. At slow speeds between five and 15km/h, the oppositely directed steering can range up to five degrees. At higher speeds the rear wheels follow the movement of the front wheels up to an angle of 3.5 degrees. Turning in the same direction improves the steering response and further increases stability in evasive manoeuvres.

The third component is the electromechanical active roll stabilisation, another innovation from Audi. With this system, a compact electric motor at the front and the rear axle with a three-stage planetary gearbox separates the two halves of the stabiliser. On an uneven road surface, they are decoupled from one another, which improves ride comfort. During sporty driving, the tubes are actively twisted against each other. That significantly reduces body roll, i.e. the lean of the car. Together with the planetary gear, an electric motor produces anything up to 1200Nm of torque.

The effect is taut, sporty handling: The car leans less in bends, and the tendency to understeer is further reduced. This enables higher lateral acceleration and thus faster cornering. The front and rear stabiliser can be adjusted independently of each other. This active distribution of power between the front and rear axles significantly enhances steering precision and the agility of the automobile.

Like the electric powered compressor, the electromechanical active roll stabilisation draws its drive power from the new 48 volt electrical subsystem, making it more powerful and faster than a conventional hydraulic system. The new electromechanical active roll stabilisation technology from Audi can also recuperate. If the wheels on one axle are deflected to greatly differing extents on bumps in the road, they excite the stabiliser – the electromechanical active roll stabilisation motor now converts each impulse into electrical energy. This energy is stored in the 48 volt electrical subsystem's lithium-ion battery, ensuring that the overall

energy balance of the electromechanical active roll stabilisation is significantly more favourable than that of a hydraulic system. Because it requires no oil, the electromechanical active roll stabilisation is also maintenance-free and environmentally friendly.

### **Dynamic control: the electronic chassis platform**

The adaptive air suspension and now for the first time also the electromechanical active roll stabilisation and sport differential are connected to the central control unit called the electronic chassis platform. This is highly precise and adapts to the situation at hand. Computation and adjustment of the handling functions take place in a one-millisecond cycle. By comparison: A blink takes roughly 100 times as long. The electronic chassis platform sends the computed values for the mechanical adjustment to the roll stabilisation and/or to the sport differential and adjusts the air suspension setting.

### **Driver assistance systems**

The Audi SQ7 TDI sets new standards with 24 driver assistance systems. All of the solutions are new or have been largely redeveloped. The adaptive cruise control plays a central role. It maintains the interval to the car ahead at speeds between 0 and 250km/h. On well-paved roads, the traffic jam assist relieves the driver in slow-moving traffic up to 65km/h by temporarily taking over the steering in addition to acceleration and braking. The predictive efficiency assistant helps by offering drivers situation-specific tips on how to save fuel. It evaluates information from the immediate vicinity of the car. If the driver wishes, the system controls the coasting of the eight-speed tiptronic. On highways it can improve fuel economy by up to 10 percent in this way.

Important safety features include the park assist, cross traffic assist rear, exit warning system, collision avoidance assist and turn assist as well as the Audi pre sense systems. At speeds up to 85km/h the standard solution Audi pre sense city monitors the area in front of the SQ7 TDI for other vehicles and pedestrians. In a critical situation, the system warns the driver and initiates full braking, if necessary.

Additional assistance systems round out the range. These include night vision assistant, Audi active lane assist, Audi side assist and the 360 degree cameras.

### **Body and exterior design**

Thanks to Audi's systematic lightweight construction concept, the SQ7 TDI weighs just 2270 kilograms without a driver, while offering strong performance with respect to crash safety, torsional rigidity and acoustic comfort. In the multimaterial body, hot-shaped and ultra-high-strength sheets form the backbone of the occupant cell.

The outer skin is made of aluminium. The drag coefficient is just 0.34, and the centre of gravity is low. This factor also sharpens the sporty character.

The Audi SQ7 TDI impresses with its masculine formal idiom. At 5.07 metres, it is roughly as long as the base model. It is 1.97 metres wide, 1.74 metres tall and has a wheelbase of 3.0 metres. All lines and surfaces are precise and concise. The sculpted Singleframe radiator grille, the distinctively highlighted wheels and the flared quattro-styled blisters emphasise the Audi genes.

Specific details hone the look of the new top model, for which there is a choice of 12 paint finishes. The Singleframe grill, the air inlets with their dual slats, the upper section of the exterior mirror housings and elements of the door trim gleam in an aluminium look. The front apron is powerfully contoured; chiseled sills accentuate the flanks of the Audi SQ7 TDI. The roof edge spoiler is wider and more distinctive than that of the Q7. A diffuser insert with an aluminium clasp encloses the four rectangular exhaust tailpipes. SQ7 TDI and V8T emblems adorn the front, the fenders and the rear.

