

Engine, transmission and all-wheel drive

Enhanced performance, faster shifting: New drive train developed from scratch

The new Cayenne features a brand-new range of engines. The six and eight-cylinder turbo engines originally made their début in the Panamera. Porsche has developed these engines in pursuit of its downsizing concept. All engines have a smaller displacement but deliver more power and torque than their respective predecessor models. The basic engine, combustion processes, gas cycles and charge technologies in the new generation of engines are all optimised for improved performance and even greater fuel efficiency. Take the Cayenne S as an example: In spite of its 15 kW (20 hp) greater engine power, the new six-cylinder engine boasts an NEDC combined fuel consumption of 9.4 to 9.2 litres of Super Plus fuel per 100 km. The driver also benefits from the further improvements made to the responsiveness of the new engines.

Under the bonnet of the standard model lies a turbocharged V6 engine with three-litre displacement, delivering an output of 250 kW (340 hp) and 450 Nm of torque. The Cayenne S is powered by a biturbo 2.9-litre V6 engine with an output of 324 kW (440 hp) and 550 Nm of torque. Finally, the Cayenne Turbo is driven by a four-litre, eight-cylinder engine with two turbochargers, generating an output of 404 kW (550 hp) and 770 Nm of torque. The specific performances of the petrol engines have been boosted from 83 to 110 hp/l in the Cayenne, 117 to 152 hp/l in the Cayenne S, and 108 to 138 hp/l in the Cayenne Turbo,

resulting in a significantly improved driving performance. The Cayenne accelerates from zero to 100 km/h in 6.2 seconds (or 5.9 seconds with the Sport Chrono Package), and achieves a top speed of up to 245 km/h. The Cayenne S, which can achieve a top speed of up to 265 km/h, knocks another second off this acceleration time and is capable of reaching 100 km/h from a complete standstill in just 5.2 seconds – 0.3 seconds faster than its predecessor. Thanks to the faster-shifting Tiptronic S gearbox, the Sport Chrono Package reduces the acceleration time by another half a second, from 5.4 seconds to just 4.9 seconds. The Cayenne Turbo reigns supreme in acceleration, coming in at just 4.1 seconds (or, with the Sport Chrono Package, 3.9 s), surpassing the performance of even the current Cayenne Turbo S. The new top model achieves a top speed of 286 km/h.

Six and eight-cylinder engines with new central turbo layout

The new engines are packed with technological innovations. The exhaust turbochargers are arranged in a central turbo layout inside the cylinder V. This results in an engine with significantly more compact dimensions, allowing it to be installed in a deeper position inside the vehicle – which lowers the centre of gravity and improves lateral dynamics. The shortened exhaust paths between the combustion chambers and the turbochargers produce a more spontaneous engine response and a faster build-up in power. The new counter-rotating twin-scroll turbochargers deliver high torque at lower engine speeds. They also help to boost the response speed of the engines. As exhaust gases are kept completely separate, the gas columns generated by the individual cylinders are virtually unaffected by their counterparts – a particular advantage in the V8 engine, and a design that also boosts efficiency.

Innovative production processes and materials are used in the manufacture of the

engines. The weight of the crankcase for the eight-cylinder engine, for example, was reduced by 6.7 kilograms (a reduction of 14.6 per cent) by using a sand casting core package manufacturing technique. The rigidity of the component was also increased through the use of high-strength, quadruple-bolted main bearing covers. The linings of the high-performance machine boast a virtually wear-free iron coating, which is applied using an atmospheric plasma spraying process.

The six-cylinder engines also feature a range of innovative solutions. In the 2.9-litre engine of the Cayenne S, the exhaust manifold is integrated into the cylinder head. As well as reducing weight, this design means that the exhaust manifold is surrounded by cooling water, which ensures that the combustion process is efficient, even under full load.

Sporty and more responsive: The new eight-speed Tiptronic S

Porsche has developed a completely new generation of drives for the Cayenne, including the eight-speed Tiptronic S automatic transmission – which now delivers an even sportier and more comfortable drive than its predecessor, in line with the characteristics of the new Cayenne. The transmission combines significantly faster shifting speeds with even more comfortable and smooth starting characteristics. It also reduces traction interruption during gear changes. New sun gear and planet gear sets result in a wider gear spread: First gear is now shorter than in the predecessor model, while eighth gear is longer. This approach improves the initial acceleration performance of the Cayenne while also boosting comfort and fuel efficiency.

