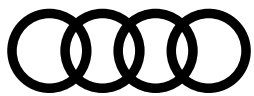




Audi Body-Collision

eSelf Study Program 200193



Audi of America, LLC
Service Training
Created in the U.S.A.
Version: November 2020

Course Number 200193

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Always check Technical Bulletins and the latest electronic service repair literature for information that may supersede any information included in this booklet.

The eSelf-Study Program (eSSP) teaches a basic understanding of the design and mode of operation of new models, new automotive components or new technologies.

It is not a repair manual! Figures are given for explanatory purposes only and refer to the data valid at the time of preparation of the eSSP.

For further information about maintenance and repair work, always refer to the current technical literature.

- > Consult repair procedures for specific equipment and tools.
- > For questions regarding approved tools and equipment:
 - > United States - collisionrepair@audi.com
 - > Canada - collision@audi.ca
- > Consult repair procedures regarding pre- and post-scanning and recalibration.



Note



Reference



Stop

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All Steel

2015 A3

(all S-line models included)

Overview

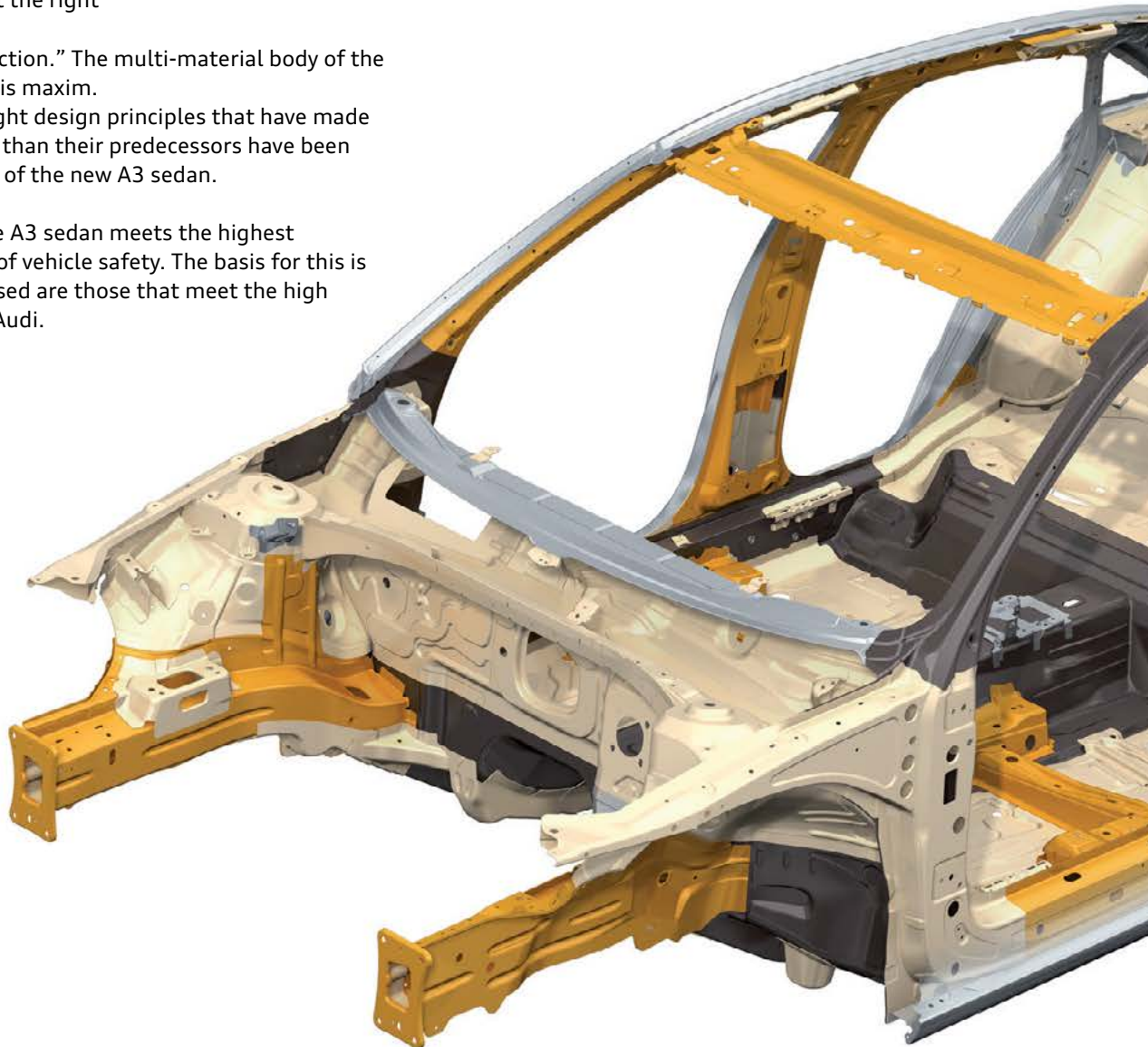
Materials - ultra lightweight construction

Body developers at Audi have broad-based engineering expertise spanning all relevant materials. This know-how is not limited to just a specific material, rather the motto is: "The right material at the right

place for optimal function." The multi-material body of the Audi A3 lives up to this maxim.

All the ultra lightweight design principles that have made all A3 models lighter than their predecessors have been applied to the design of the new A3 sedan.

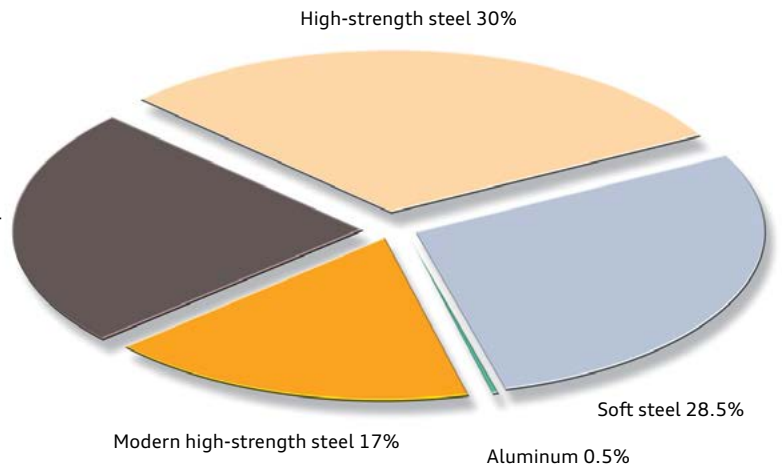
At the same time, the A3 sedan meets the highest demands in the area of vehicle safety. The basis for this is that only materials used are those that meet the high quality standards of Audi.



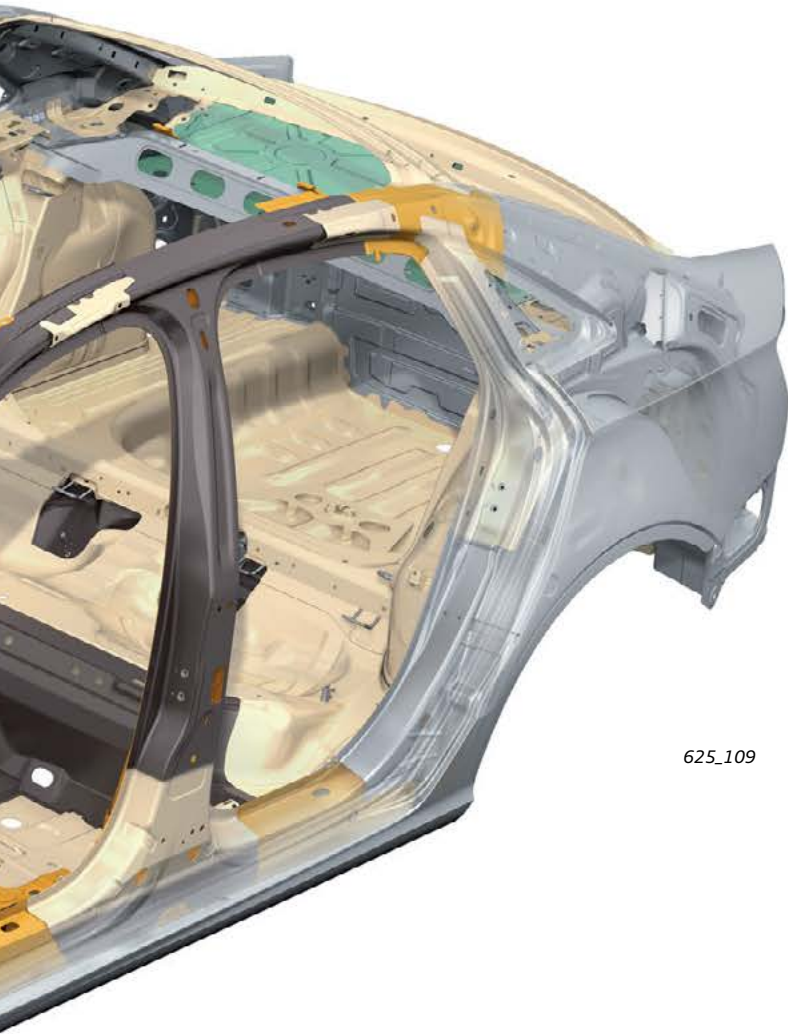
Ultra high-strength hot-formed steel components

Ultra high-strength hot-formed steel components provide approximately a 24% share of the A3 sedan body structure. Before the components are stamped, special steel is heated to nearly 1832 °F (1000 °C) in a continuous oven. After heating, it is immediately placed in a water cooled press tool. The steel is quickly cooled to approximately 392 °F (200 °C) before it is stamped. The rapid cooling of the steel changes its iron/carbon structure and creates a steel with high tensile strength which in turn allows thinner wall thicknesses for the particular components. Steels created in this manner require special care and procedures during repairs.

Ultra high-strength hot-formed steel 24%



625_110



625_109

A3 sedan B pillar

The B-pillar with striker plate is partially tempered during the forming process. The component assembly is very hard at the top end and softer below a narrow transition zone. This enables side impact forces to be absorbed effectively.



625_111

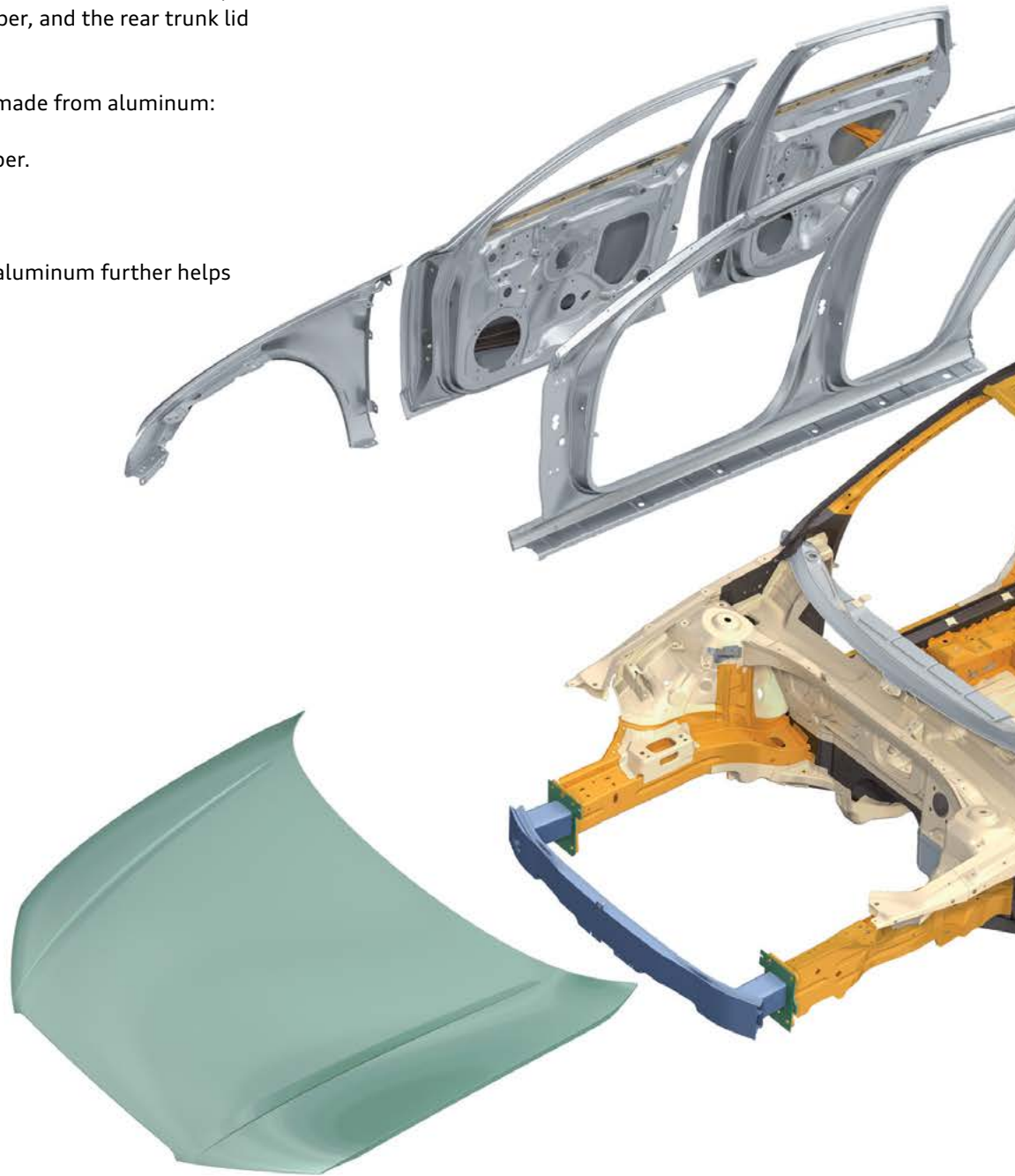
Body panels

Some inner and outer body panels such as the fenders, doors, rear bumper, cross member, and the rear trunk lid are all made from light steel.

The following components are made from aluminum:

- > the front bumper cross member.
- > the hood.
- > the rear hat shelf.

The use of both light steel and aluminum further helps reduce the weight of the body.



Joining techniques

Both old and new body component joining techniques are in use. In addition to the 4803 classic resistance spot welds used during assembly of the body, the following joining methods are also used:

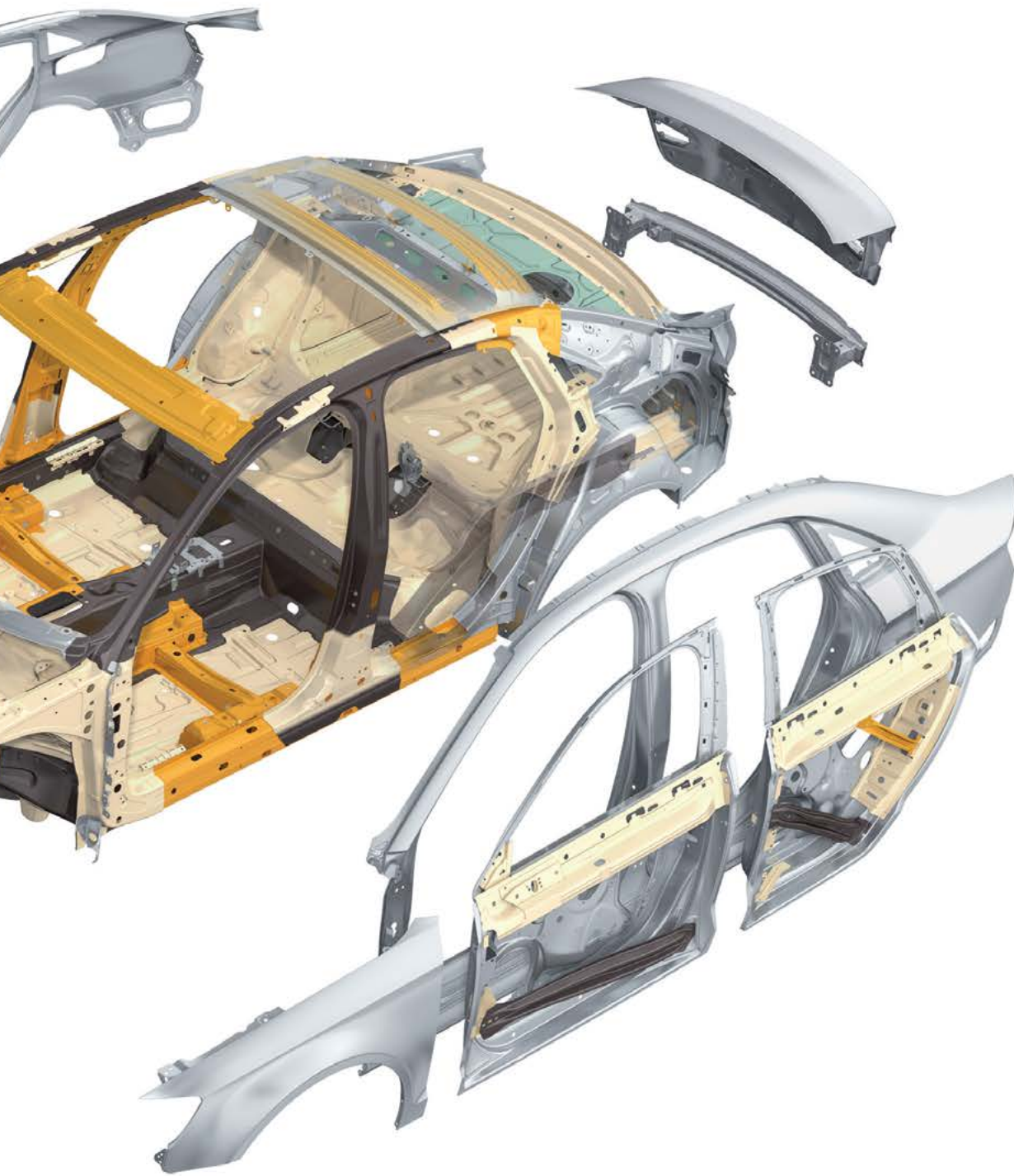
- > MAG welding.
- > Laser welding.
- > Clinching (attachments only).
- > Solid punch riveting.

In each A3 sedan there are over 196 ft (60 m) of glued joints.

The joint between the body side wall and roof is laser welded and then smoothed by brushes to produce a nearly invisible zero joint.







The water drainage paths in the area of the rear trunk lid are joined by Plasmatron welding.

To save more weight, doors and window frames are pressed in one piece. The inner and outer doors are welded by the ultra-modern remote laser technique.



625_112

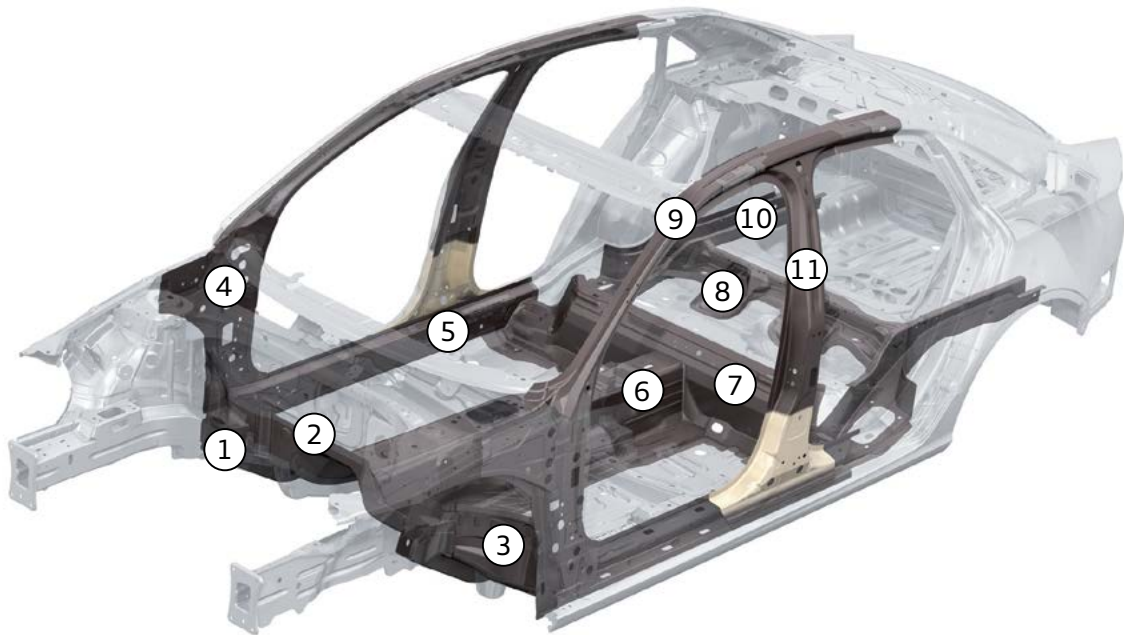
Key:

-  Ultra high-strength hot-formed steel
-  Modern high-strength steel
-  High-strength steel
-  Soft steel
-  Sheet aluminum
-  Aluminum profile

Ultra high strength hot-formed steel components are installed in the following areas

Forming the backbone of the occupant cell is what are known as form-hardened steels. An extreme temperature change during forming process gives these steels extremely high strength; the parts can be designed with relatively thin walls, making them lightweight.