LED headlights and dynamic rear turn signals are standard. Optionally available is Matrix LED technology, with which the high beam for each headlight is split up into 30 individual light-emitting diodes. With their highly precise control system, they illuminate the road superbly without blinding oncoming traffic. The Matrix LED headlights also include intelligent cornering lights.

## **Interior**

The Audi SQ7 TDI offers its passengers the largest interior in its segment, with seven seats of accommodation. The sport seats for the driver and front passenger offer a wide range of power adjustments. Optionally available are sport seats plus with pneumatic side bolster adjustment on the seat backs and seat cushions as well as variable head restraints. The customised contour seats with seat ventilation and optional massage function offer even more comfort.

The three-piece backrests in the second row can be folded down separately, and the third row can be lowered electronically into the floor of the SQ7 TDI. With a full contingent of passengers, the seven-seater model has a luggage capacity of 235 litres. With the third row folded down, this becomes 705 litres with a maximum of 1890 litres. A power tailgate is standard.

The SQ7 TDI ups the ante with elegant interior details. A red ring surrounds the start-stop button, and the pedals are plated with stainless steel. The centre tunnel console, the standard sport leather steering wheel flattened at the bottom, the key and the illuminated door sill trims bear SQ7 logos. The interior lighting shines in LED technology. There is a standard ambient lighting package, which can be adjusted over a range of 32 colours. Besides the three colour profiles familiar from the Q7, the SQ7 TDI also offers the Sport light profile in red/white.

Black is the dominant colour in the interior. The two-piece inlays combine brushed aluminium with chrome paint finish, slate grey. Carbon Atlas, piano finish and other materials are available from Audi Sport GmbH. The sport seats come standard in Valcona leather. The sport seats plus come factory-fitted with the high-grade leather upholstery, including a diamond pattern. A special highlight is the Audi design selection Kodiak brown. It comprises the sport seats plus with Valcona leather upholstery and diamond pattern plus an Alcantara headlining in black. The inlays are made of aluminium and Carbon twill, copper – a type of binding for woven materials. The instrument panel, the centre tunnel console and the top shoulders of the doors are covered in black leather with contrasting stitching. Customers can also choose the elegant design selection Murillo brown.

## **Controls and displays**

Audi is taking a new approach to controls with the optional MMI navigation plus with MMI all-in-touch. The driver can enter characters on the large touchpad or perform multi-finger gestures to zoom in on the map, for example. The system provides acoustic and haptic feedback after each command. The MMI logic with its flat hierarchies and free text search is oriented on modern smartphones. The natural voice control system understands a large number of expressions from everyday speech.

The optional Audi virtual cockpit with 12.3-inch display presents its information in brilliant, high-resolution graphics. It displays a special screen when the car is started and a special S design when driving. These elements also appear on the monitor of the MMI navigation plus with MMI all-in-touch. The driver uses the multifunction steering wheel to choose the view in the virtual cockpit. Audi supplements this with a head-up display. It projects important information, such as speed and navigation data onto the windshield in the driver's direct field of vision.

## **Infotainment and Audi connect**

The top infotainment system uses the second-generation modular infotainment platform. Its central computer comprises two main units – the radio car control unit and the MMX board (MMX = Multi-Media eXtension).

The MMX board integrates – along with the working and flash memory – a super-fast processor that processes all online, media, voice control, navigation and telephone features. The board is a plug-in module. Audi can keep it at the state of the art during the development process and thus bring innovations in consumer electronics into the car at an early stage.

A Wi-Fi hotspot enables the passengers to surf with up to eight mobile devices. The standard Audi connect package brings numerous online services on board, including navigation with Google Earth and Google Street View, and it can also serve as a Wi-Fi hotspot.

The Audi smartphone interface brings Apple Car Play and Android Auto into the car. If the customer connects an iOS or Android smartphone to the USB port (iOS from 7.1, Android from 5.0 Lollipop), the smartphone's contents

such as navigation, phone, music and select third party apps are offered in a separate MMI menu. They can be accessed conveniently by MMI or voice control.

Two Audi tablets that can be fastened to the backs of the front seats provide entertainment for the rear passengers. Networked with the MMI navigation plus with MMI all-in-touch, they serve as Rear Seat Entertainment. At the end of the trip, the passengers can unclip the tablets and continue to use them outside the car.

The sound systems on board provide an extraordinary sound experience. The Bang & Olufsen Advanced Sound System with 3D sound comprises a 1920-watt amplifier and 23 speakers, four of which are installed in the A-pillars. Those elements that create spatial height are played back through these speakers, creating a large virtual stage for the music.

The standard sound system is the innovative Bose sound system with 3D sound. It includes 19 speakers, two of which are integrated into the A-pillars to depict the spatial dimension of height.