Thanks to the new shift-by-wire technology, the shift paths in the manual shift gate have been kept very short, which in turn reduces the necessary shift forces and ensures even more comfortable operation. And, thanks to its position and design, the selector lever offers the ideal contact surface for manual operation of the infotainment system.

The new, even more clearly differentiated driving modes enable the driver to benefit from the new transmission tuning. In “Normal” mode, the automatic transmission shifts to the higher gears quickly and smoothly to save fuel. In “Sport” mode, the Cayenne’s Tiptronic S feels very sporty, allowing fast gear changes with short acceleration times. With the optional Sport Chrono Package, the driver can use the mode switch on the steering wheel to select driving modes directly – a feature that Porsche first presented in the 918 Spyder.

All Cayenne models achieve top speed in sixth gear. The seventh and eighth gears, along with the coasting function, are designed for maximum efficiency and to improve driver comfort on long-distance journeys. The low engine speed further reduces the noise level in the interior.

The auto start/stop function has also been subject to further development, and now switches off the engine as the car coasts to a stop when approaching a traffic light, increasing comfort and reducing fuel consumption. The auto start/stop function is automatically deactivated in the Sport and Sport Plus driving modes.

The new transmission also has benefits if the Cayenne is used to tow another vehicle. Very few vehicles are able to pull a trailer load of up to 3.5 tonnes so effortlessly. Thanks to the torque increase of the converter, the transmission can transfer very high torque even at start-up and during manoeuvring. First gear is also around four per cent shorter compared to the previous transmission model. This allows the vehicle to be driven very

sensitively, especially at very low engine speeds, which is also a significant advantage off road.

Sport Chrono Package with PSM Sport available for the Cayenne for the first time

The introduction of the optional Sport Chrono Package takes the new Cayenne even closer to its sports car counterparts. Just like in the 911, the driver selects the driving mode via the mode switch on the steering wheel. In addition to Normal, Sport and Sport Plus modes, the driver can also select the "Individual Mode". This mode allows the driver to store an individual set-up and select it simply by rotating the mode button. Sport Plus mode activates Performance Start for optimum acceleration from a standstill, optimises all chassis systems for performance, sinks the air suspension to the lowest level and adjusts the angle of the roof spoiler on the Cayenne Turbo for optimum downforce.

The Sport Response button in the centre of the mode button enables the driver to optimise the Cayenne for ultra-high responsiveness for a period of 20 seconds. This unlocks the maximum performance of the engine and the transmission for overtaking manoeuvres at the push of a button. In this mode, the Cayenne responds even more rapidly to the driver stepping on the accelerator, immediately converting this signal into optimal acceleration. The instrument cluster shows the driver, via a countdown timer, how long the Sport Response function will remain active. The performance boost can be used as often as required. When the Sport Response function is active, it can be ended manually at any time by pressing the button again.

As in sports cars, the Sport Chrono Package also includes the separate PSM Sport mode. In a safe environment, ambitious drivers can take the Cayenne closer to its limits, with the Porsche Stability Management (PSM) system tuned for maximum sporty performance. PSM remains active in the background. PSM Sport mode can be enabled regardless of the selected driving mode.

Active Porsche Traction Management (PTM) for all models

In all new Cayenne models, Porsche now uses Porsche Traction Management (PTM), with an electronically and map-controlled multi-plate clutch, for its all-wheel drive. With its broad spread of torque distribution, the active hang-on all-wheel drive offers huge advantages in terms of driving dynamics, agility, traction and off-road capabilities. The system deploys variable and adaptive strategies to control the distribution of the propulsion force between the rear axle and the front axle. In addition, PTM monitors the driving conditions at all times. For optimum force distribution and traction in dynamic driving, the propulsion force is dosed on bends to allow the tyres to build up optimum levels of lateral support. During off-road driving, the system uses the fully variable distribution of the drive forces between the axles to ensure maximum propulsion at all times.