Mercedes-Benz

Mercedes-Benz SLS AMG Coupé Electric Drive

Electrifying – the world's most powerful electric super sports car

Press Information

With the SLS AMG Coupé Electric Drive, Mercedes-AMG is entering a new era: the locally emission-free super sports car featuring advanced technology from the world of Formula 1 represents the most exclusive and dynamic form of electric motoring. The most powerful AMG high-performance vehicle of all time has four electric motors producing a total output of 552 kW and maximum torque of 1000 Nm. As a result, the gullwing model has acquired the status of the world's fastest electrically-powered series production vehicle: the SLS AMG Coupé Electric Drive accelerates from zero to 100 km/h in a mere 3.9 seconds. Meanwhile, the exclusively tuned "SLS eSound" means that this matchless driving experience stirs the emotions acoustically too in typical AMG fashion.

A new dimension of driving performance – the AMG brand pledge is fulfilled to remarkable effect by the outstanding performance dynamics, which come courtesy of AMG Torque Dynamics and are made possible by the wheel-selective all-wheel drive. The most "electrifying" gullwing model ever has been developed in-house by Mercedes-AMG GmbH. The extremely powerful high-voltage battery for the SLS AMG Coupé Electric Drive is the result of the collaboration between Mercedes-AMG and Mercedes AMG High Performance Powertrains in Brixworth in the UK. Here, the British Formula 1 experts were able to draw on their extensive experience with KERS hybrid concepts.

"The SLS AMG Coupé Electric Drive is redefining standards for cars with electric drive systems. As the most powerful gullwing model ever, it also epitomises the enduring innovative flair of Mercedes-AMG. Our vision of the most dynamic electric vehicle has become a reality and enables AMG customers to enjoy a whole new dimension of exclusive driving experience. With the help of our colleagues at Mercedes AMG High Performance Powertrains in Brixworth, we are bringing fascinating high tech from the world of Formula 1 to the road," according to Ola Källenius, Chairman of Mercedes-AMG GmbH.

Pioneering, visionary, electrifying: the powerful and locally emission-free super sports car with electric drive once again showcases Mercedes-AMG GmbH's development expertise. AMG, the performance brand of Mercedes-Benz, is

demonstrating its technological leadership in this segment with this unique, cutting-edge drive concept. The SLS AMG Coupé Electric Drive is aimed at technology-minded super sports car fans who are open to new ideas and fascinated by ambitious high-tech solutions for the future of motoring.

Enormous thrust thanks to 1000 Nm of torque

"Not only is the SLS AMG Coupé Electric Drive the world's only super sports car with electric drive, it is also the most powerful series-produced electric car of all. Out on the road, the gullwing model generates a breathtaking sensation unlike any other – partly due to the 552 kW of maximum output and 1000 Newton metres of torque, but especially thanks to the AMG Torque Dynamics, the SLS eSound and AMG Lightweight Performance", observes Tobias Moers, Head of Overall Vehicle Development and member of the Board of Management of Mercedes-AMG GmbH.

What makes the pioneering drive package in the SLS AMG Coupé Electric Drive so thrilling is the completely novel and electrifying driving experience: enormous thrust comes courtesy of four synchronous electric motors providing a combined maximum output of 552 kW and peak torque of 1000 Nm. This extra-special breed of gullwing car accelerates from zero to 100 km/h in 3.9 seconds and can reach a top speed of 250 km/h (electronically limited). The car's agile response to movements of the accelerator pedal and the linear power output are a source of pure delight: unlike with a combustion engine, the build-up of torque is instantaneous with electric motors – maximum torque is effectively available from standstill. The spontaneous torque build-up and immense power delivery without any interruption in traction on the one hand are combined with completely vibration-free motor running characteristics on the other.

The four compact permanent-magnet synchronous electric motors, each weighing 45 kg, have a maximum speed of 13,000 rpm and drive the four wheels selectively by means of a special transmission arrangement for each axle. This provides a unique way of distributing torque to individual wheels – normally this would only be possible with wheel hub motors, which have the drawback of creating considerable unsprung masses.