Form-hardened steels represent a 24 percent share of body materials. They are used in the transition from the front of the vehicle to the occupant cell, in the A-pillars, B-pillars, roof arch, center tunnel, side sills and floor panels. Altogether, they lower the car's weight yet provide excellent strength.



625_114

- | | |
|--------------------------------------|------------------------------------|
| ① Long members (2 left / 2 right) | ⑦ Rear seat crossmember |
| ② Upper foot room crossmember | ⑧ Rear transverse crossmember |
| ③ Lower foot room crossmember | ⑨ Left and right upper A pillars |
| ④ Left and right inner A pillars | ⑩ Left and right rear long members |
| ⑤ Left and right inner rocker panels | ⑪ Left and right inner B pillars |
| ⑥ Center tunnel | |

Panorama tilt sunroof

The 2015 A3 sedan features an optional panorama slide/tilt sunroof.

The roof opening is larger than that of an internally guided sunroof and creates a particularly airy and spacious interior feel for the occupants.



609_069b

Thermal insulation

The glass roof panel is tinted and provides additional thermal insulation. Thermal insulation is provided by the following reflective components:

- › 99 % UV radiation reflection.
- › 92 % heat radiation reflection.
- › 90 % light radiation reflection.

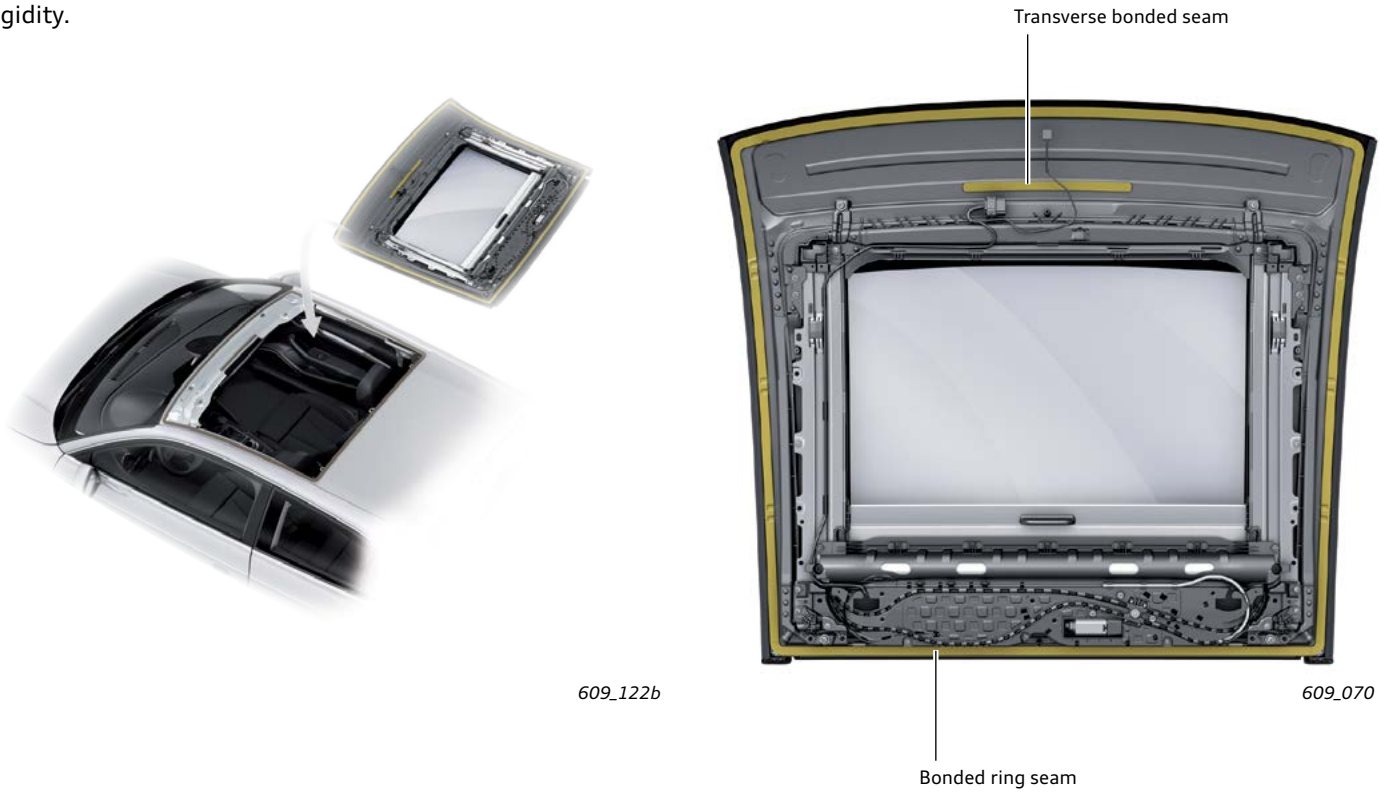
The panorama slide/tilt sunroof module meets the statutory requirements for anti-pinch protection.



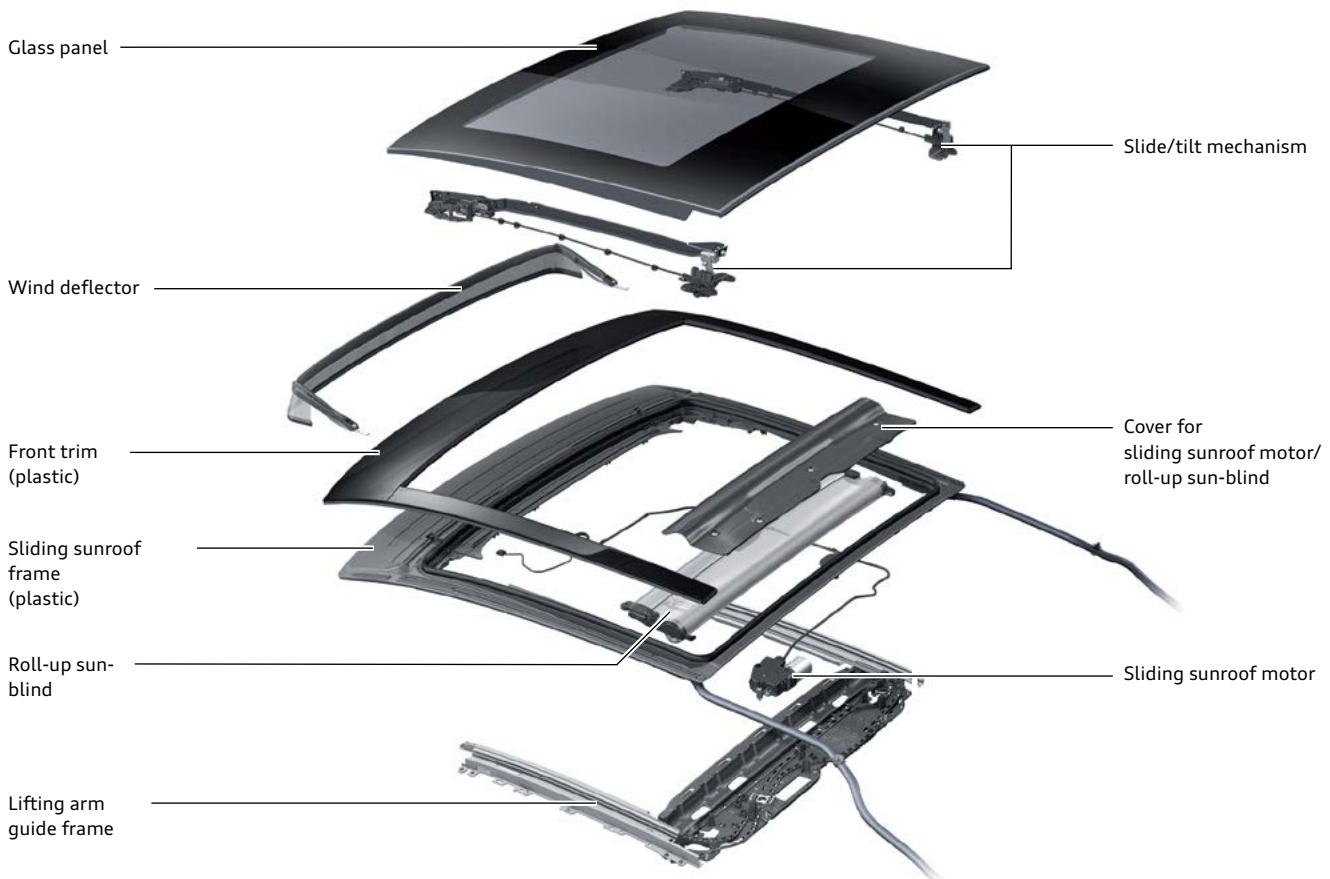
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Roof installation

The panorama slide/tilt sunroof is glued into the roof opening and thus is a major factor contributing to body rigidity.



Component overview

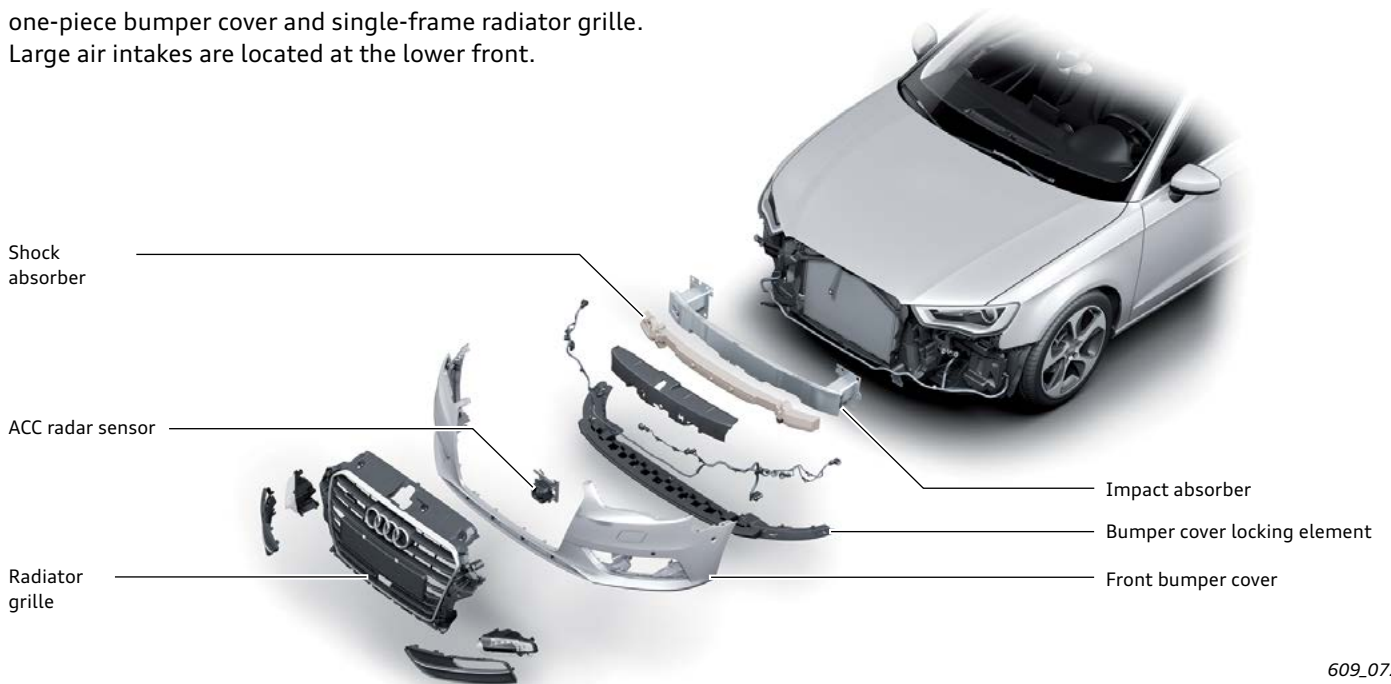


609_071

Bumper system

Front bumper

Characteristic elements of the vehicle's front end are the one-piece bumper cover and single-frame radiator grille. Large air intakes are located at the lower front.

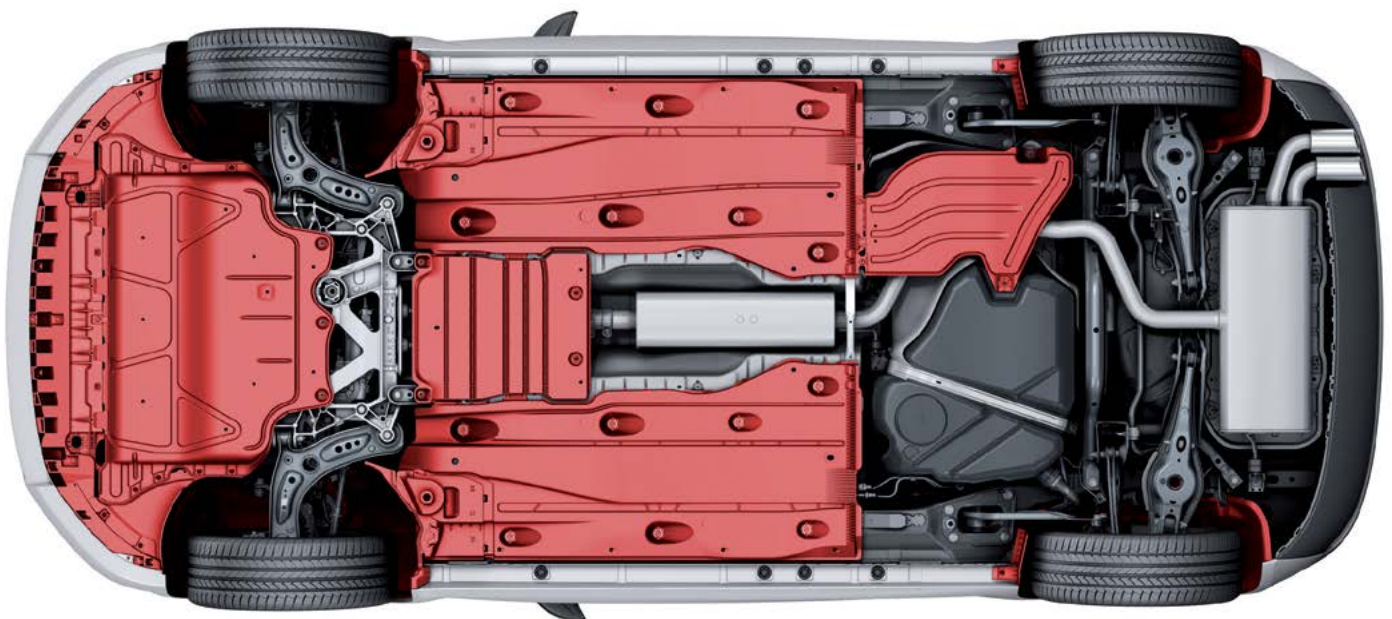


609_072

Underbody

The Audi A3 has a highly effective acoustic and aerodynamic underbody designed to withstand mechanical and thermal stresses. In addition to aerodynamics, attention was paid to sound absorption, body protection and thermal engine management during the development phase.

The result is improved airflow around the engine and transmission capsule, the cross-members and the wheel arches, thus allowing a low drag coefficient (c_w) of 0.31 to be achieved.



609_082

2019 Q3

(all S-line models included)

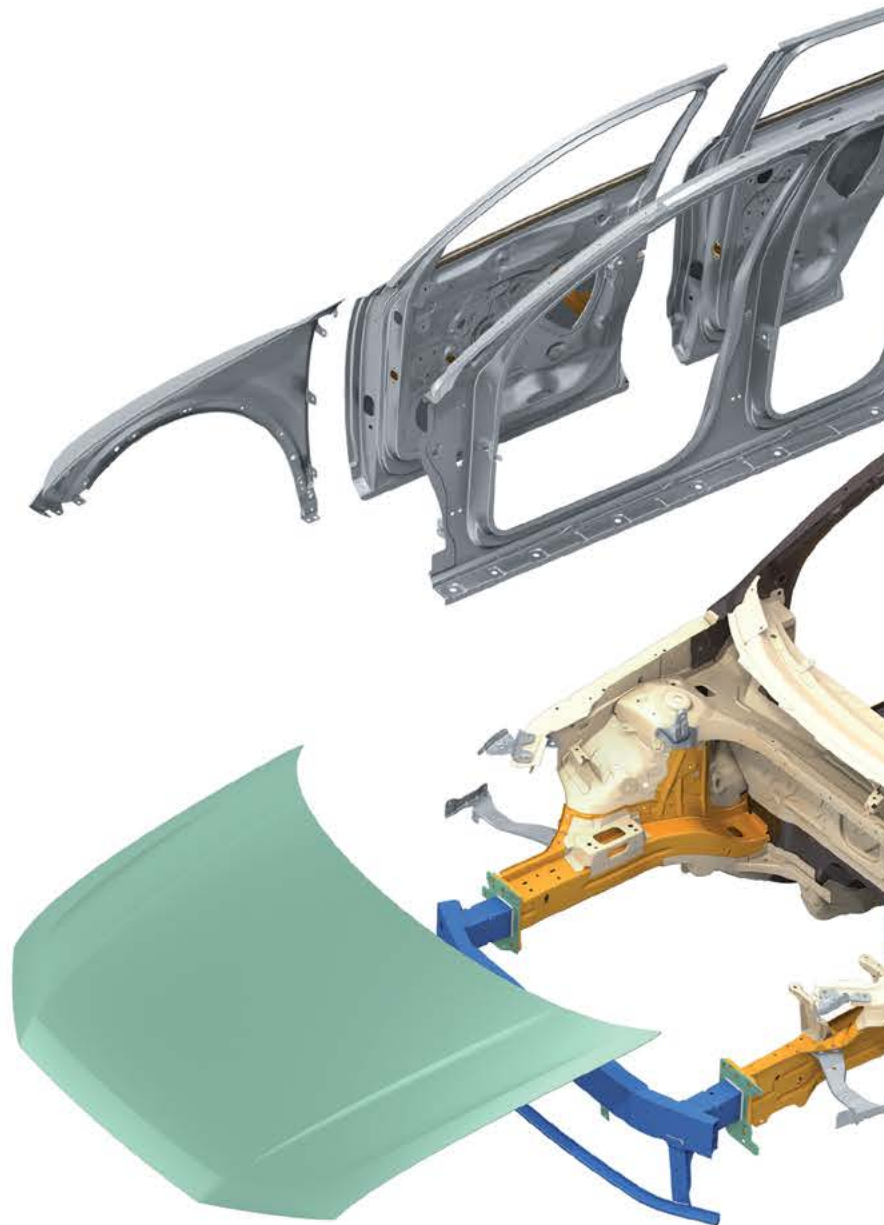
Overview

The 2019 Q3 is based on the MQB A2 matrix. It includes a frame structure of several ultra-high strength components formed by the tunnel, the upper and lower footwell cross members, side member (sill panel) and rear cross member. The ultra-high strength seat cross member provides additional support at the side.

