A6 Sportback e-tron: The most aerodynamic Audi of all time

- **A new record: The A6 Sportback e-tron* writes Audi history with a Cd value of 0.21**
- **Attention to detail: Aerodynamics expert Matteo Ghelfi: “We look iteratively at each individual millimeter and radius.”**
- **Progressive wheel designs: Wheel designer Andreas Valencia Pollex: “The wheel range for the A6 e-tron* has been designed for maximum aerodynamics.”**

Ingolstadt, July 31, 2024 – With an exceptionally low Cd value of 0.21, the Audi A6 Sportback e-tron* is the most aerodynamic Audi of all time and leads the entire VW Group in its segment in terms of aerodynamics. The A6 Avant e-tron* also achieves an excellent Cd value of 0.24, placing it at the top of its body segment. Aerodynamics developers Andreas Lauterbach and Matteo Ghelfi and wheel designer Andreas Valencia Pollex explain how they achieved the record value with meticulous attention to detail.

Aerodynamics has always played a key role in Audi’s long history of success. As far back as 1967, the NSU Ro 80 had an aerodynamic, wedge-shaped body with a Cd value of 0.35 that changed automotive design forever. The third-generation Audi 100 (C3), introduced in the summer of 1983, boasted a Cd value of 0.30, which was exceptional for its time. Right on its heels, the third-generation Audi 80 (B3) continued this success story with a drag value of 0.29. Now, the Audi A6 e-tron* is writing a new chapter, proving once again that Audi always combines form and function in a perfect symbiosis.

“Over 1,300 simulations and countless hours in the wind tunnel.”

“From the very start of the project, we placed a high value on efficiency and range and pursued very ambitious goals, regarding the A6 e-tron*. To be honest, in the beginning, we weren’t sure if we would be able to achieve the values we were aiming for. Getting to that last thousandth of a Cd value is the hardest part, but in the end, we exceeded our goals,” Lauterbach recalls.

The outstanding result was achieved primarily through “excellent teamwork between us (Aerodynamics experts) and our colleagues in Design. We all pulled together. From the beginning of the project, the Designers shared their drafts with us so that we could provide initial aerodynamic evaluations. In an iterative process – firstly using virtual simulations and later the physical model in the wind tunnel – we went on to optimize the basic vehicle body.

In particular, the basic proportions with the slim greenhouse and the sloping roofline contribute to good aerodynamics."

Lauterbach and Ghelfi devoted considerable time to working on the details with their colleagues in the Design team. Ghelfi: "In all, we ran over 1,300 simulations on the car and spent countless hours in the wind tunnel and in meetings collaborating with surface experts and designers. For example, air curtains are used to improve the airflow around the front of the car. The outside edge of the air curtain intake protruded somewhat, which impeded the airflow. Millimeter by millimeter, we reached a compromise that ultimately worked out for both sides." Lauterbach adds: "Another example is the rear track width. Our team would have liked it to be narrower. Together, we found a solution that brought out the best in terms of design, dimensions, and aerodynamics." Ghelfi: "Regarding aerodynamics, the aero bezels were particularly important. The lateral breakaway edges on the rear of the A6 Avant e-tron* made it possible to achieve a clearly defined flow stall. They are significantly larger than in other Audi cars. Working in the wind tunnel with our Design colleagues, we carefully pored over each side's respective arguments and strived to find the best solution. The result is that the aero bezels alone improve the range by 0.008, equivalent to eight kilometers. That's a significant advantage to come from a single design detail."

"Looking at the car overall, neither side had to make any major compromises. When all was said and done, and I called my colleague in Design to tell him that together we had achieved the Cd value of 0.21 for the A6 Sportback e-tron*, he could hardly believe it," recounts Lauterbach proudly.

"Every detail fine-tuned to the last millimeter."

Achieving these top Cd values for the A6 Sportback e-tron* and Avant e-tron* demanded considerable attention to detail. The switchblade cool-air intake under the Singleframe alone, which helps the air to flow around this area with few losses, realized a Cd advantage of 0.012, equivalent to about 12 kilometers. Lauterbach: "The underfloor also plays a significant role in a car's aerodynamic performance. On the A6 Sportback e-tron*, we added radii, optimized stiffening ribs, and breakaway edges at critical points. The rear diffuser is another element crucial to aerodynamics: Due to the smooth underfloor, this part is exposed to direct airflow, and pressure recovery has a positive effect on the Cd value."