The key data at a glance:

	SLS AMG Coupé Electric Drive
Max. output	552 kW
Torque	1000 Nm
0 - 100 km/h	3.9 s
Top speed	250 km/h*
Range	250 km (according to NEDC)
Battery energy content	60 kWh
Battery voltage	400 volts
CO_2 emissions	0 g/km

*Electronically limited

Unmistakably AMG: the sound of the 21st century

Powerful, resonant, dynamic, emotional and authentic: the acoustic performance of the SLS AMG Coupé Electric Drive epitomises the sound of the 21st century. Following exhaustive series of tests as well as numerous development test drives, the AMG experts have composed the "SLS eSound" – a unique soundtrack which captures the outstanding dynamism of this exceptional super sports car with electric drive. Even without an AMG V8 engine underneath the bonnet, the SLS AMG Coupé Electric Drive satisfies all expectations of a genuine AMG high-performance car and proves itself to have a full set of AMG genes with its "SLS eSound". To put it quite simply: the tremendous power and torque unleashed by 552 kilowatts and 1000 Newton metres is music to the ears too.

The "SLS eSound" includes the characteristic start-up sound, which rings out on pressing the "Power On / Off" button on the AMG DRIVE UNIT: this sound triggers a sense of excitement and indicates that the vehicle is ready to start. When the driver shifts from "P" to "D" with the E-SELECT lever, the acoustics change and transform into a specially designed driving sound as soon as the SLS AMG Coupé Electric Drive moves off. The occupants can enjoy a tailored sound pattern to suit each driving situation: incredibly dynamic when accelerating, subdued and restrained when cruising and intuitively comprehensible during recuperation phases – i.e. when the driver decelerates using the steering-wheel shift paddles and energy is being recovered. Using, in the main, authentic yet denaturalised real noises that cause the driver to make a subconscious association is of great benefit

here as they do not sound artificial, as is usually the case with synthetic noises. This form of sound generation is thus far unprecedented in the field of production car development, and gives the driver emotive, instantly comprehensible feedback on the vehicle's current behaviour.

The "SLS eSound" is not only dependent on road speed, the electric motors' speed and load conditions, it also reflects the driving situation and the vehicle's operating state with a suitable driving sound. Cornering, load changes, kickdown or powering along the motorway at top speed: the driver is always assured of superb, informative feedback by the intelligent combination of the specially composed sound and the vehicle's existing inherent noises together with the elimination of undesirable background noise – or "sound cleaning" as the experts call it. The four electric motors in the SLS AMG Coupé Electric Drive generate a rather hushed, high-frequency sound pattern that seems inappropriate for a super sports car. These motor-speed-dependent frequency components are therefore harmoniously integrated into the "SLS eSound" in such a way that they have a positive impact on the vehicle's overall soundtrack instead of sounding incongruous.

Groundbreaking work for Mercedes-AMG developers

Four individual layers, granular, order and wavetable synthesis, overshoot models, 3D parametric formants – these are just a few of the technical terms from the world of sound engineering that demonstrate just how much specialist knowledge the acoustic experts at Mercedes-AMG have acquired. Composing the "SLS eSound" took the development team into uncharted territory, requiring them to carry out some pioneering work. Seldom has so much work been invested in defining the acoustic characteristics for a production car. Over
20 individual sound elements were devised, composed, arranged, evaluated and finalised. During the concept phase, a carefully selected range of futuristic sounds were also shortlisted. At the same time, the final soundtrack had to replicate the highly dynamic performance of the electrically powered gullwing model in order to produce the acoustic experience that AMG high-performance cars are renowned for. Over the course of the complex development phase, the acousticians at AMG also called on the skills and experience of professional musicians, signal theory experts and IT specialists. The multitude of parameters and the tuning required for the individual operating and driving states presented the Mercedes-AMG team with a major challenge that they overcame with flying colours.