Die-quenched panels and ultra-high strength steel (hot-formed) are also used for the body structure. Thanks to these die-quenched panels and particularly to the ultra-high strength hot-formed components, it was possible to increase the torsional rigidity of the Audi Q3 body.

Key:

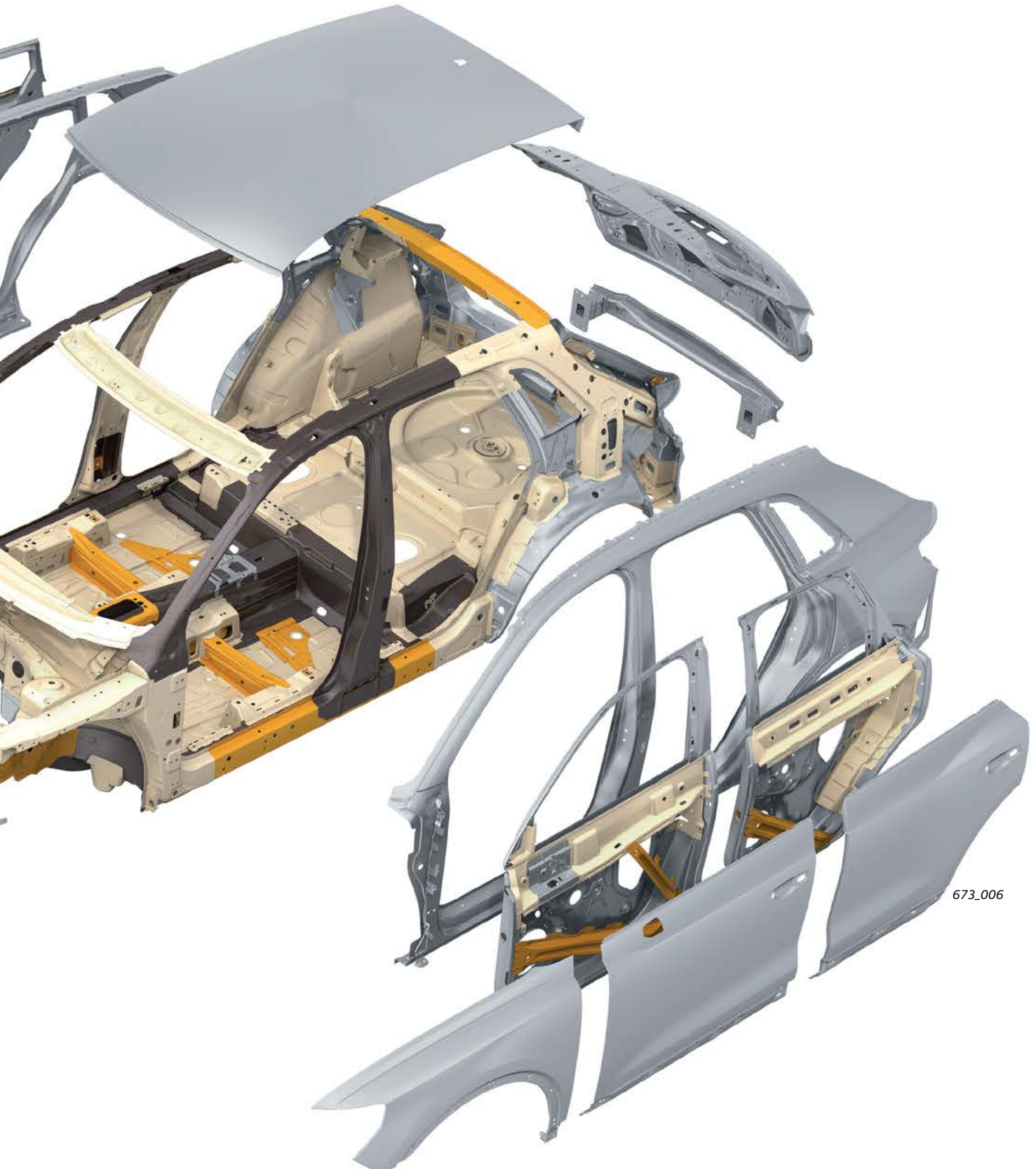
- Sheet aluminum
- Aluminum section
- Ultra-high-strength steel (hot-formed)
- Modern high-strength steel
- High-strength steel
- Soft steel



Joining techniques

The main joining method used for the construction of the Audi Q3 body is resistance spot welding. Resistance spot welding is combined with a high-strength bonding process in the areas of the vehicle body where stringent requirements for vibration comfort and passive safety apply. The following joining techniques are also used:

- › MAG welding.
- › Laser welding for steel.
- › Laser soldering/brazing.
- › MIG soldering/brazing for steel.
- › Seaming.
- › Bonding.
- › Flow-drill screws.
- › Pop riveting.



673_006

General body repairs

Rear lid

An electrically operated rear lid is standard equipment on the 2019 Audi Q3. The left and right spindle drives for the rear lid are identical. The installation brackets have a marking to ensure the spindle is installed in the correct position.

Power latching system

The rear lid also has a power latching system. When the rear lid is closed and the microswitch in the rear lid lock detects that the striker plate is in the initial catch, Rear Lid Closing Aid Motor V382 pulls the rotary latch in the rear lid lock further into the main catch via a Bowden cable.



Brackets for electric rear lid

673_008

Damper weight

A damper weight, designed to minimize any vibrations transmitted to the rear lid from the final drive components is installed on all models.



673_010

Rear spoiler

The main purpose of the roof spoiler on the rear of the Audi Q3 is aerodynamics. The spoiler reduces aerodynamic drag and in conjunction with the side dynamic trim, optimizes turbulence behind the vehicle. This in turn reduces dirt build-up on the rear window.

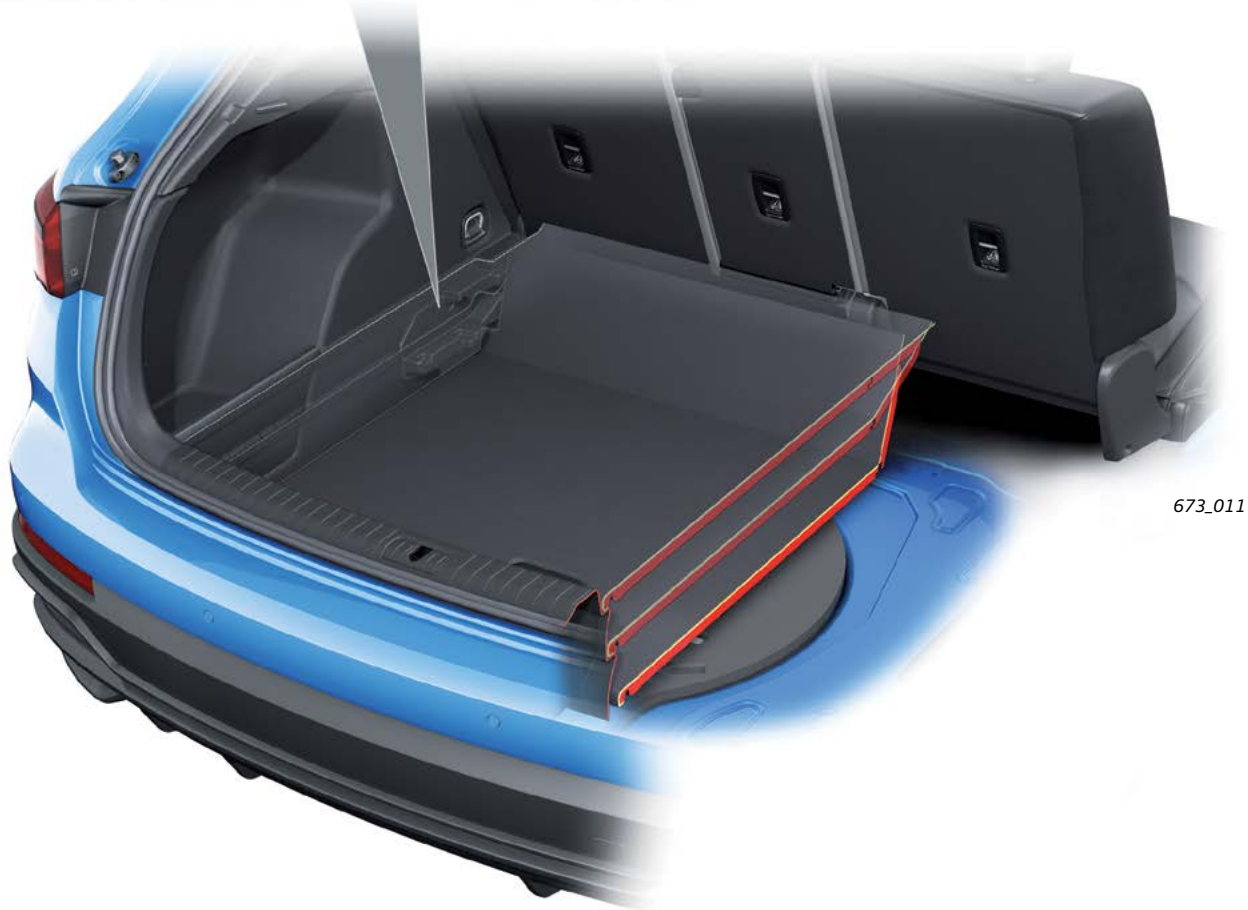
The aerodynamic trim panels are located by clips that position them in the top section of the spoiler and are additionally secured by adhesive strips. The spoiler itself is retained with four bolts.

The high-level brake light is installed in the spoiler. The spoiler may also house AM and FM antennas depending on the infotainment equipment installed.

Luggage compartment

The size of the luggage compartment is variable. Moving the rear bench seat forward up to 5.5 in (150 mm) and using the 7-level seat back angle adjustment allows the luggage compartment volume to be adjusted as required. The seat backrest is split in a 40:20:40 configuration. To increase the variation options even more, there are three positions for the height of the luggage compartment floor. This is accomplished by unique supports on both sides of the luggage compartment side trim panels.

There are also supports on the same level at the rear in the lock carrier trim. In the lowest position, the luggage compartment floor sits on the luggage compartment floor lining. To lower the luggage compartment floor, it must be lifted by the handle at the rear, pulled back slightly and pushed back into the desired position at the front. The rear shelf can also be stored under the luggage compartment floor when it is not needed.

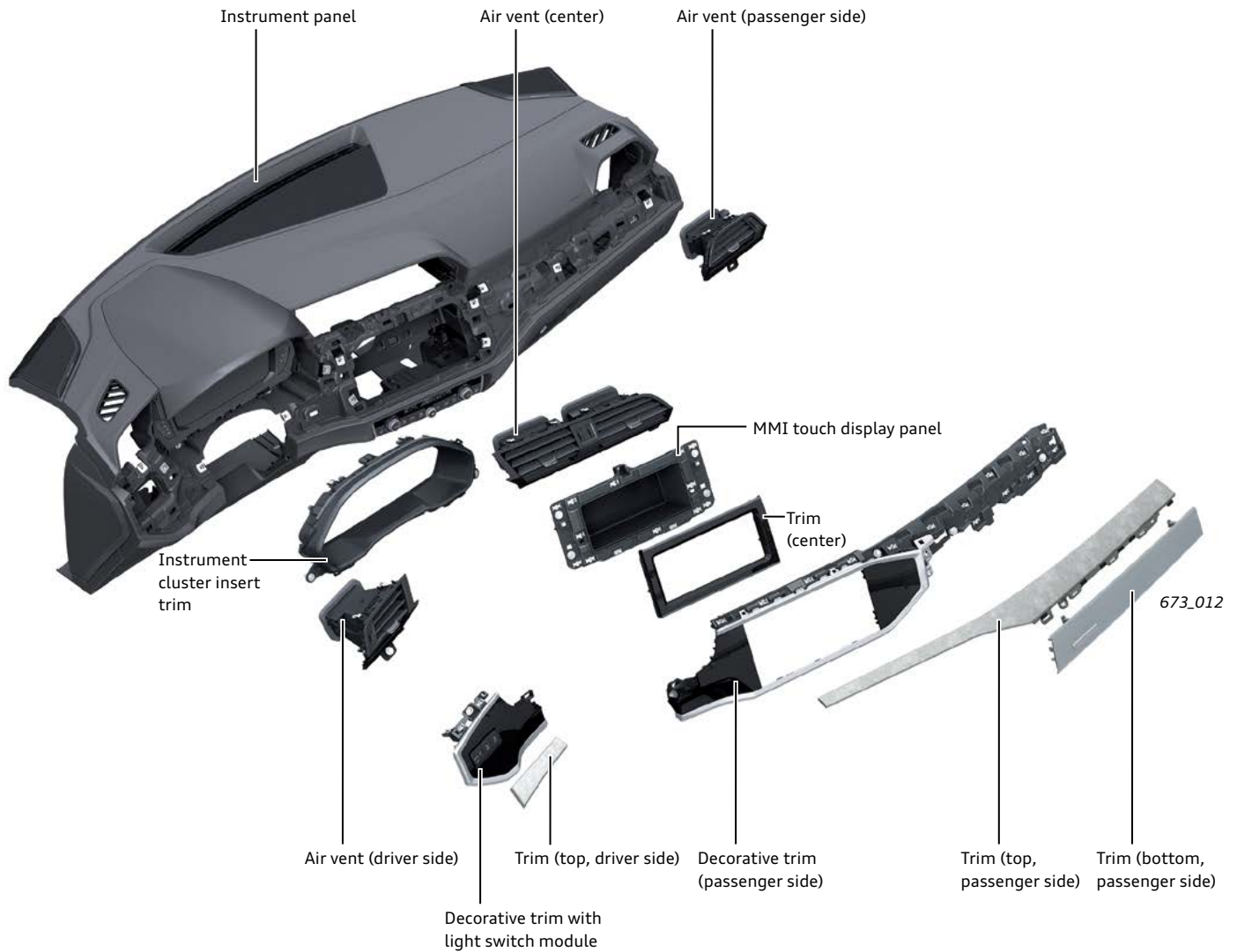


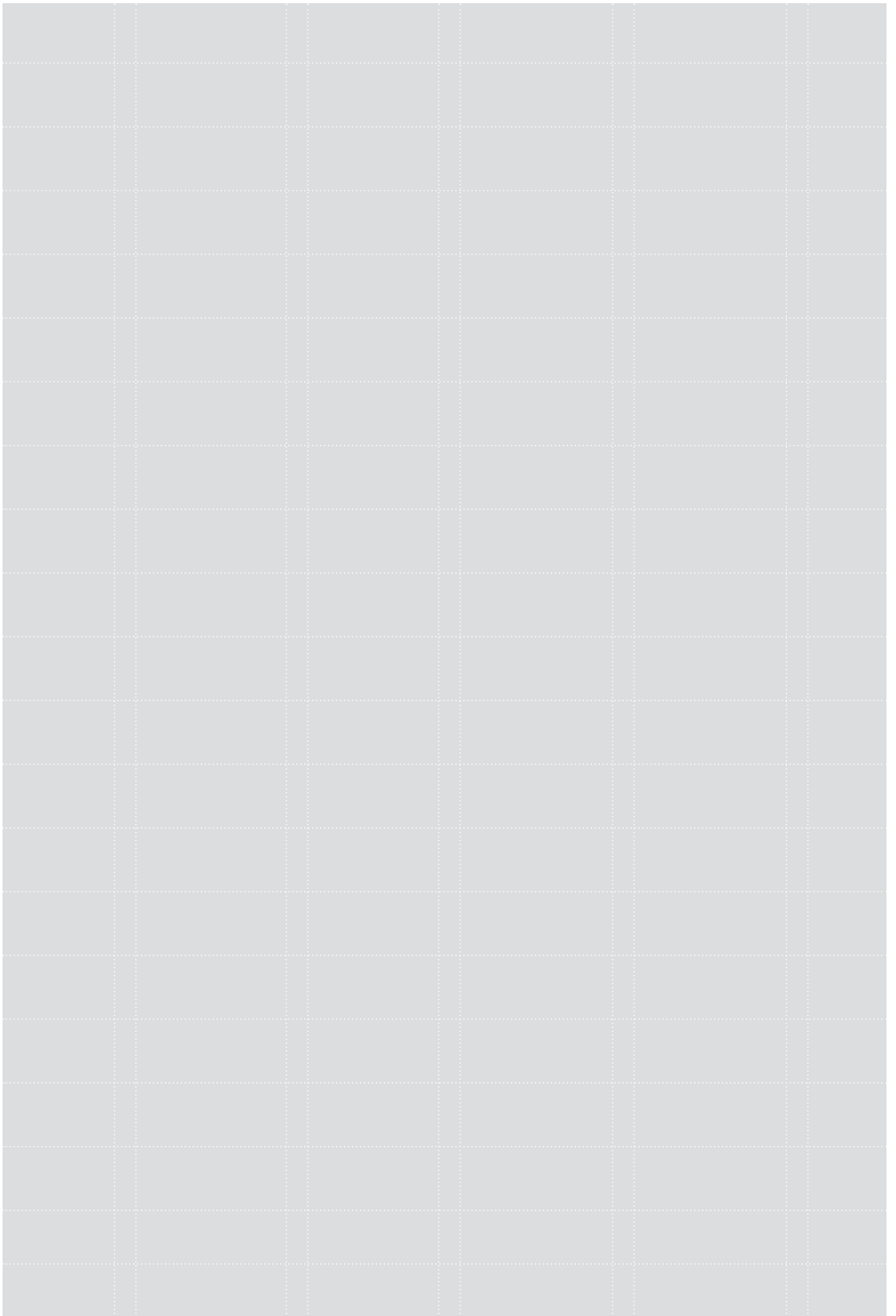
673_011

Instrument panel

The instrument panel has a two-part horizontal design. The horizontally arranged air outlets are integrated in the upper section. The large central trim section is installed underneath. It surrounds the MMI touch display. Two decorative trim panels on the passenger side underline the horizontal layout. The lower one ensures that no securing elements are visible to the occupant.

Because it is constructed in layers. It may be necessary to remove more parts than initially expected to remove a component. Always follow the procedures described in ElsaPro.





Hybrid Construction

2017 A4

(all S-line models included)

Overview

The A4 sedan has a multi-material design. This lightweight construction concept utilizes die-cast aluminum components in addition to regular sheet-metal parts.

A decisive factor in modern body construction is the lightness and rigidity of the body structure as a whole. The bodies of the Audi A4 incorporate die-cast aluminum components in addition to soft, high-strength, modern high-strength and ultra-high-strength sheet-steel components.

Due to geometrical lightweight construction and an intelligent material mix, the body of the Audi A4 is 33.0 lb (15 kg) lighter than the previous version of the Audi A4.

