Convertible top and aerodynamics

Innovative lightweight roof with magnesium elements

The eye-catching feature of the 911 Carrera Cabriolet is the unique panel bow convertible top. Thanks to the innovative technology, it has been possible to achieve a previously unattainable coupé-like roof curvature of the closed fabric roof, something which also offers aerodynamic benefits. A new and lighter hydraulic roof drive allows the convertible top to be opened and closed in around 12 seconds in each case – like on the previous model, this is possible at speeds up to 50 km/h. The roof is operated by a button in the centre console or from outside using the remote control (not in the USA). Porsche traditionally places high demands on the convertible top of the 911. Like previously for all other 911 models, this folding roof is therefore a complete in-house development. With practically identical contours to the Coupé, the fabric roof elegantly spans the arc from the windscreen frame to the convertible top compartment lid. There are no visible bows under the fabric and also no sections that interrupt the flowing design. Even the heated rear glass window is practically flush and is integrated into the structure with just a minimal joint.

Porsche development: panel bow convertible top made of lightweight magnesium

The innovative panel bow convertible top design makes it possible to achieve this previously unattainable form for fabric roofs. Here, the entire soft top – apart from the side sections – spans a rigid roof surface composed of four individual segments that about each other seamlessly. The four elements are the front roof frame, two panel bows and the rear window. Like the other segments, the window frame is made of magnesium. A majority of the frame guide rods are also made of this very light material. Only the side guides, actuators and rear bow are made of aluminium. All frame parts are connected kinematically, so that just one hydraulic cylinder is needed on each side to move the convertible top. For the locking mechanism, Porsche has opted for the proven electric central closure mechanism supported by side centering pins.

There is no fixed connection between the panel bows and the fabric of the roof, so that the four magnesium segments can fold flush over one another in the proven Z-folding mechanism when the roof is opened. This unique design means that the opened roof package consisting of the roof fabric, frame, panel bows and rear window, at just 23 centimetres high and around 55 centimetres long, has minimal space requirements. While the front section of the roof remains visible in the open position, a sickle-shaped convertible top compartment lid covers the rear portion as before. This large lid stretches down to the now larger spoiler. When the top is closed, the vehicle occupants enjoy levels of climate and noise comfort that come very close to those of the Coupé. The entire surface of the exterior fabric is lined with an insulating mat. In the interior, the roof segments are covered with rigid roof panels that lend the cockpit an enveloping interior feel. The side sections are also covered with fabric, so that no technical components are visible when the roof is closed. The headroom is also roughly equivalent to that of the Coupé.

Electrically operated, fully integrated wind deflector

The integrated, electrically operated wind deflector ensures increased comfort in the 911
Carrera Cabriolet at higher speeds. It is secured on a U-shaped support hoop, which is fully integrated in the rear area when folded down and therefore does not restrict the space on the rear seats. The hoop can be raised within two seconds at the push of a button and unrolls a mesh that is tensioned at right angles between the front seat backrests by a second movable frame element. The wind deflector can be opened and closed up to a speed of 120 km/h. When the top is open, it guarantees very good protection against draughts and minimum wind noise. Thanks to map control, the wind deflector takes into account the position of the electrically adjustable front seats for every action. For example, deployment is prevented if one of the backrests is in the movement range of the wind deflector. The raised wind deflector is automatically retracted when the convertible top is closed.

Adaptive rear spoiler with 45 percent larger active area

The variable aerodynamic concept of the Coupé was adopted for the new 911 Carrera Cabriolet with adapted parameters. The form of the spoiler blade is adapted to the specific rear end contours of the Cabriolet, for instance. When the convertible top is closed, the spoiler positions correspond to those of the Coupé because the new roof generates a practically identical airflow pattern. This changes when the roof is open, and the spoiler then moves to a specially developed, steeper position. Depending on the vehicle configuration, the spoiler is also extended to different heights and angles. In addition, a closing element is activated at the front spoiler edge by means of a special articulated kinematic mechanism which ensures optimum air flow over the spoiler blade. The spoiler is automatically extended at 90 km/h and retracted at 60 km/h, but can also be extended below these speed limits at the push of a button. The front cooling air flaps round off the aerodynamic concept. When the roof is open, they also open automatically and completely above a speed of 120 km/h. The optional Sport Chrono Package allows direct activation of the rear spoiler via the “Sport” and “Sport+” driving modes. If these modes are selected by means of the mode switch on the steering wheel, the rear spoiler extends to the steep Performance position as from 90 km/h. In Wet mode also, the rear spoiler is adjusted to Performance position from a speed of 90 km/h. Top speed is always reached in the Performance position.

Cd = 0.30: Cabriolet with exemplary aerodynamics

The basic elements of the aerodynamic concept for the 911 Carrera Cabriolet are the streamlined body surface contours, the convertible top, the enlarged variable rear spoiler and the cooling system with its adaptive air flaps at the front which does not need large air intakes under the vehicle and therefore allows a practically smooth vehicle underbody. Optimised air intake and air outlet cross-sections also improve cooling air routing, so the Cd value of 0.30 for the 911 Carrera Cabriolet is maintained – when the roof is closed – in spite of the increased engine and braking power.

Roll-over protection system also increases rigidity

The open 911 Carrera S has an automatic roll-over protection system. This essentially consists of a compact, self-supporting portal frame made of welded, high-strength extruded aluminium sections. Due to its high strength, the supporting frame is also used for body reinforcement: it contributes to the torsional rigidity of the Cabriolet through diagonal struts to the B-pillars and convertible top compartment.

In the event of an imminent roll-over, two newly developed cassette modules behind the rear seats are extended by spring pressure; triggering takes place pyrotechnically by a
micro gas generator. If the convertible top is closed, a carbide metal pin on each of the two cassettes breaks through the safety glass of the rear window. Accidental triggering is practically impossible because sensing and actuation and continuous monitoring are performed by the high-precision airbag control unit with integrated roll-over sensor. This monitors every change in the body inclination, longitudinal and transverse acceleration as well as road contact.