Apart from the sound itself, the "SLS eSound" control unit needed to be developed from scratch too. This self-contained component communicates with the other control units in the vehicle via the CAN bus (CAN: Controller Area Network), allowing it to be fed with all information relating to the current driving status with lightning speed. The integral Digital Sound Processor (DSP) then relays the generated "SLS eSound" signals to the standard-fit AMG sound system, comprising eleven high-end loudspeakers and with a total output of 690 W.

The tweeter, mid-range and woofer speakers combine together with a twin subwoofer to generate the convincing, authentic sounds heard aboard the SLS AMG Electric Drive. Of course, it's not just the "SLS eSound" which is heard via the standard COMAND APS multimedia system: the audio signals from the radio, CD, mobile devices such as the iPod® as well as the phone are controlled by the COMAND system and ultimately mixed together with the "SLS eSound" in a microprocessor-controlled high-performance DSP amplifier with special sound tuning. This setup enables two different sound genres to be reproduced for the occupants in one and the same vehicle: the three-dimensional "SLS eSound" together with the sound staging used for the entertainment acoustics. Purists furthermore have the option of completely muting the "SLS eSound" in COMAND to listen to nothing more than the whir of the electric motors, the wind noise and the sound of the tyres on the road. The AMG high-end sound system can be identified by its special, weight-reduced black anodised aluminium grilles.

Advanced Formula 1 technology: high-voltage lithium-ion battery

Battery efficiency, performance and weight: Mercedes-AMG is setting the pace in each of these areas. The high-voltage battery in the SLS AMG Coupé Electric Drive boasts an energy content of 60 kWh, an electric load potential of 600 kW and weighs 548 kg – all of which are absolute best values in the automotive sector. The liquid-cooled high-voltage lithium-ion battery features a modular design and a maximum voltage of 400V.

Advanced technology and know-how from the world of Formula 1 have been employed during both the development and production stages: the battery is the result of the collaboration between Mercedes-AMG GmbH in Affalterbach and Mercedes AMG High Performance Powertrains Ltd. Headquartered in Brixworth in England, the company has been working closely with Mercedes-AMG for many years. The F1 engine experts benefited from their extensive expertise with the KERS hybrid concept, which made its debut in the

2009 Formula 1 season. At the Hungarian Grand Prix in 2009, Lewis Hamilton drove with the Mercedes-Benz KERS system to achieve an historic first victory for a Formula 1 vehicle equipped with KERS hybrid technology. Mercedes AMG High Performance Powertrains supplies the Formula 1 teams MERCEDES AMG PETRONAS, Vodafone McLaren Mercedes and Sahara Force India with Mercedes V8 engines and the KERS system.

The high-voltage battery consists of 12 modules, each containing 72 lithium-ion cells. This optimised arrangement of a total of 864 cells not only makes efficient use of the installation space, it also benefits battery performance. One of the technical requirements for this is the intelligent parallel switching of the individual battery packs, which helps to maximise the energy storage device's safety, reliability and service life. As in Formula 1, the battery is charged whilst the car is being driven by means of targeted recuperation during deceleration phases.

High-performance control as well as effective cooling of all components

A high-performance electronic control system converts the direct current from the high-voltage battery into the three-phase alternating current which is required for the synchronous motors, and regulates the energy flow for all operating conditions. Two low-temperature cooling circuits ensure that the four electric motors and the power electronics are maintained at a balanced operating temperature. A separate low-temperature circuit is responsible for cooling the high-voltage lithium-ion battery. At low ambient temperatures, the battery is quickly brought up to optimum operating temperature with the aid of an electric heating element. And at extremely high external temperatures, the cooling circuit for the battery can be additionally boosted with the aid of the air conditioning. This also helps to preserve the overall service life of the battery system.

Quick-charge function via special wall box

Ideally, the SLS AMG Coupé Electric Drive is charged with the aid of a wall box, as it is known. Installed in the home garage, this technology provides a 22 kW quick-charge function, which is the same as the charging performance available at a public charging station. A high-voltage power cable is used to connect the vehicle to the wall box, and enables charging to be completed in around three hours. Without the wall box, charging takes around 20 hours. The wall box is provided as an optional extra by Mercedes-AMG as part of a collaboration with SPX and KEBA, two suppliers of innovative electric charging infrastructures for the automotive industry.