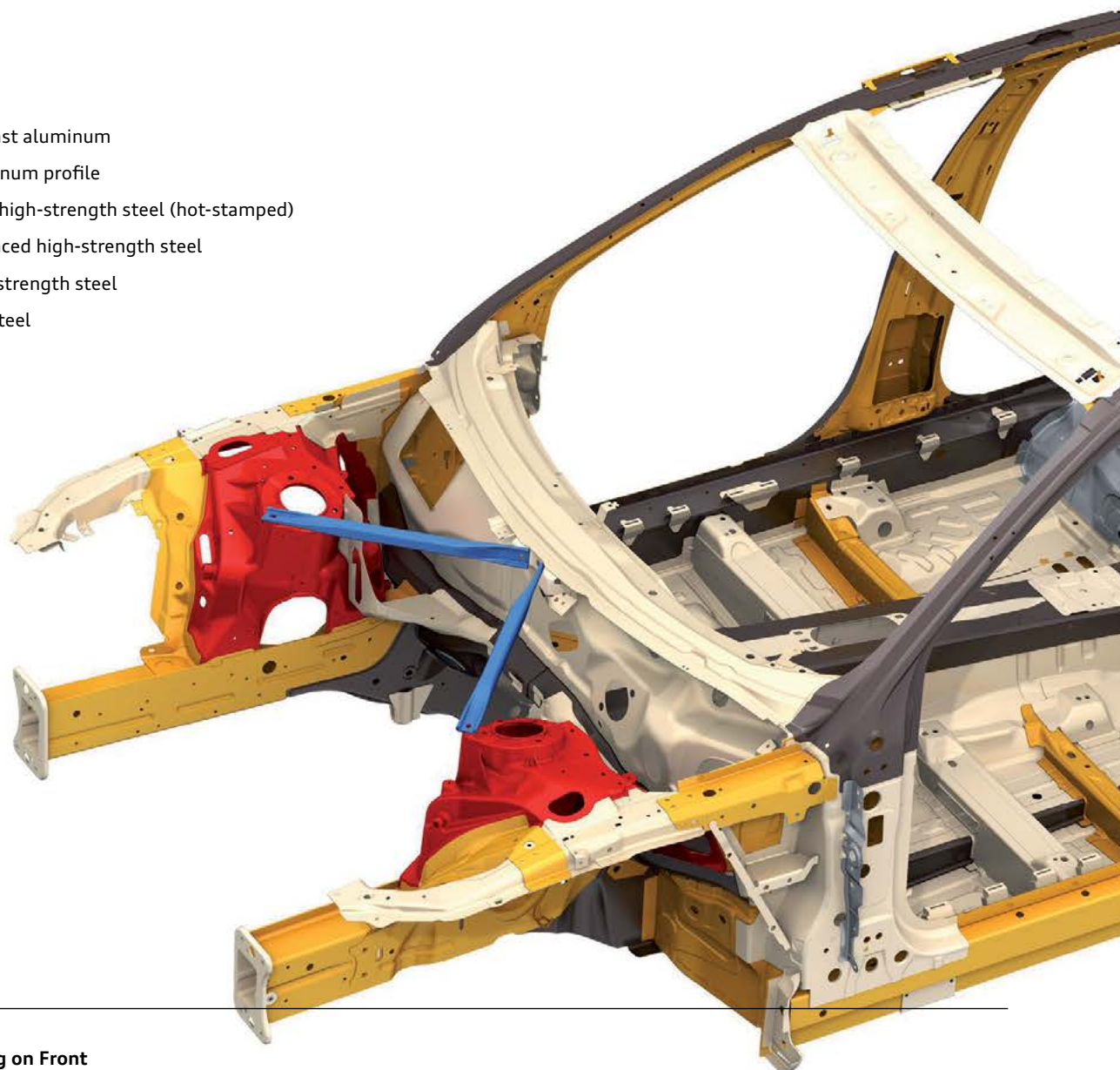
Body structure

Ultra-high-strength hot-stamped components are used in the following areas:

- > Front frame side member.
- > Front side member reinforcement.
- > Bulkhead (tunnel bridge).
- > 'A' pillar.
- > 'B' pillar.
- > Inner chassis rail (sill).
- > Upper tunnel reinforcement.
- > Rear frame side member.

Key:

- Die-cast aluminum
- Aluminum profile
- Ultra-high-strength steel (hot-stamped)
- Advanced high-strength steel
- High-strength steel
- Soft steel



No Pulling on Front



Note

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.

Ultra-high-strength steel (hot-stamped)

Hot-stamped components form the high-strength, backbone of the occupant cell. They strengthen the transition from the front end to the passenger compartment, the frontal area of the roof frame ('A' pillar), the 'B' pillars, the lower beams and parts of the floorpan. They constitute 17% of the body structure.

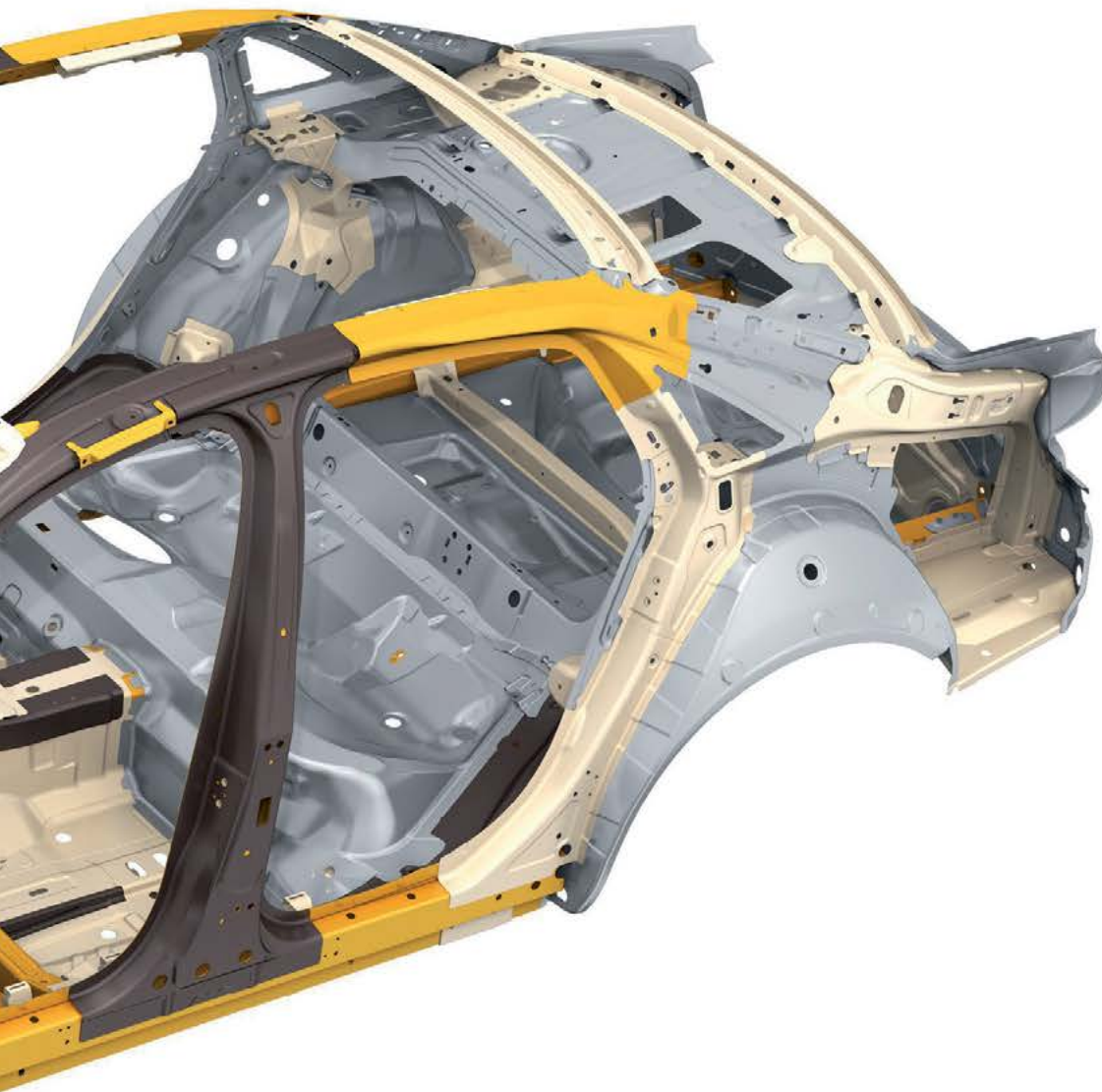
Sectional repairs may be performed on the following hot-stamped components:

- > 'A' pillars.
- > 'B' pillars.

Special care must be taken when handling hot-stamped steel during repairs to the body. This material must not be straightened or reshaped, even if the deformation is only minimal, due to its high yield strength and rebound characteristics.

Special attention was given to service solutions during the development of the body structure. This means that damaged components are replaced fully or partially at specially designated parting cut areas.

All other hot-stamped components must, if damaged, be completely replaced to manufacturer specifications. High heat input into the welding area would irreversibly compromise the strength and structure of the component through micro-structural changes in the material.



644_152



No Pulling on Front



Note

There is no pulling allowed on the front structure due to the possibility of damage to the aluminum components.

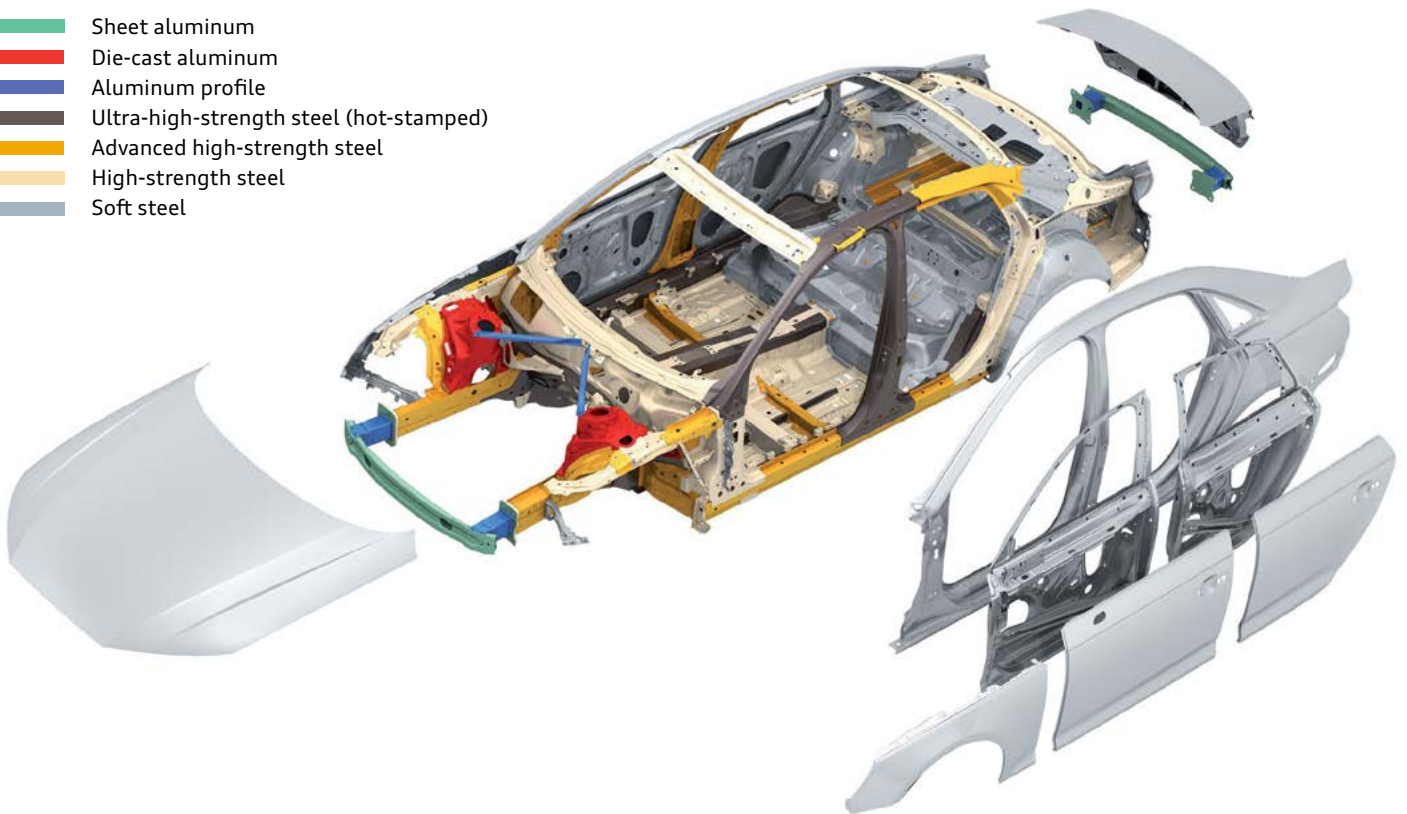
Outer skin

The A4 sedan has a steel outer skin. The attachments are also made of steel. Only the bumper impact beams and the rear trunk lid of the Audi A4 are made of aluminum. The rear lid is deep-drawn in the press using what is known as an "intelligent" tool process.

Laser sensors measure how the sheet metal behaves during the shaping process. If necessary, electrically operated drawing aids make small adjustments to the press. This results in even higher precision to the stamped component.

Outer skin of the A4 sedan

- Sheet aluminum
- Die-cast aluminum
- Aluminum profile
- Ultra-high-strength steel (hot-stamped)
- Advanced high-strength steel
- High-strength steel
- Soft steel



644_154



Note

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No Pulling on Front

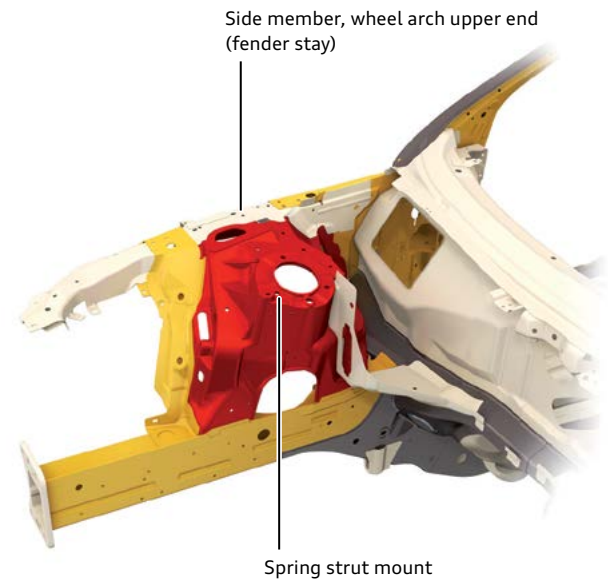
Aluminum castings

The aluminum castings in the vehicle structure are joined to the adjacent sheet-metal parts by punch riveting and structural adhesive. The adhesive also serves to insulate both materials from one another, thus preventing contact corrosion.

Specific repair solutions have been developed for repairing damage to these aluminum castings and adjoining sheet-steel parts. Straightening and reshaping work is not permitted in the area of these components.

Structural integration of the spring strut

The front spring strut mounts are die-cast aluminum components. Compared with sheet-steel components, which are welded together out of several parts, they reduce weight in the Audi A4 by a total of 17.6 lb (8.0 kg). This design allows a very stiff connection between the upper wishbones and the car body helping to ensure optimal conditions for driving dynamics.



644_156



Note

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.



No Pulling on Front

Attachments

Door handles

The kinematics of the door handles on the Audi A4 have been modified.

Door handles typically move in a horizontal direction only. The 2017 A4 door handle now swivels approximately 30° upwards.

This results in an action which is anatomically adapted to the movement of the hand and provides better ergonomics when opening the door.



644_106



644_107

Active radiator louver

(not available at vehicle introduction)

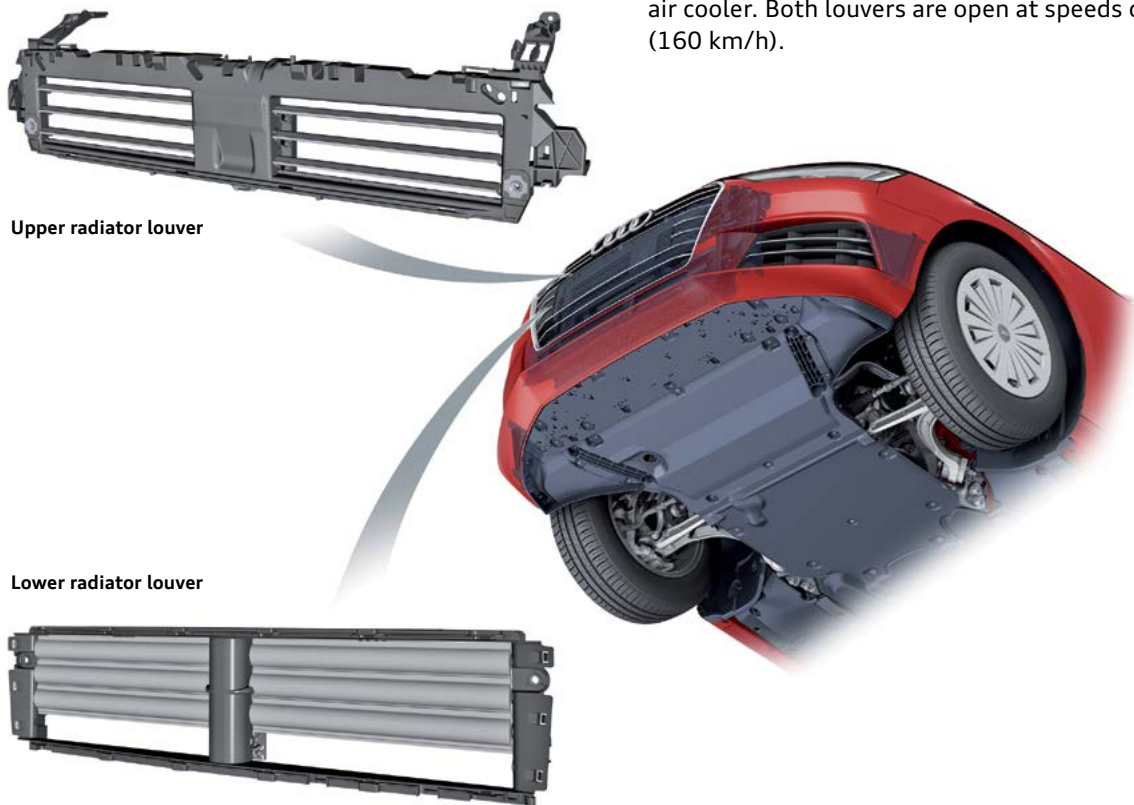
The Audi A4 may be equipped with an active cooling air intake system which improves aerodynamics and assists the thermal management system.

Unlike the Audi Q7, the A4 features a split active cooling air intake system. The upper and lower louvers can be activated separately.

Three positions are possible depending on input variables such as coolant temperature, engine temperature and transmission temperature.

- › Both louvers closed.
- › The lower unit open and the upper unit closed (to ensure earlier air flow through the charge air cooler).
- › Both louvers open.

The lower louver does not have a bottom shutter plate. This ensures a continuous, forced flow of air through the charge air cooler. Both louvers are open at speeds over 99.4 mph (160 km/h).



644_111

Sunroof

A conventional glass sliding sunroof is standard for the A4 models.

Sedan



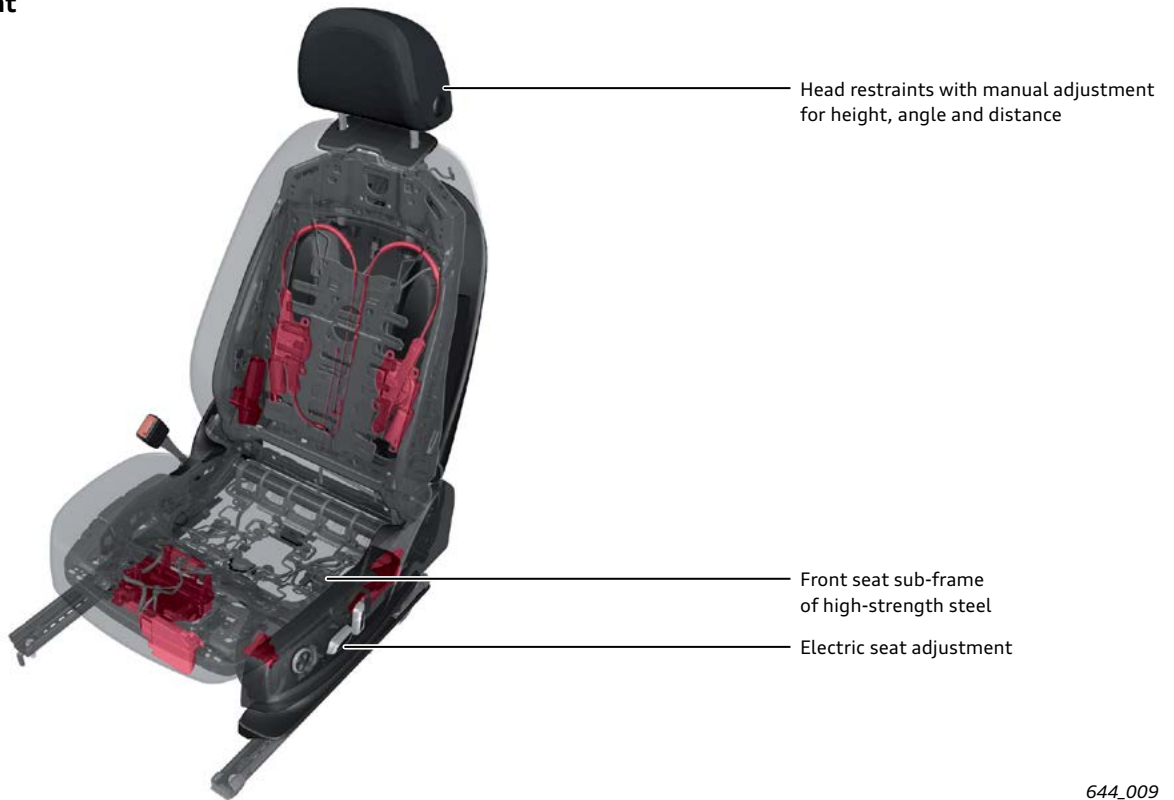
644_104

Seating systems

The Audi A4 has eight-way power front seats as standard equipment on the Premium model while the eight-way power seats of the Premium plus and Prestige models have the additional memory function as standard.