Ghelfi adds: "The underfloor is largely finished, and we've fine-tuned many of its parts, including specially adapted wheel spoilers and 3D bumpers on the front wheels, each of which has been individually optimized for the Sportback and Avant models using CFD analysis, which improves the Cd by 0.002 and 0.009 according to wind tunnel measurements. The large underfloor cover (the engine undershield) in the front of the car was optimized by adding a large radius on the air outlet; the rocker panel and the rear axle have been largely covered. These are just a few examples. We looked at practically each individual radius.

**The collective fuel/electric power consumption and emissions values of all models named and available on the German market can be found in the list provided at the end of this text.*

We were able to achieve all these optimizations thanks to excellent teamwork with the project leaders, system team leaders, component managers, and designers."

Lauterbach explains the overall concept this way: "The balance between the basic shape, rear height, rear contours, and underfloor design impact not only the car's Cd value but also its lift. We achieved an ideal balance between lift and Cd by fine-tuning the underfloor as described." Ghelfi adds: "The Avant has an additional diffuser spoiler that compensates for the fundamental difference in aerodynamics between the Sportback and Avant silhouettes, which means that the underfloor airflow differs for the two A6 e-tron derivatives*. This is another reason the Avant uses wider 3D bumpers to improve airflow around the front wheels."

"Practically all of the wheels for the A6 e-tron* are designed for aerodynamics"

The aero optimizations that some of the different-sized wheels feature round off the aerodynamics concept of the Audi A6 e-tron*. Rim designer Andreas Valencia Pollex: "Formerly, wheels basically only had to meet stability requirements. Today, we develop and design intelligent aero wheels that are as efficient as possible because the wheels, and even the tires, have a major impact on the range of an electric car." The A6 e-tron* has special 19" aero wheels and two special 20" aero wheels.

Valencia Pollex continues: "To achieve perfect aerodynamics, the rims had to be somewhat flat so that the air that hits the front of the car is directed sideways around the body without much turbulence. We want the wind to flow along a wall rather than a collection of geometric shapes. So, we also developed a 21" wheel with aero blades made from special plastic for the A6 e-tron."

Lauterbach adds: "If you look at the whole range of wheels, the best and the worst wheels in terms of aerodynamics are only 0.015 Cd apart. That means that practically every wheel is designed for maximum aerodynamics."

All information, images, and videos related to the new Audi A6 e-tron model series are available in the Audi MediaCenter.

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Product and Technology Communications
Michael Crusius
Spokesperson model series A6 e-tron,
model series Q5, Driver Assistance Systems,
Electronic, Infotainment, Battery
Technology
Phone: +49 841 89-42329
Email: michael.crusius@audi.de
www.audi-mediacenter.com

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In 2023, the Audi Group delivered 1.9 million Audi vehicles, 13,560 Bentley vehicles, 10,112 Lamborghini vehicles, and 58,224 Ducati motorcycles to customers. In the 2023 fiscal year, Audi Group achieved a total revenue of €69.9 billion and an operating profit of €6.3 billion. Worldwide, an annual average of more than 87,000 people worked for the Audi Group in 2023, more than 53,000 of them at AUDI AG in Germany. With its attractive brands and numerous new models, the group is systematically pursuing its path toward becoming a provider of sustainable, fully networked premium mobility.

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Fuel/electric power consumption and emissions values of the models named above:

Audi A6 Sportback e-tron performance
Combined electric power consumption in kWh/100 km (*62.1 mi*): 15.9-14.0;
combined CO_2 emissions in g/km (g/mi): 0 (0) CO_2-class: A

Audi A6 Avant e-tron performance
Combined electric power consumption in kWh/100 km (*62.1 mi*): 17.0-14.8;
combined CO_2 emissions in g/km (g/mi): 0 (0) CO_2-class: A

Audi S6 Sportback e-tron
Combined electric power consumption in kWh/100 km (*62.1 mi*): 16.7-15.7;
combined CO_2 emissions in g/km (g/mi): 0 (0) CO_2-class: A

Audi S6 Avant e-tron
Combined electric power consumption in kWh/100 km (*62.1 mi*): 17.4-16.4;
combined CO_2 emissions in g/km (g/mi): 0 (0) CO_2-class: A