Eight-stage design concept for maximum safety

To ensure maximum safety, the SLS AMG Coupé Electric Drive makes use of an eight-stage safety concept, comprising the following:

1. All high-voltage cables are colour-coded in orange to prevent confusion
2. Comprehensive contact protection for the entire high-voltage system
3. The lithium-ion battery is liquid cooled and accommodated in a high-strength aluminium housing within the carbon-fibre "zero-intrusion cell"
4. Electrical separation of the high-voltage and low-voltage networks within the vehicle and integration of an interlock switch
5. Active and passive discharging of the high-voltage system when the ignition is switched to "off"
6. In the event of an accident, the high-voltage system is switched off within fractions of a second
7. Continuous monitoring of the high-voltage system for short circuits with potential equalisation and insulation monitors
8. Redundant monitoring function for the all-wheel drive system with torque control for individual wheels comprising multiple control units using a variety of software

Thanks to this design concept, Mercedes-AMG is able to ensure maximum safety during production and operation of the vehicle, and also during maintenance and repair work. Needless to say, the SLS AMG Coupé Electric Drive also meets all statutory and internal Mercedes crash test requirements.

All-wheel drive with AMG Torque Dynamics offers new-found freedom

Four motors, four wheels – the intelligent and permanent all-wheel drive of the SLS AMG Coupé Electric Drive guarantees driving dynamics of the highest calibre, while at the same time providing the best possible active safety. Optimum traction of the four driven wheels is therefore ensured, whatever the weather conditions. According to the developers, the term "AMG Torque Dynamics" refers to individual control of the electric motors, something which enables completely new levels of freedom to be achieved. The AMG Torque Dynamics feature is permanently active and allows for selective distribution of power to each individual wheel. The intelligent distribution of drive torque has a beneficial effect on driving dynamics, handling, driving safety and ride comfort. Each individual wheel can be both electrically driven and electrically braked in accordance with the specific driving situation, thus helping to

- optimise the vehicle's cornering properties,
- reduce the tendency to oversteer/understeer,
- increase the yaw damping of the basic vehicle,
- reduce the steering effort and steering angle required,
- increase traction,
- and minimise ESP® and ASR intervention.

The AMG Torque Dynamics feature boasts a high degree of variability and individuality by offering three different driving modes:

- Comfort (C): comfortable, forgiving driving characteristics
- Sport (S): sporty, balanced driving characteristics
- Sport plus (S+): sporty, very agile driving characteristics

AMG Torque Dynamics enables optimum use to be made of the traction potential between the tyres and the road surface in all driving states. The technology allows maximum levels of freedom, meaning that the vehicle's performance limits can be fully exploited. Outstanding handling safety is assured at all times by the two-stage Electronic Stability Program ESP®.

"AMG Lightweight Performance" design strategy

The trailblazing bodyshell structure of the SLS AMG Coupé Electric Drive forms part of the ambitious "AMG Lightweight Performance" design strategy. The battery is located within a carbon-fibre monocoque, which forms an integral part of the gullwing model and acts as its "spine". The monocoque housing is firmly bolted and bonded to the aluminium spaceframe body. The fibre composite materials also partly originate from the world of Formula 1. The advantages of CRP (carbon-fibre-reinforced plastic) were exploited by the Mercedes-AMG engineers in the construction of the monocoque. These include high strength, which makes it possible to create extremely rigid structures in terms of torsion and bending, excellent crash characteristics and low weight.

Carbon-fibre components are up to 50 percent lighter than comparable steel ones, yet retain the same level of rigidity. Compared with aluminium, the weight saving is still around 30 percent, while the material is considerably thinner. The weight savings achieved through the carbon-fibre battery monocoque contribute to the agility of the SLS AMG Coupé Electric Drive and, together with the wheel-selective four-wheel drive system, ensure immense driving pleasure. The carbon-fibre battery monocoque is, in addition, conceived as a "zero-intrusion

cell" in order to meet the very highest standards of crash safety. It protects the battery modules inside from deformation or damage in the event of a crash.