To enhance seating comfort, there is an adjustable center armrest between the front seats, two cup holders and large door pockets for storage.

Standard front seat



Optional sport seat

The sport seats have electrically adjustable lumbar supports and are optionally available with seat ventilation.



Seat memory

The memory function allows personal seating profiles to be stored for the driver. The memory function can be operated with the radio remote key or with the recall buttons in the driver's door.

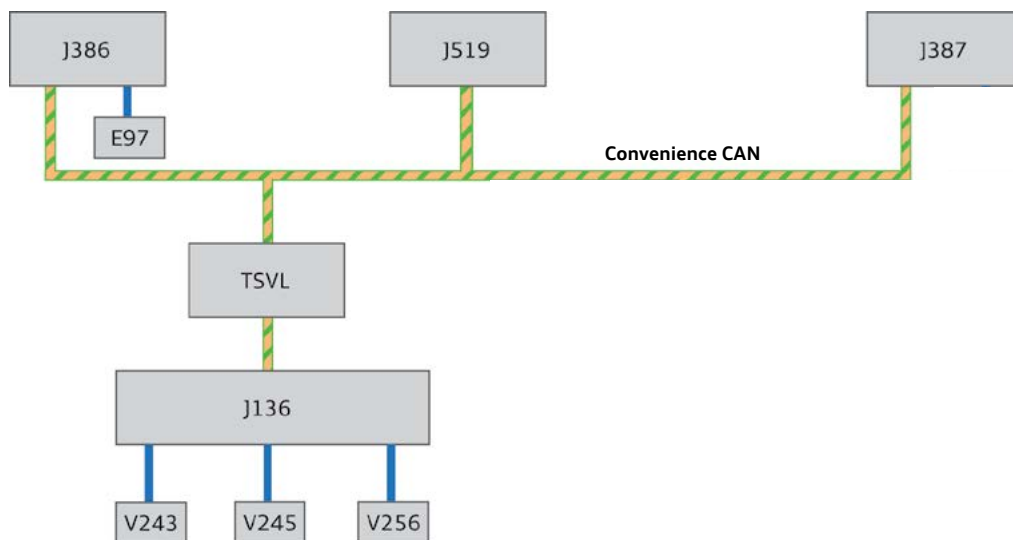
Whenever the vehicle is locked, the driver's seat profile is stored and assigned to the key. The seat profile is automatically recalled when the door is opened.

The outside rear view mirror settings are also stored with the seat memory.

System overview and signal characteristic

The information from Driver Memory Seat Control Head E97 is processed by Driver Door Control Module J386.

This information is then transferred to Memory Seat/Steering Column Adjustment Control Module J136 via the Convenience CAN. The seat module then activates the corresponding control motors.



644_027

Key:

E97 Driver Memory Seat Control Head

J136 Memory Seat/Steering Column Adjustment Control Module

J386 Driver Door Control Module

J519 Vehicle Electrical System Control Module

V243 Driver Seat Angle Adjustment Motor

V245 Driver Seat Height Adjustment Motor

V256 Driver Seat Depth Adjustment Motor

TSVL Left Front Seat Coupling Station

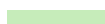






2018 A5 Cabriolet

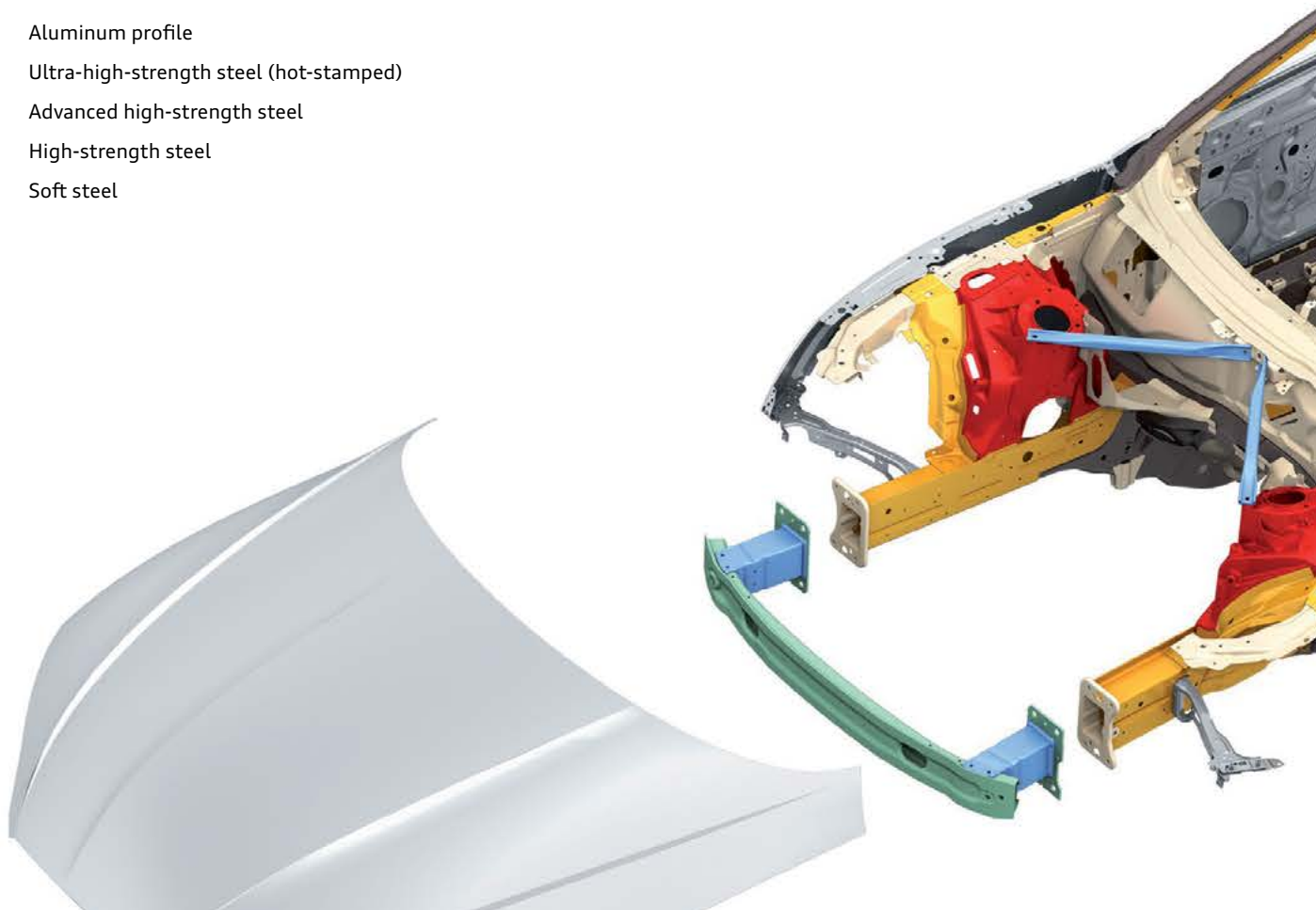
Overview

The body of the 2018 A5 Cabriolet is based on the A5 coupe. To increase rigidity while reducing weight of the overall body structure, ultra-high-strength sheet steel is used as well as soft, high-strength and modern high-strength steels. In addition, there are two die-cast aluminum strut mountings in the front. They are attached to the adjacent sheet steel components using punch rivets, flow-drill screws and structural adhesive.

Structural adhesive not only strengthens the aluminum/steel joint, but also prevents contact corrosion that would otherwise occur between two dissimilar materials. Straightening and reshaping work in close proximity to aluminum components or aluminum/steel joints is not permitted. This can damage the aluminum casting or produce invisible cracks in the component.

Key:

-  Sheet aluminum
-  Die-cast aluminum
-  Aluminum profile
-  Ultra-high-strength steel (hot-stamped)
-  Advanced high-strength steel
-  High-strength steel
-  Soft steel



Note

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.



No Pulling on Front



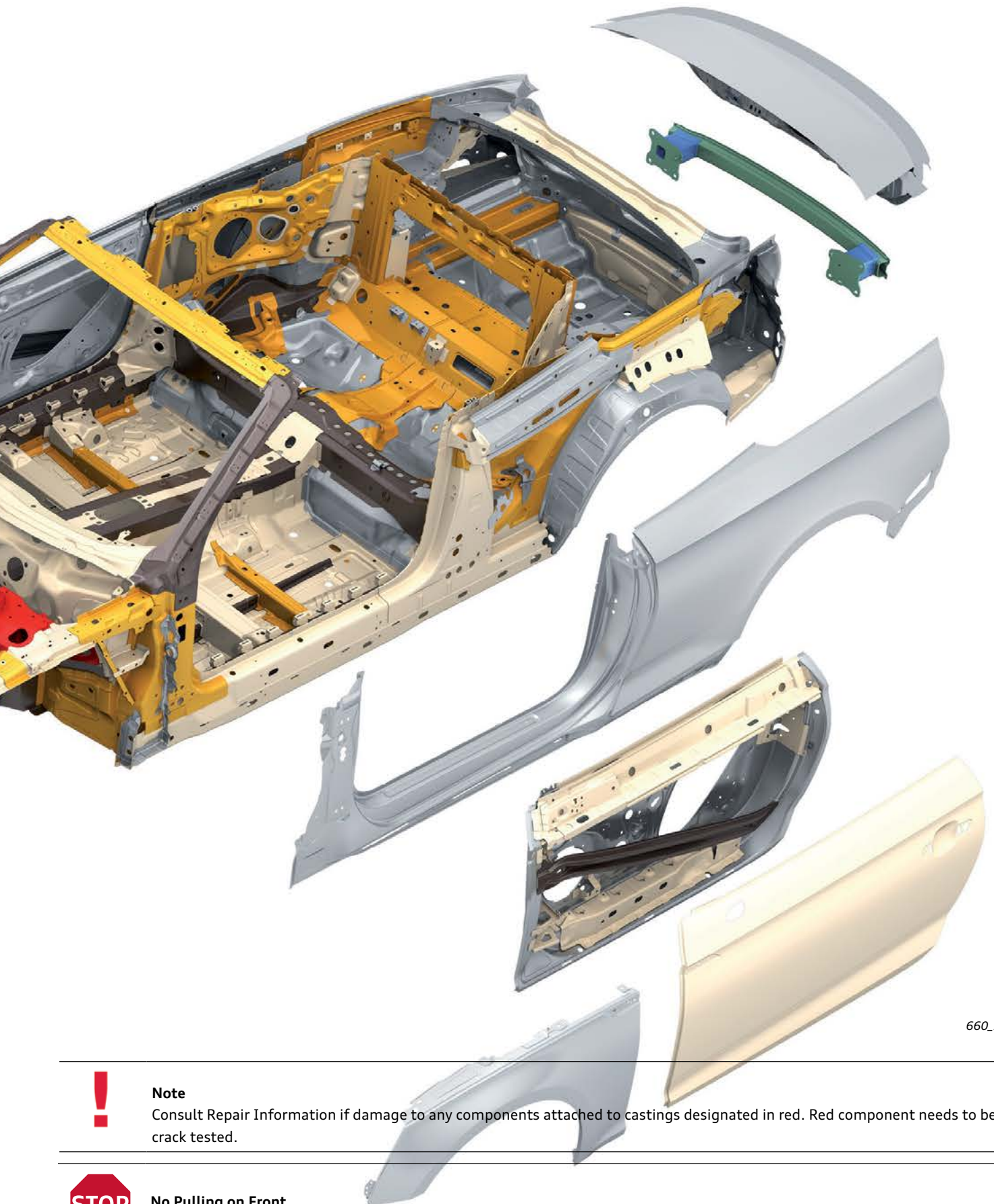
Note

All work on the body must be performed according to the instructions given in ElsaPro.

Ultra-high-strength hot-shaped components

Thermoformed components in the body of the Audi A5 Cabriolet form the high-strength backbone of the occupant cell. They strengthen the transition from the front end to the

passenger compartment and the frontal area of the roof frame (A-pillars), as well as the lower beams and parts of the floorpan. They account for 17% of the body structure.



660_102



Note

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.



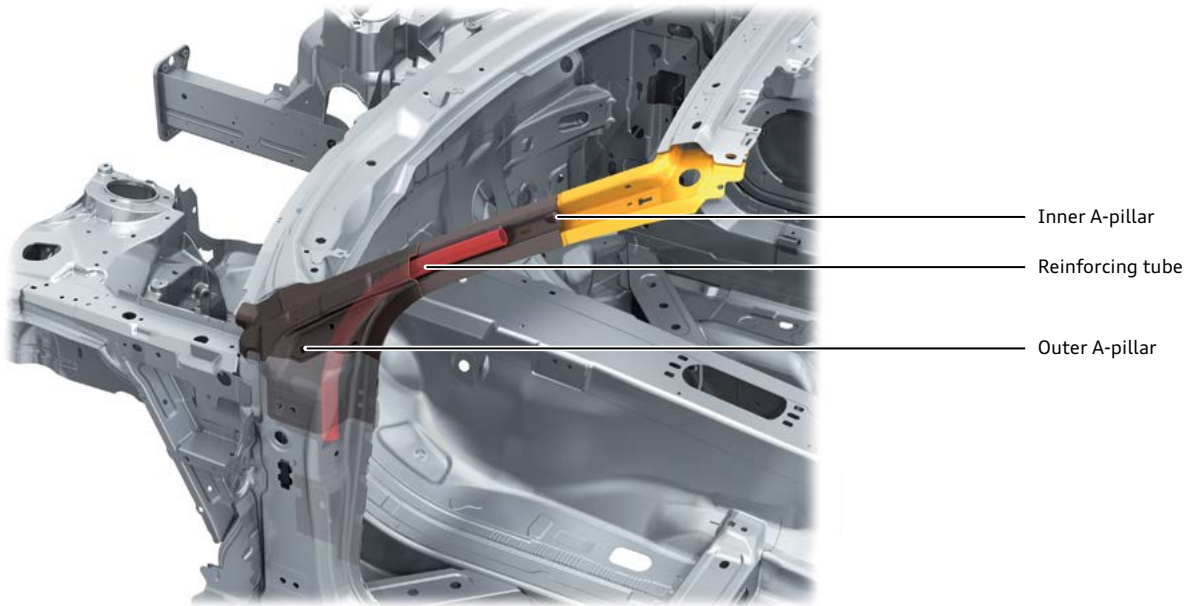
No Pulling on Front

Body structure/reinforcements

A-pillar reinforcement

In the event of a rollover, the highly rigid A-pillar structure of the Audi A5 Cabriolet can provide additional safety. The A-pillar consists of an outer panel, an inner panel and a reinforcement tube.

To meet strength requirements, all three components are made of ultra-high-strength thermoformed steel.

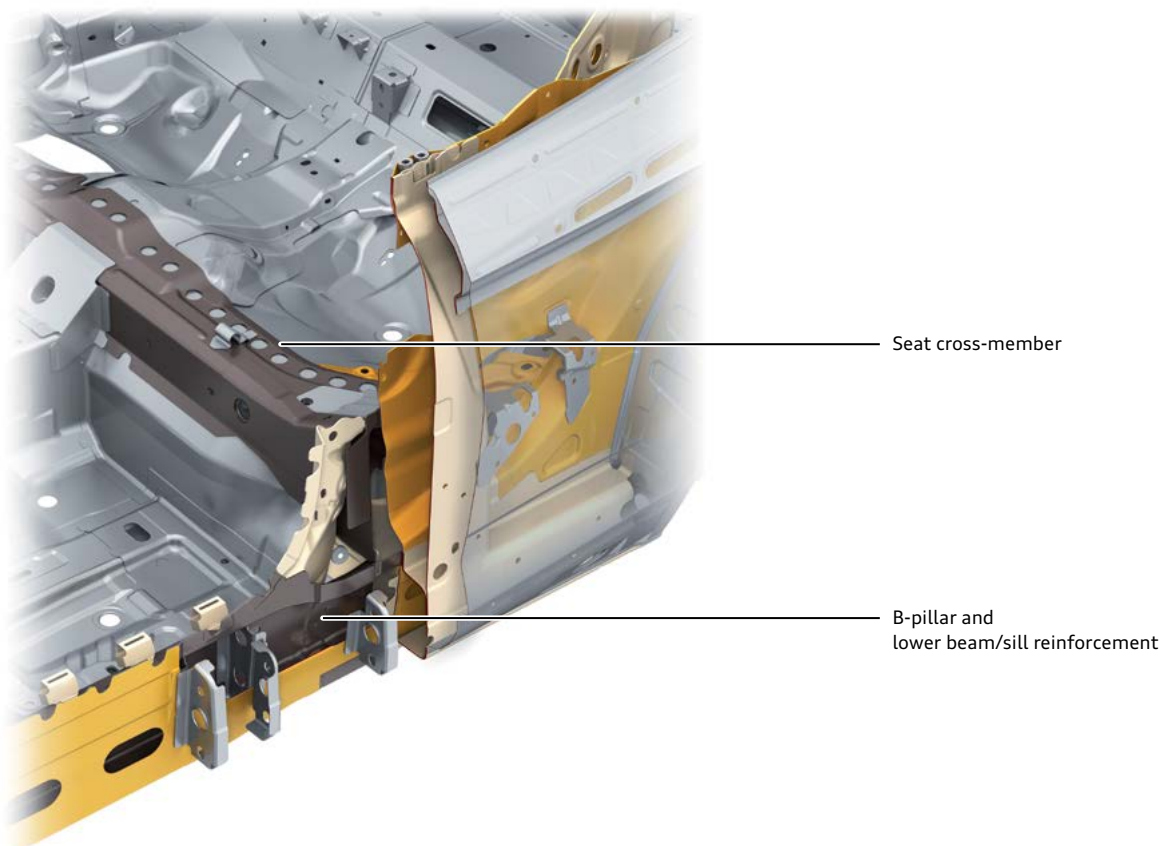


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Lower rail / sill / seat cross-member reinforcements

Various additional reinforcements are used to ensure that the body structure meets the convertible-specific strength requirements in the lower rail, sill and B-pillar areas.

To provide better side impact protection, the seat cross-member located between both B-pillars is made from ultra-high-strength thermoformed steel.