The basis for the CRP construction is provided by fine carbon fibres, ten times thinner than a human hair. A length of this state-of-the-art fibre reaching from here to the Moon would weigh a mere 25 grams. Between 1000 and 24,000 of these fibres are combined into individual strands. Machines then weave and sew them into fibre mats several layers thick, which can be moulded into three-dimensional shapes. When injected with liquid synthetic resin, this hardens to give the desired structure its final shape and rigidity.

Optimum weight distribution and low centre of gravity

The purely electric drive system was factored into the equation as early as the concept phase when the super sports car was being developed. It is ideally packaged for the integration of the high-performance, zero-emission technology: by way of example, the four electric motors and the two transmissions can be positioned as close to the four wheels as possible and very low down in the vehicle. The same applies to the modular high-voltage battery. Advantages of this solution include the vehicle's low centre of gravity and balanced weight distribution – the ideal ingredients for superb handling, which the electrically powered gullwing model shares with its petrol-driven siblings.

New front axle design with pushrod damper struts

Driving the front wheels as well called for a newly designed front axle: unlike the series production versions with AMG V8 engine, which have a double-wishbone suspension, the SLS AMG Coupé Electric Drive features an independent multi-link suspension with pushrod damper struts. This is because the vertically-arranged damper struts had to make way for the additional drive shafts. As is customary in many racing cars, horizontal damper struts are now used, which are operated by means of separate pushrods and levers. Thanks to this sophisticated front axle design, which has already been tried and tested in the world of motorsport, the agility and handling dynamics of the SLS AMG Coupé Electric Drive are on a par with the V8 variants. Another distinguishing feature is the speed-sensitive power steering with rack-and-pinion steering gear, which operates electrohydraulically rather than just hydraulically.

AMG ceramic composite brakes for flawless stopping power

The SLS AMG Coupé Electric Drive is slowed down with the aid of AMG high-performance ceramic composite brakes, which boast direct brake response, a precise pressure point and outstanding fade resistance, even under extreme operating conditions. The oversized discs – measuring 402 x 39 mm at the front and 360 x 32 mm at the rear – are made of carbon-fibre-reinforced ceramic, feature a composite construction all round and are connected to an aluminium pot with a floating radial mounting. The ceramic brake discs are 40 percent lighter in weight than conventional cast iron brake discs. The reduction in unsprung masses not only improves handling dynamics and agility, but also ride comfort and tyre grip. The lower rotating masses at the front axle also ensure even sharper steering response – which is particularly noticeable when taking motorway bends at high speed.

Exclusive, high-class design and appointments

Visually, the multi-award-winning design of the SLS AMG is combined with a number of specific features that are exclusive to the Electric Drive variant. The front apron has a striking front splitter made from exposed carbon fibre, which generates downforce on the front axle. The radiator grille and adjacent air intakes are embellished with special body-coloured surfaces with bionic honeycomb-shaped apertures. Not only do these add a visual highlight, they also improve the airflow over the cooling modules mounted behind them thanks to their streamlined design. Darkened headlamps impart an added sense of individuality to the front section.

When the vehicle is viewed from the side, the eye is caught by the stylised "Electric Drive" lettering between the high-gloss black fins on its flanks. The new, specially designed rear apron with matt black diffuser insert and the tail lights with their black surrounds add a dynamic finishing touch at the rear. The "AMG electricbeam magno" matt paint finish is exclusive to the SLS AMG Coupé Electric Drive, while three other paint colours are available as an alternative at no extra charge. The SLS AMG Coupé Electric Drive rides as standard on AMG 5-twin-spoke light-alloy wheels-in a matt black finish, shod with tyres size 265/35 R 19 (front) and 295/30 R 20 (rear). In combination with the AMG electricbeam magno paintwork, the wheels' body-coloured rim flange produces an exclusive contrasting effect.

Exceptional, fully appointed interior

In conjunction with the AMG electricbeam magno paint finish, contrasting yellow topstitching adorns the very classy and sporty interior's designo black Exclusive leather upholstery. AMG sports bucket seats, AMG carbon-fibre trim, the AMG Interior Carbon-Fibre package and the carbon-fibre side panelling for the centre console help to reinforce the exclusive, dynamic character of the fastest electric car in the world. Heated and electrically adjustable AMG sports seats with memory function are also optionally available.

Behind the new AMG performance steering wheel with Alcantara® trim in the grip area is the new-look AMG instrument cluster: the rev counter has been replaced by a power display including information on power output, the recuperation status, the driving modes and the battery charge. The seven green LEDs positioned above the central display indicate the current recuperation level:

- Level 1 (low): One LED lights up
- Level 2 (mid): Three LEDs light up
- Level 3 (high): Five LEDs light up
- Level 4 (full): Seven LEDs light up

AMG Performance Media as standard

The AMG DRIVE UNIT comprises the electronic rotary switch for selecting the three driving modes "C" (Controlled Efficiency), "S" (Sport) and "S+" (Sport plus), which the driver can use to specify three different performance levels from the electric motors, which in turn also affects the top speed and accelerator pedal response. Behind the buttons for "Power On / Off" and "ESP ON/OFF", there are also buttons for the AMG Torque Dynamics and AMG Setup functions.

The SLS AMG Coupé Electric Drive also comes as standard with the COMAND APS system including AMG Performance Media. Besides full high-speed mobile internet access, the multimedia system also provides information on:

- Vehicle energy flow
- High-voltage battery charge status
- Current range
- Currently activated and maximum possible recuperation level
- Selection of next departure time and display of charging forecast
- Bar chart of energy consumption in kWh/100 km and recuperation levels for the last 15 minutes
- Temperatures of the high-voltage battery and motors
- Activation of the standby mode to preserve the battery during longer periods of inactivity
- Vehicle Setup: driving modes, mode for AMG Torque Dynamics and ESP®
- AMG Torque Dynamics: individual wheel torques, current motor output and torque
- "Race" mode: real-time display of lateral and linear acceleration combined with braking performance, accelerator position and steering angle, including memory function
- Recording of individual lap times on a closed-off racetrack, including sector times and memory function
- Real-time display of acceleration time from e.g. 0-100 km/h or 0-200 km/h (alternatively: quarter-mile)
- Real-time measurement of stopping distance
- Real-time display of individual tyre pressures

The extensive standard specification furthermore includes (selection):

- AMG carbon-fibre exterior mirrors
- AMG carbon-fibre engine compartment cover
- Automatically dimming interior mirror and driver's side exterior mirror as well as folding exterior mirrors left and right
- Garage door opener integrated into the interior mirror
- Convenience telephony
- Media Interface
- Reversing camera
- Bluetooth telephone module
- Blind Spot Assist

Manufaktur hand finishing at company headquarters in Affalterbach

Mercedes-AMG has installed a dedicated Manufaktur hand-finishing section for electric vehicles at its headquarters in Affalterbach for final assembly of the SLS AMG Coupé Electric Drive. The electrically powered gullwing model is assembled and readied for operation at a total of seven different stations. The entire logistics process is based in Affalterbach, too.

Production of parts such as the exterior and interior initially takes place at the Mercedes-Benz production facility in Sindelfingen. In Affalterbach, highly trained workers take charge of assembling the axles, electric motors, transmissions and cooling system components. Particular care is taken with the installation of all high-voltage components, such as the liquid-cooled lithium-ion battery, the accompanying cables, inverter and control units, and the onboard charger. Needless to say, the utmost standards of safety are applied during all work on high-voltage components. The operational check and extensive final inspection at the end ensure that the manufacturing and product quality offered by the SLS AMG Coupé Electric Drive is of the very highest order.