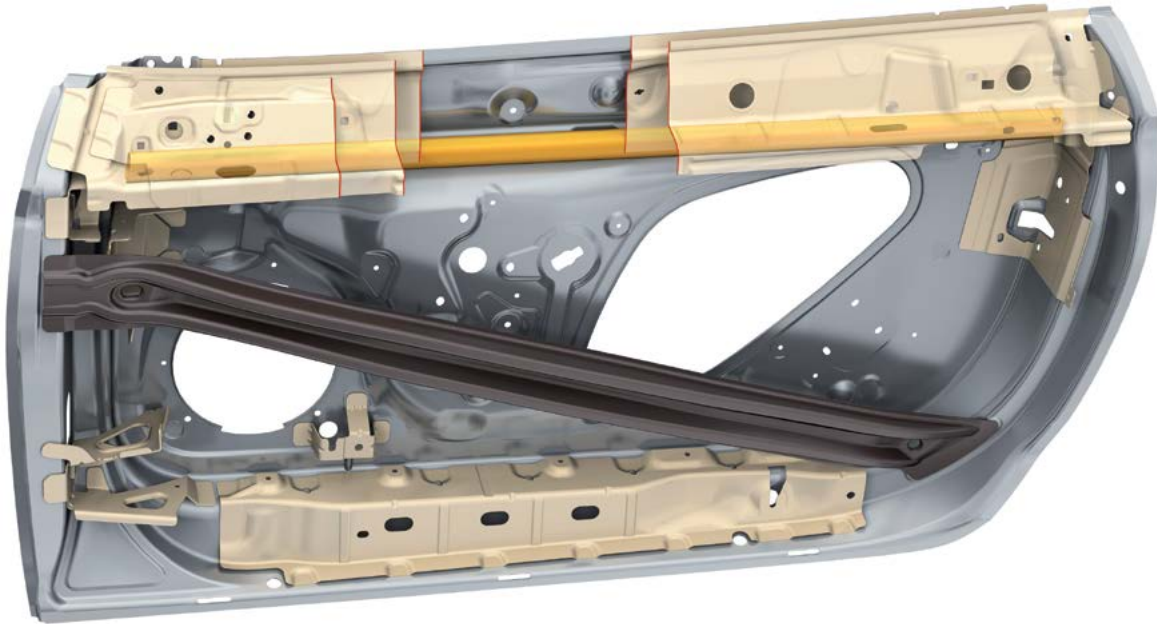


660_104

Door side impact reinforcement

The door of the Audi A5 Cabriolet and the side impact protection integrated in the door are largely identical to those of the Audi A5 Coupé.

The side impact protection is designed to absorb impact energy in the event of a collision and to redirect this energy to the side body structure.

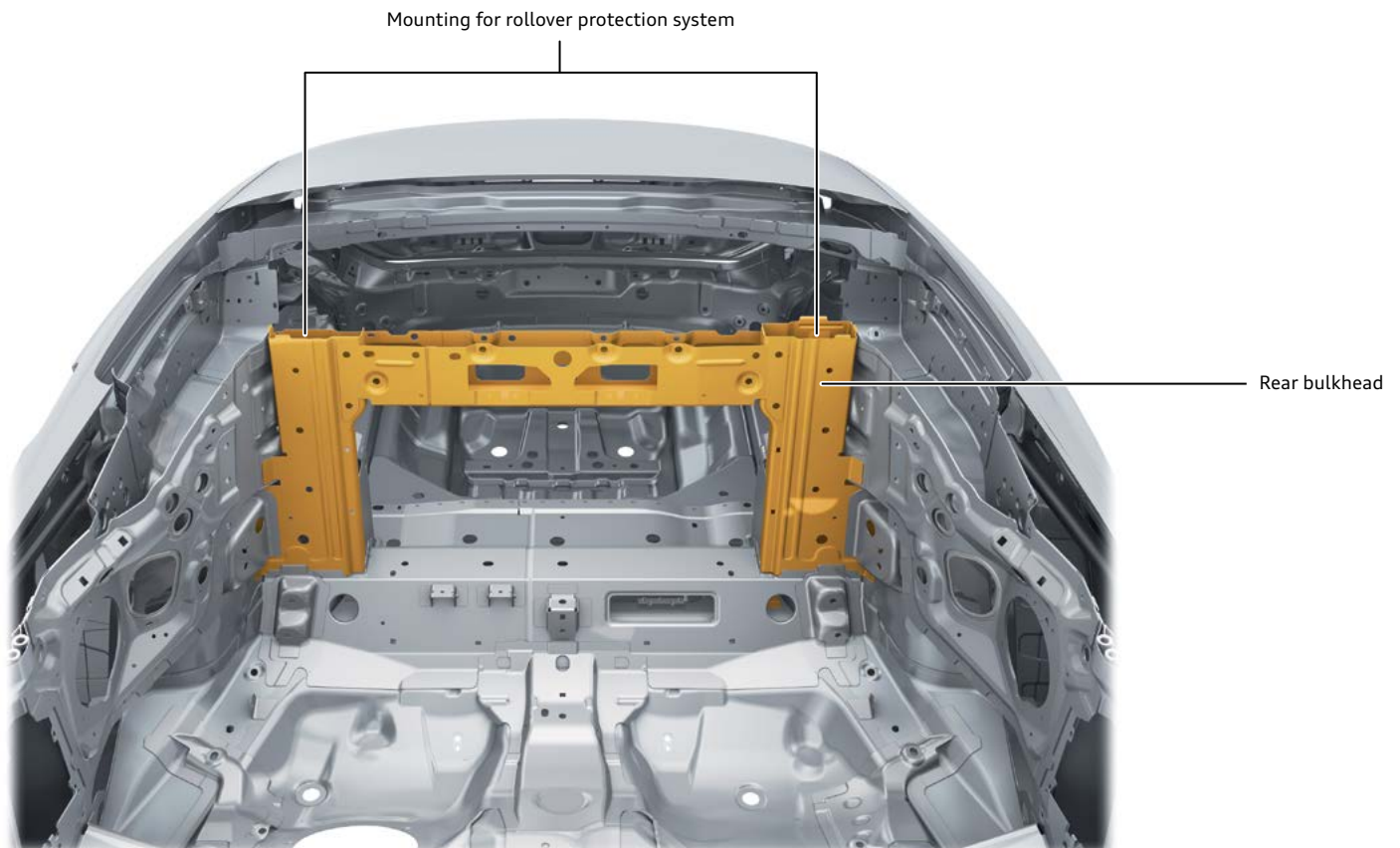


660_105

Rear bulkhead

Additional strengthening is provided by the rear bulkhead, which is rigidly connected to the car body. High-strength sheet steel is used to provide extra-high rigidity in areas critical to a crash, such as the mounting for the rollover protection system.

This provides not only better safety for the car occupants, but also increases the stiffness of the occupant cell significantly.



660_106

2019 A6 and A6 48v Hybrid

(all S-line models included)

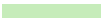







Overview

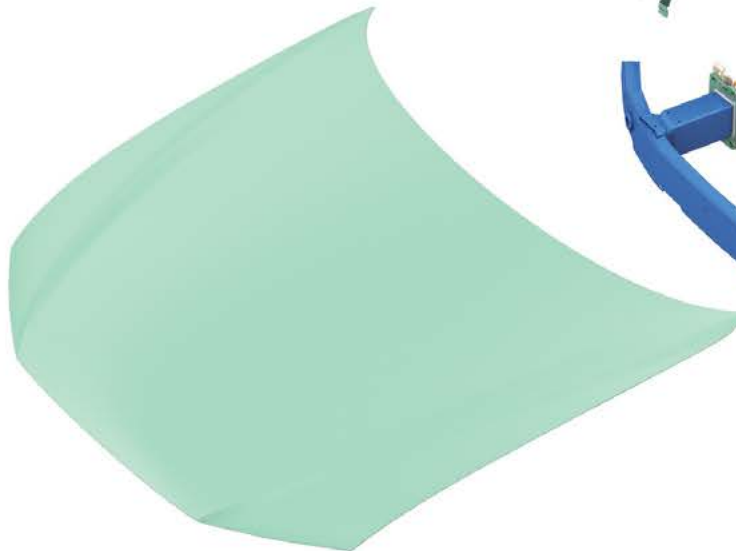
The body of the 2019 A6 is a composite construction using various materials. It is similar to the composition and construction of the 2019 A7.

On the Audi A6 sedan, the rear roof cross member, the connection to the side roof frame and the D-pillar are fully manufactured from steel.

The rear shelf is made of sheet aluminum.

Key:

-  Sheet aluminum
-  Die-cast aluminum
-  Aluminum section
-  Ultra-high-strength steel (hot-formed)
-  Modern high-strength steel
-  High-strength steel
-  Soft steel
-  Composite steel/plastic

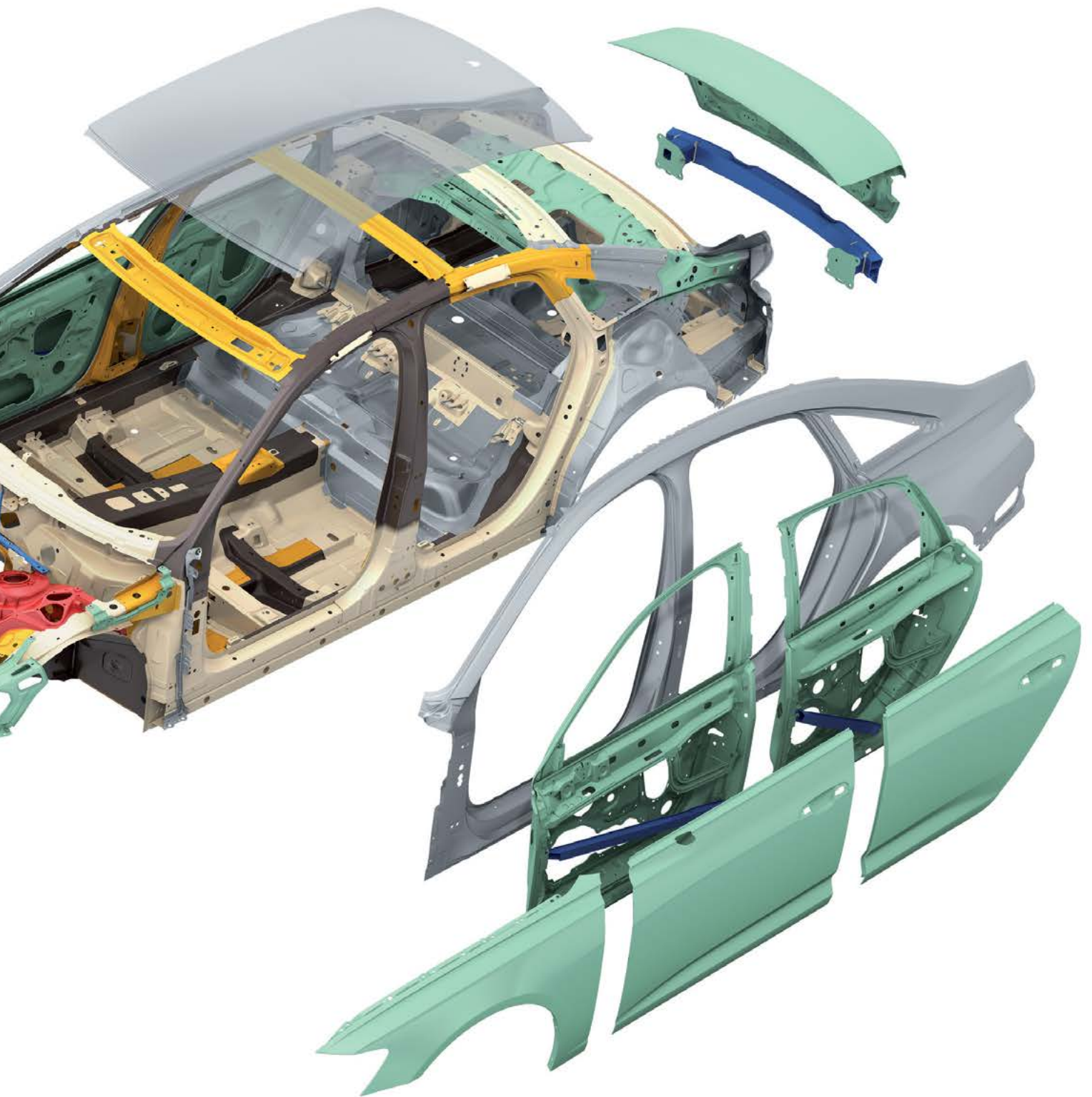


Note

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.



No Pulling on Front



670_143



Note

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.



No Pulling on Front



Reference

For further information on the construction and structure of the body, please refer to the 2019 Audi A7, [Page 36](#).

Body assembly

On the topic of body assembly, it is also very clear that the 2019 A6 is related to the 2019 A7. For example, the Audi A6 also has semi-electric door locks. The construction of its instrument panel is also practically identical to the one in the Audi A7.



Seats

Eight-way power front seats with driver memory are standard equipment on the 2019 A6. They are heated and feature four-way power lumbar adjustment for the driver. Ordering the Warm Weather Package (Pr. no. PWZ (Premium Plus and Prestige only)), provides four-way adjustable lumbar support for the front passenger seat and seat ventilation for both seats.

Heated rear seats are available as part of the Cold Weather Package (Pr. no. PAW).

A contour seat package is also available for Premium Plus and Prestige models.

The A6 is equipped with a three-seat 40:20:40 split-folding rear seat. The backrest can only be released directly at the backrest in the interior of the vehicle. It can also be locked with the vehicle key so the luggage compartment cannot be accessed from the vehicle interior.

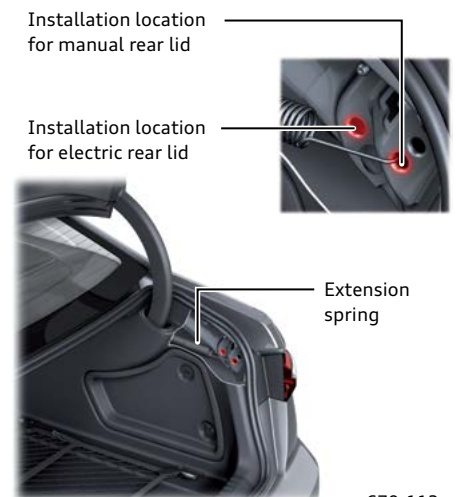


Folding and lockable rear seat backrest

Rear lid

There are two rear lid versions for the 2019 A6. The manual rear lid is opened via two mechanical extension springs. A hydraulic damper (left-side) has the task of reducing the speed of opening in the last 45° of the opening procedure.

An optional electric rear lid is available for the A6. With this system, Rear Lid Motor 1 V444 moves the left rear lid hinge via a spindle drive. An extension spring on the right hinge supports the opening process on both the manual and electric systems. However, the spring installation position in the rear of the body will change depending on which system is installed.



670_112

Power latching system

The power latching system for the rear lid has also been integrated into the rear lid lock on the 2019 A6. On the previous model, the striker on the lock carrier was moved downwards after the lock was engaged.

However, Rear Lid Closing Aid Motor V382 now pulls the rotary latch of the rear lid lock into its end position after the initial catch has engaged.



670_114

Operation of rear lid lock

The rear lid opens when the rear lid lock is actuated by Comfort Systems Central Control Module J393 via Rear Lid Central Locking System Motor V53.

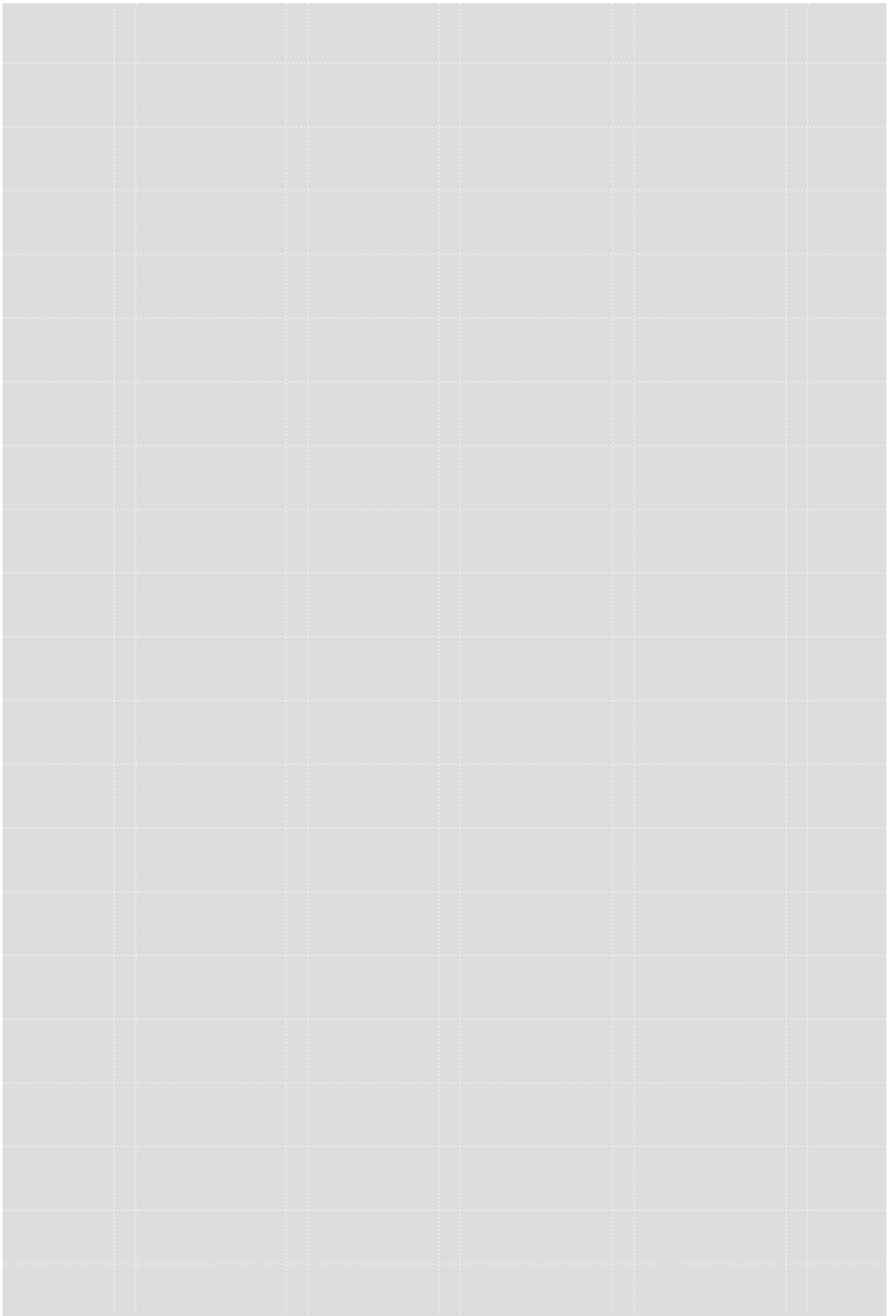
It is possible to release the rear lid manually in the event of an electrical failure.

- › The small cover in the rear lid trim in the luggage compartment must first be removed and the lever on the lock pressed upwards.



Rear lid manual release with folding rear seat backrest

670_115



2019 A7 and A7 48v Hybrid

(all S-line models included)

Overview







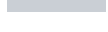

Like its predecessor, the body of the Audi A7 is a composite construction using various materials. In addition to various grades of steel, die-cast aluminum is used for the front suspension turret and for the node castings on the rear roof frame. An aluminum reinforcement plate is located on the D-pillar.

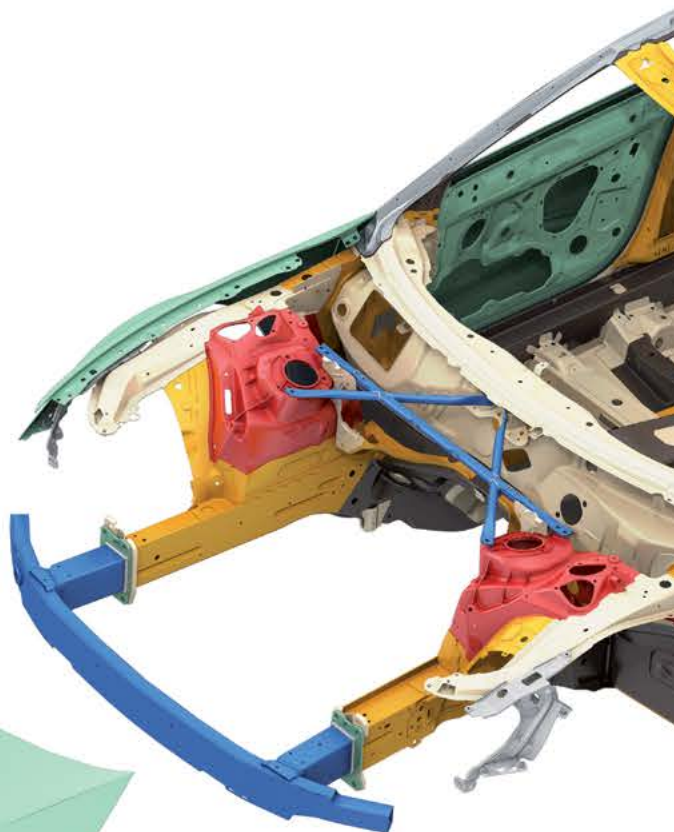
The bumper carriers with crash boxes, the body brace and the reinforcement struts on the underbody are manufactured from extruded aluminum profiles and the attachments from sheet aluminum.

The upper shell of the rear roof frame is made of a new type of steel/plastic composite material.

The main joining technologies used are (for steel) spot welding and laser welding on the sill panels, laser soldering on the roof/water channel and (for steel aluminum composite materials) punch riveting with adhesive bonding.

Key:

-  Sheet aluminum
-  Die-cast aluminum
-  Aluminum section
-  Ultra-high-strength steel (hot-formed)
-  Modern high-strength steel
-  High-strength steel
-  Soft steel
-  Composite steel/plastic



Note

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.

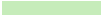









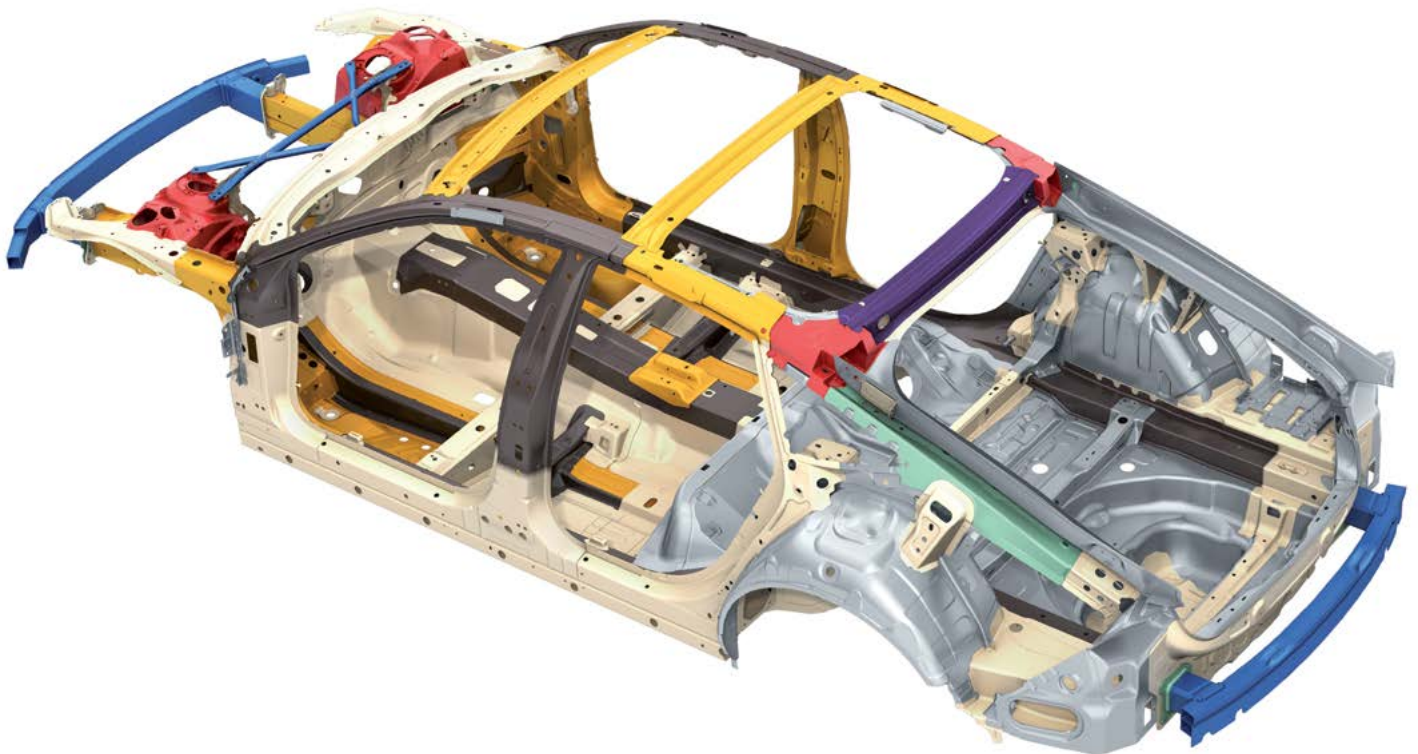
No Pulling on Upper Body, Roof, and Front

Body structure


The high torsional strength and crash safety of the body structure on the Audi A7 is achieved by the intelligent mixture of different high-strength to ultra-high-strength types of sheet steel.

Key:

-  Sheet aluminum
-  Die-cast aluminum
-  Aluminum section
-  Ultra-high-strength steel (hot-formed)
-  Modern high-strength steel
-  High-strength steel
-  Soft steel
-  Composite steel/plastic



669_118

 **Note**
Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.

 **No Pulling on Upper Body, Roof, and Front**

The number of ultra-high-strength hot-formed sheet steel parts in the passenger compartment has been increased. Some of these steel parts are hardened; others consist of tailored blanks with variable wall thicknesses.

They are used in the lower area of the bulkhead, the side members, the rear seat cross members, the top section of the tunnel, the rear longitudinal members, the B-pillars and the A-pillars.

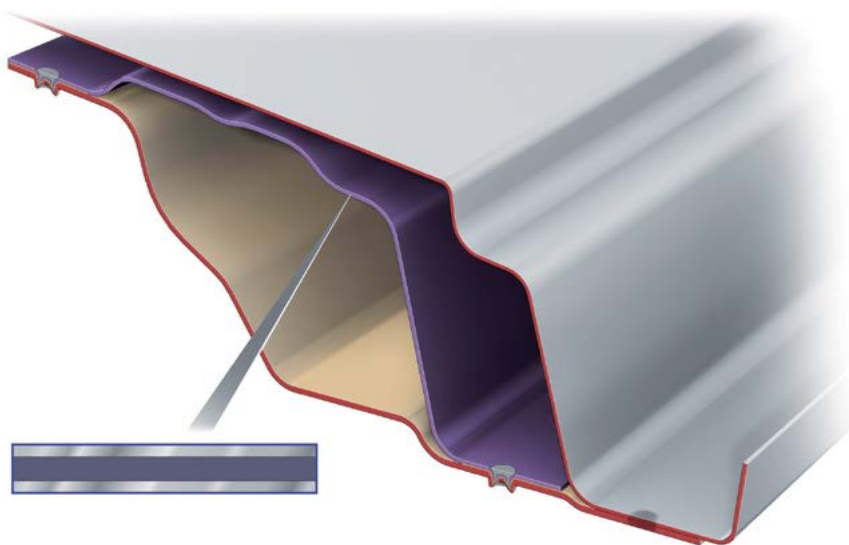


669_119

Composite steel/plastic material

One of the innovations and a special feature is the use of composite steel/plastic material for the top section of the rear roof cross member. In this material, a 0.4 mm thick plastic sheet is combined with 0.2 mm thick steel sheets to form a composite sheet. The rigidity and flexural strength is similar to comparable steel parts, while the weight is significantly lower.

In the production process, the semi-finished product is deep-drawn just like a regular steel sheet and the two halves of the roof cross member are joined by punch riveting and adhesive bonding. Punch rivets and additional adhesive are also used to join the aluminum cast nodes at the sides.



669_120

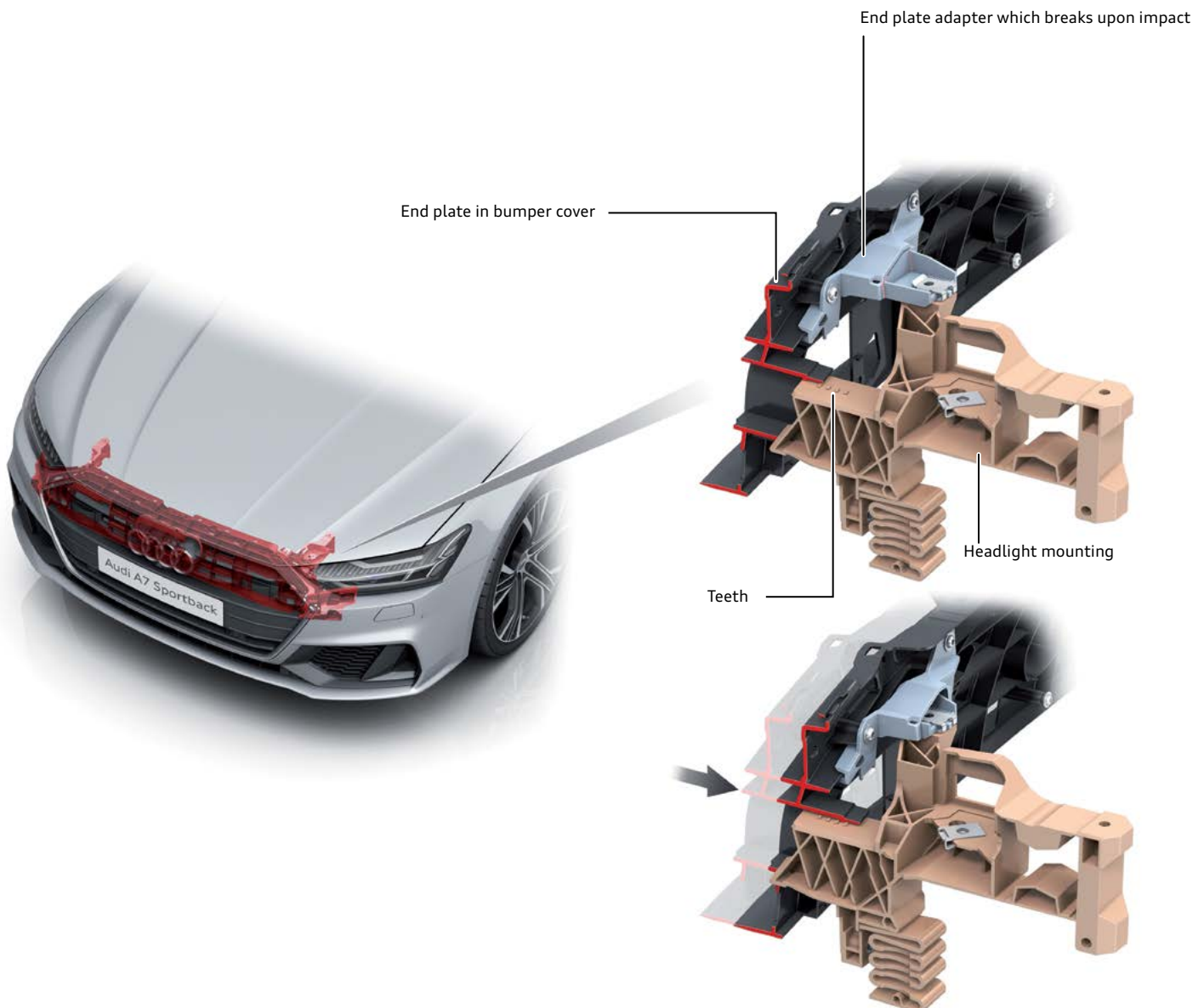
Body assembly

Front bumper

To minimize the risk of a pedestrian sustaining knee injuries in the event of a collision with the Audi A7, a mechanism is integrated in the end plate of the front bumper cover to prevent the bumper cover from springing back against the pedestrian's knee.

This mechanism pushes the end plate into the headlight mounting where it latches onto a set of teeth which hold it there. Because damage can occur to the detent mechanism (for example, if the teeth are blunt or broken), both parts must be replaced after an accident. Replacement is intended to ensure that the mechanism functions properly should another pedestrian accident occur.

The connection between the end plate and the headlight mounting is made by an end plate adapter which is designed to break on impact. This end plate adapter is the first part to break in small impacts, for example, when parking. In this case, the end plate does not latch onto the headlight mounting. The end plate and the headlight mounting can continue to be used; only the adapter has to be replaced.



669_130

Instrument panel

The appearance and design of the A7 instrument panel is similar to the 2019 A8 but its structure is fundamentally different. The air outlets do not swivel electrically and do not have the movable covers. Because the trim on the

passenger side surrounds the MMI screen and forms a single unit with the top panel, the procedure for disassembling the instrument panel is different to the Audi A8. Always follow the instructions in the most recent service literature.



669_133

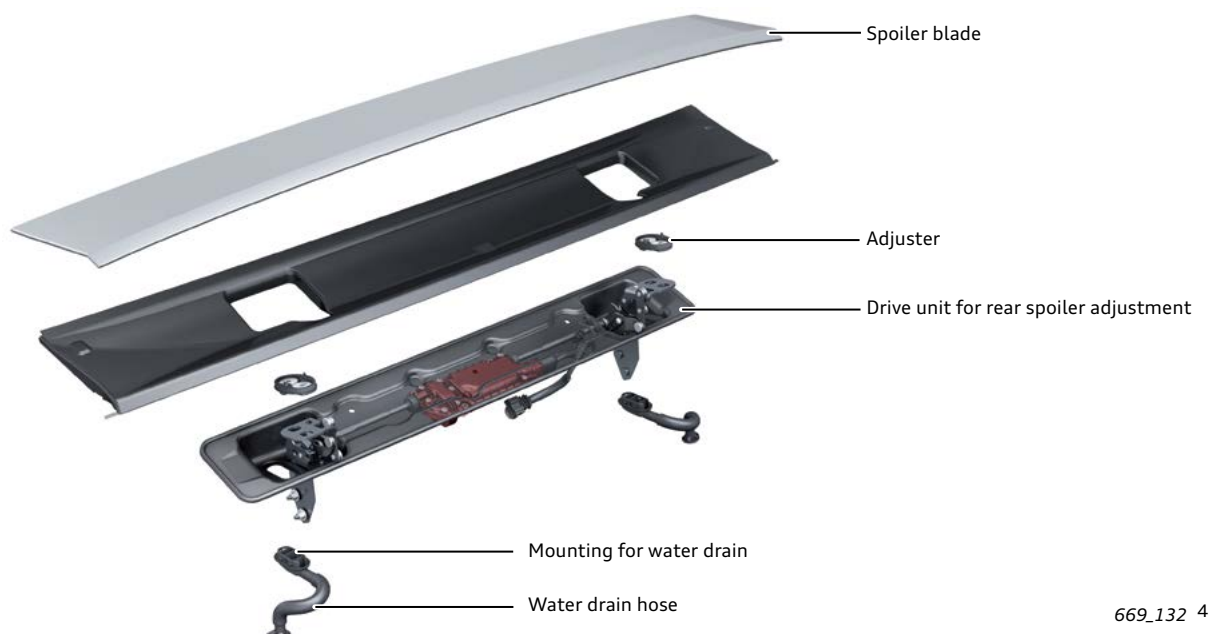
Rear spoiler

Like its predecessor, the Audi A7 has a retractable spoiler in the rear lid. At speeds above approximately 75 mph (120 km/h), Rear Spoiler Motor V52 automatically extends the spoiler blade. The spoiler is automatically retracted when the speed drops below approximately 50 mph (80 km/h). A button in Front Information Display Control Head 2 J1060 can also be used to operate the spoiler manually. To retract the spoiler at speeds up to 12 mph (20 km/h), the button in J1060 must be held until the spoiler is fully retracted. The following corresponding messages appear on the MMI display J685: "Press and hold to retract rear spoiler manually" and "The rear spoiler is retracted." At speeds above 12 mph (20 km/h) the button only needs to be pressed briefly.

Two Hall sensors monitor whether the spoiler has reached the end positions. One of the sensors measures the end position of the extended rear spoiler while the other counts the number of drive motor revolutions while the spoiler is being retracted.

Adjusters allow the height of the spoiler blade to be aligned vertically (z axis) in relation to the rear lid and side panel. Elongated holes are used for alignment in the longitudinal and transverse directions (x and y axes).

Drain hoses on the right and left ensure that water can be channeled out of the drive unit for the rear spoiler adjustment. Since molded hoses are used, the markings on both sides must align with each other when the hoses are installed on the mountings.



669_132 41

Panoramic glass sunroof

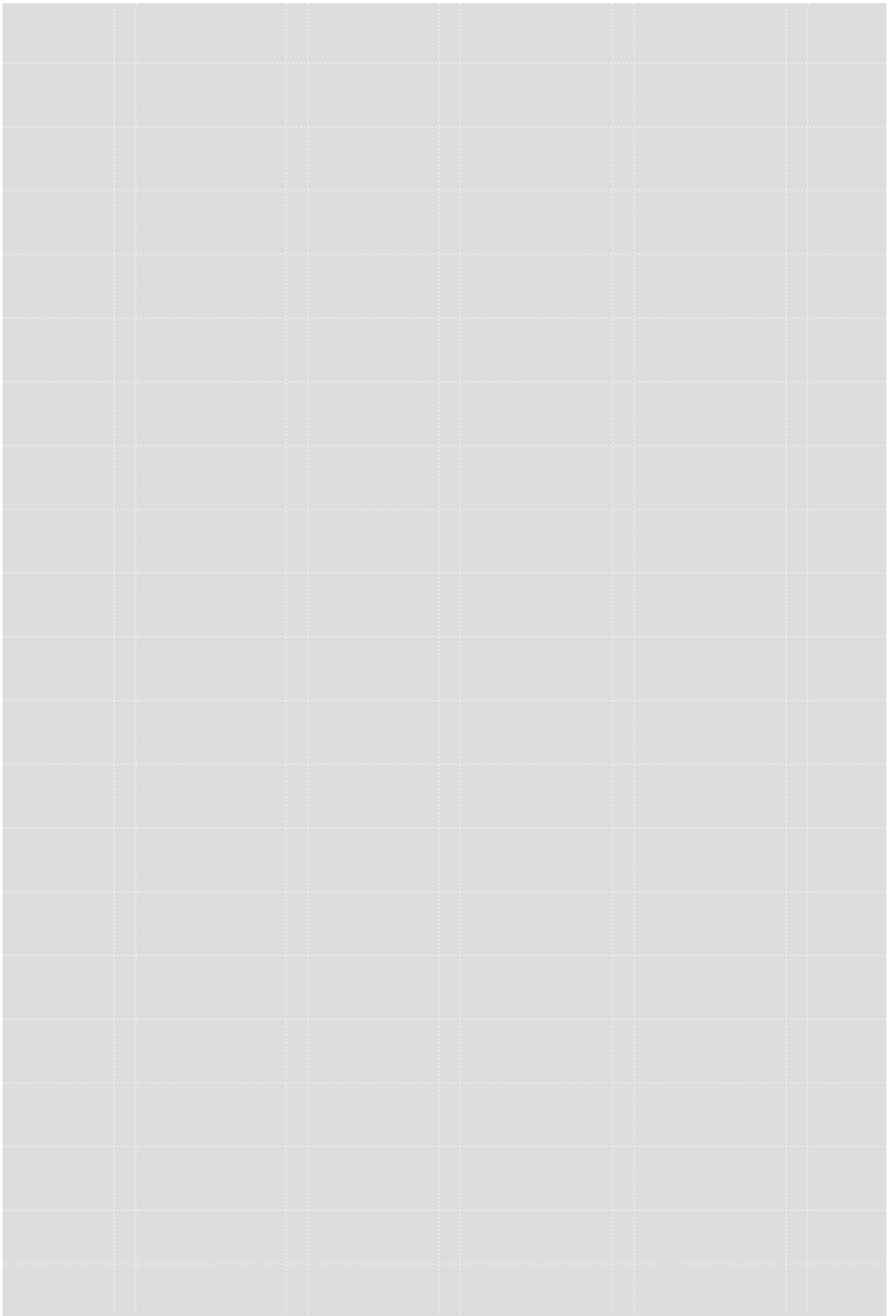
The Audi A7 can be equipped with a panoramic glass sunroof which spans the entire width of the roof. A piece of glass trim is permanently installed in front of the moving sunroof panel.

The glass panel can either be tilted at the rear or it can slide open over the roof towards the rear. An electrically operated blind provides protection against bright sunlight.

The water drain hoses on the left and right are located at the rear end of the roof insert. A new feature is that, instead of being clipped into the sunroof frame, the water drain hoses are attached directly to the roof reinforcement at the top and the wheel housing at the bottom.



669_131



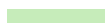






2018 Q5

(all S-line models included)

Overview

Despite being larger than its predecessor, the 2018 Q5 has shed 44.0 lb (20 kg) of body weight. This was achieved through a combination of geometric lightweight design and an intelligent material mix. The overall body structure of the Q5 owes its lightness and rigidity to the use of two additional die-cast aluminum front strut mountings and the customary mix of soft, high-strength, advanced high-strength and ultra-high-strength sheet-steel components.

Key:

	Sheet aluminum
	Die-cast aluminum
	Aluminum profile
	Ultra-high-strength steel (hot-stamped)
	Advanced high-strength steel
	High-strength steel
	Soft steel

Joining technique

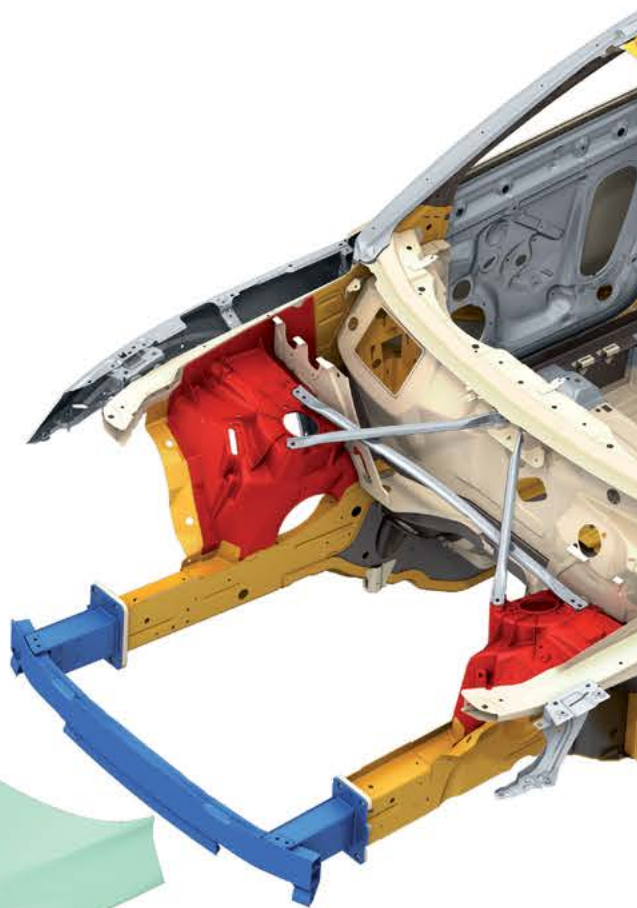
A number of different joining technologies are used to assemble the body of the Q5.

In addition to classic resistance spot welding (there are 5656 spot welds on the vehicle), the following technologies are used:

- › MAG welding (total seam length: 64.8 in (1646 mm)).
- › Laser soldering (total seam length: 140.6 in (3572 mm)).
- › Laser welding (total seam length: 183.4 in (4660 mm)).
- › MIG soldering of steel (total seam length: 72.3 in (1838 mm)).
- › Semi-tubular punch rivets (132 pcs.).
- › Flow-drill screws (16 pcs.).
- › Seaming (total seam length: 82.08 in (2085 mm)).
- › Bonding (total seam length: 2418.3 in (61425 mm)).

They are attached to the adjacent sheet-steel components using punch rivets, flow-drill screws and structural adhesive. Structural adhesive not only strengthens the aluminum-steel joint, but also prevents the contact corrosion that would otherwise occur between these two materials.

Straightening and reshaping of aluminum components or aluminum-steel joints is not permitted because it can lead to damage and invisible cracks.



Note

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.



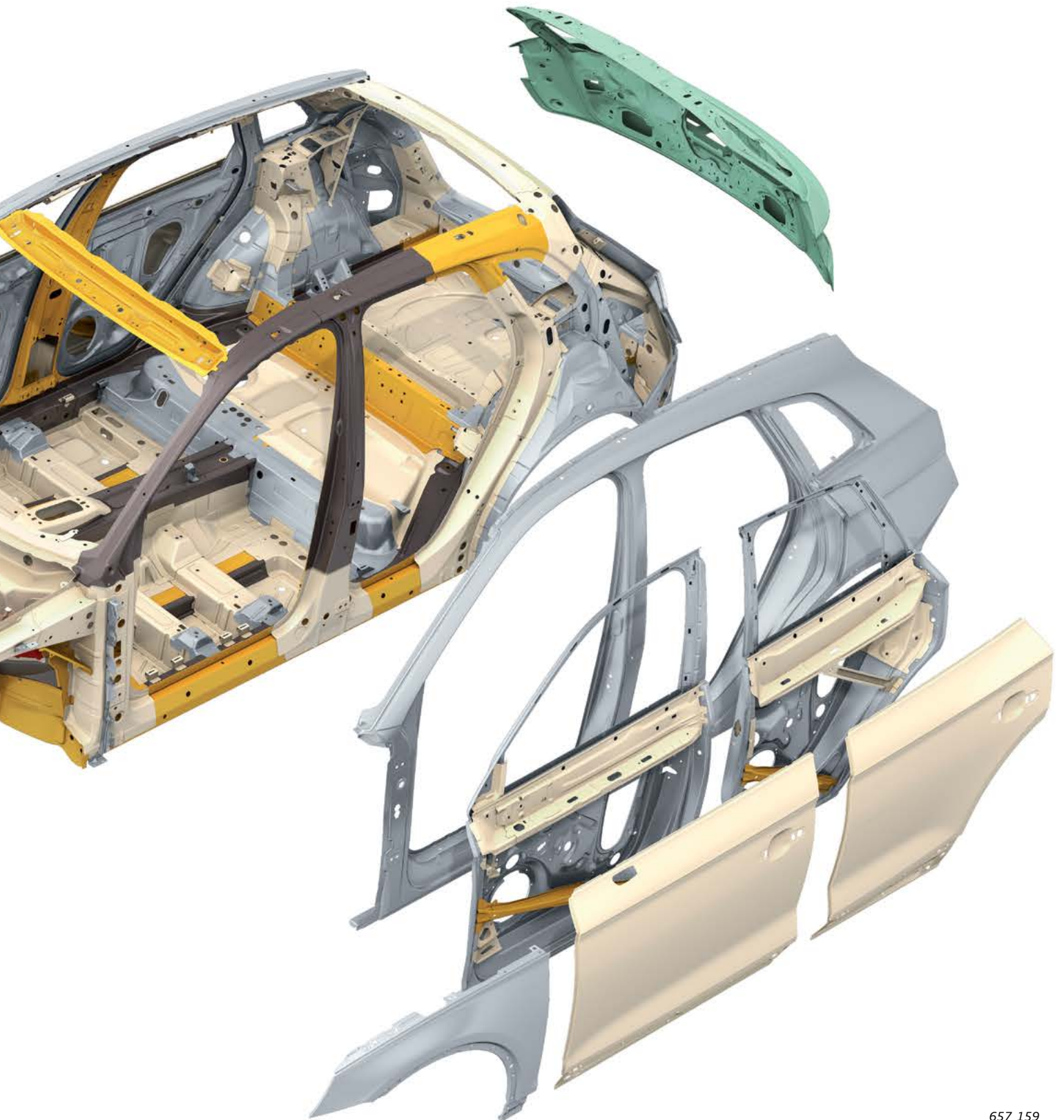
No Pulling on Front

Ultra-high-strength hot-shaped components

Hot-shaped components form the high-strength, crash-safe backbone of the occupant cell. They strengthen the transition from the front end to the passenger compartment, the frontal section of the roof frame, the B-pillars, the lower beams (inner sills) and parts of the floorpan. They account for 20% of the body structure.

Tailored blanks are used for many hot-formed body components in the Audi Q5. The semi-finished products are rolled so that they are of different thickness, giving a weight advantage of 10.1 lb (4.5 kg).

Audi uses partial tempering for the B-pillars: The individual zones in the mold are cooled at different rates, giving them different strength characteristics. In a side impact collision, the bottom section of the B-pillar deforms to absorb energy while very little deformation occurs in the upper section (at head height).

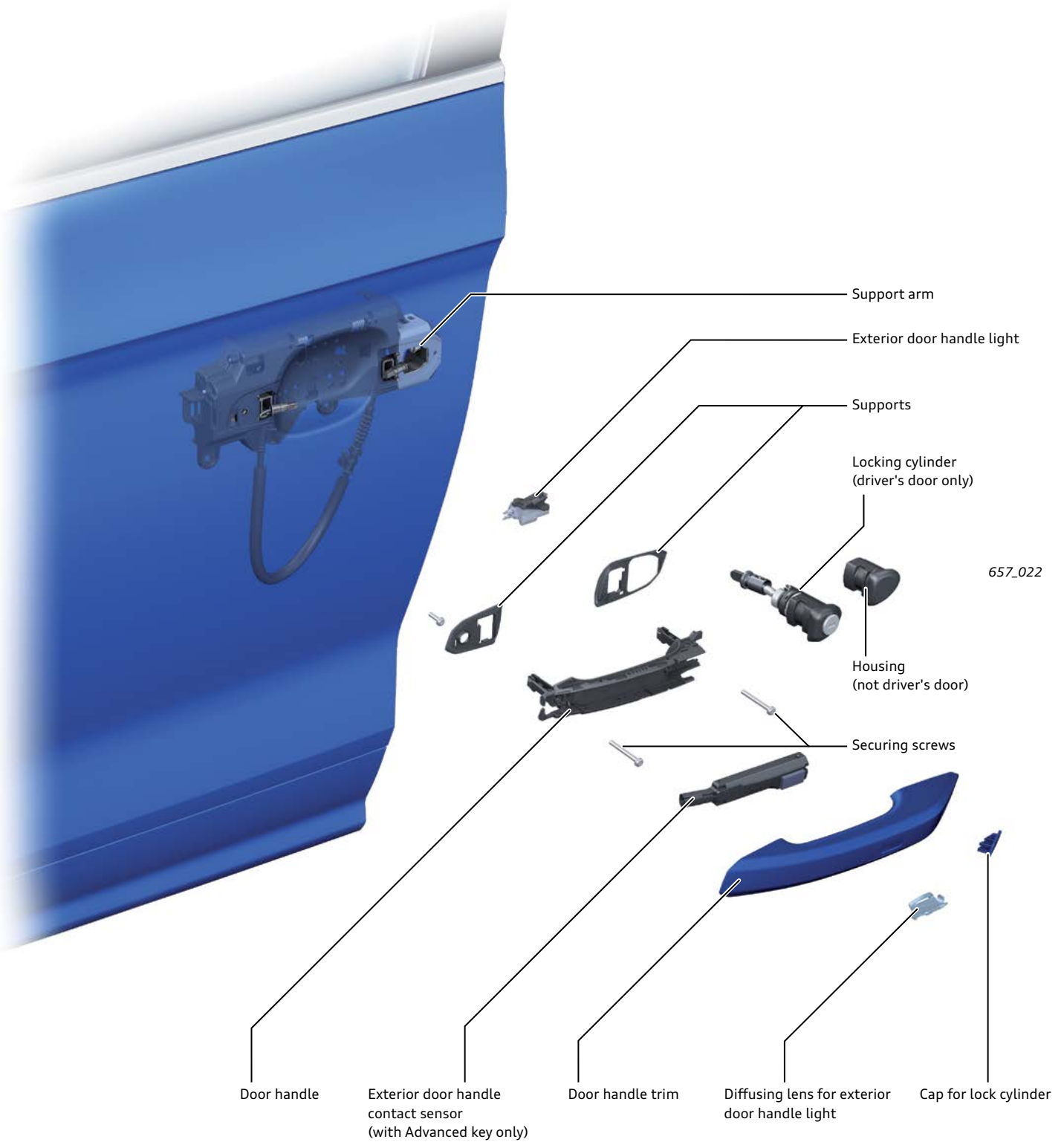


Attachments

Door handle

The Audi Q5 also adopts, among other things, the door handle design of the Audi A4 featuring the kinematic mechanism which allows the door handle to swivel upwards when pulled.

The procedure for removing and disassembling the door handles has changed accordingly.



Note

For details of the procedure for removing and dismantling the door handles, please refer to ElsaPro.

Hood

The 2018 Q5 has a wrap-around hood design. To ensure uniform shut lines and gaps, the hood can be adjusted in three separate planes. These adjustment options allow service personnel to align the hood in the x, y and z directions after collision repairs have been performed. The longitudinal adjustment (x axis) and the lateral adjustment (y axis) are made at the hood attachment points (hinges).

For vertical adjustment (z direction) and further longitudinal adjustment of the hood, each complete hinge can be moved upwards, downwards, forwards or backwards. The attachment points are partially concealed by the hinge when the hood is open. It is recommended that the hinge be tack welded in the foremost and upper-most positions (the greatest possible distance to the door and front fender) during repairs.



657_026

Hood attachment points at the hinge



Note

For further information and details of the hood adjustment procedure, please refer to ElsaPro.

Front side windows

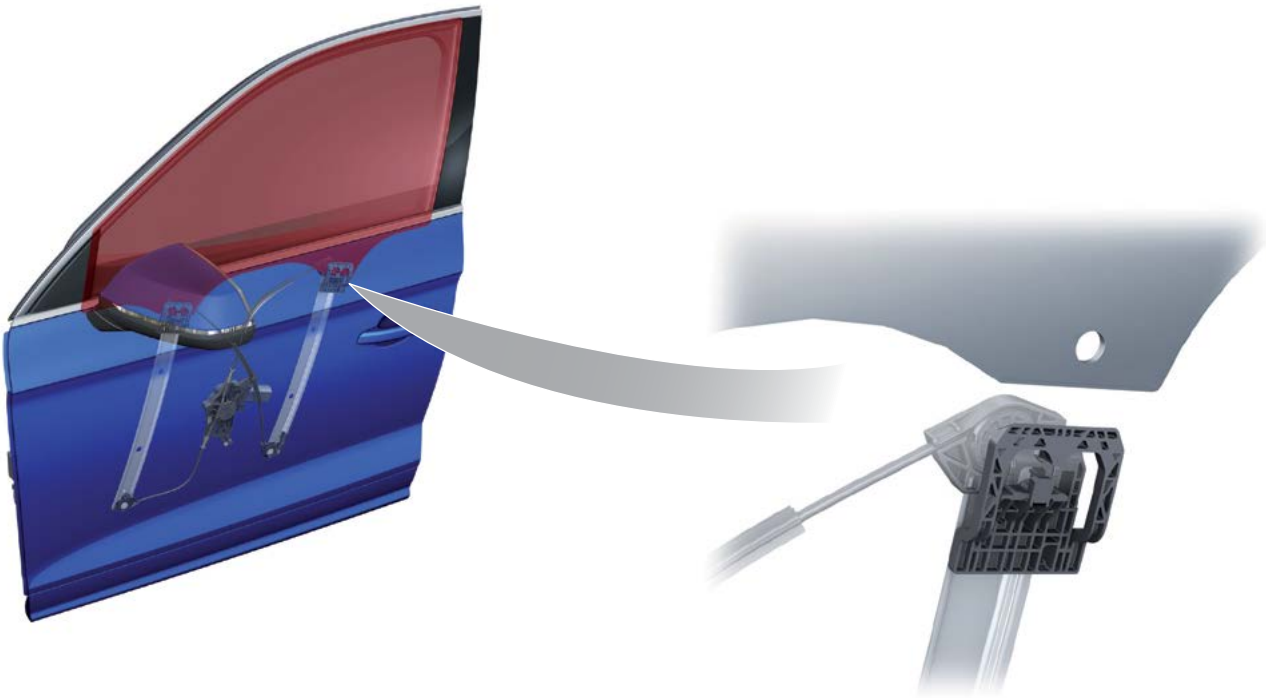
Two different styles of door window glass are available on the Q5:

- > Tempered glass.
- > Laminated acoustic glass (Prestige and SQ5 only).

On vehicles with tempered glass, the window is held in place by the regulator through two holes in the glass pane.

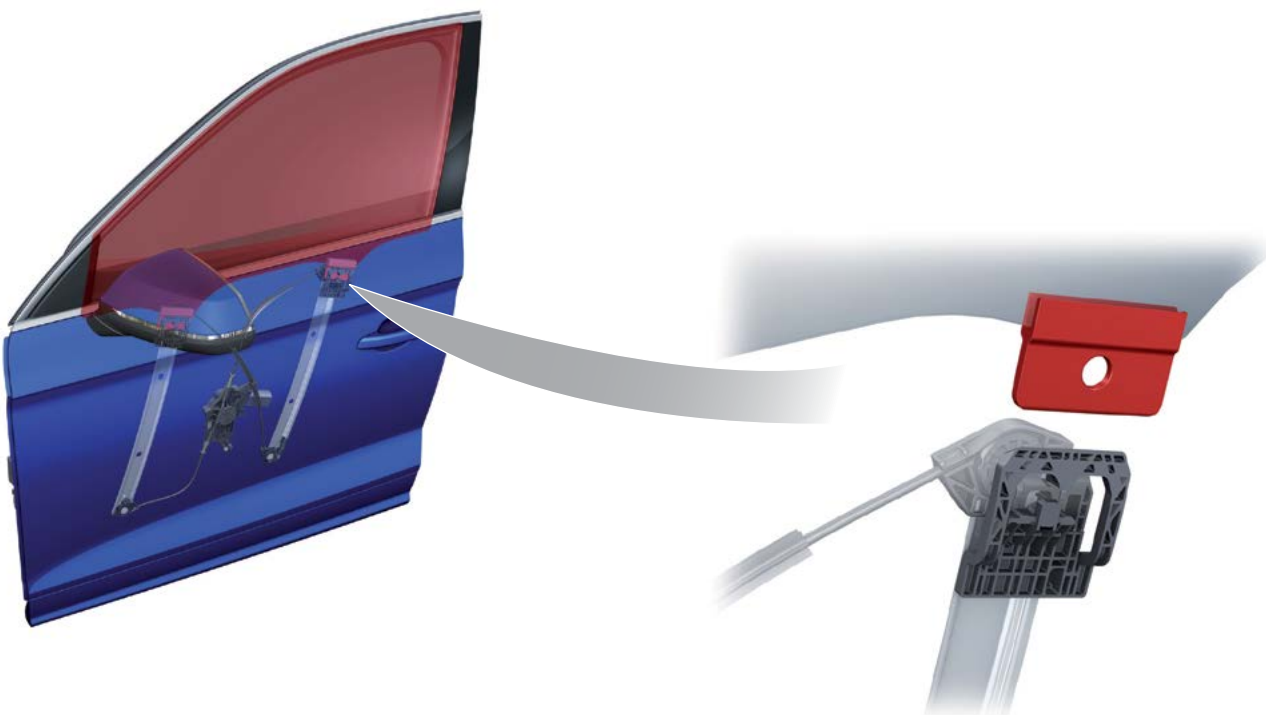
With the laminated acoustic glass, two adapters are bonded to the glass pane. The adapters are then bolted to the window regulator. This was done to avoid perforating the polymer inner-layers of the laminated glass.

Tempered safety glass



657_024

Laminated safety glass



657_025

Panoramic glass sunroof

The panoramic glass sunroof of the Q5 has a two part design. The front glass is movable (tilting/retractable) while the rear glass has a fixed position.

A power operated roller blind covers both glass panels.

Drain hoses are located at each corner of the roof to provide reliable drainage of rain water.

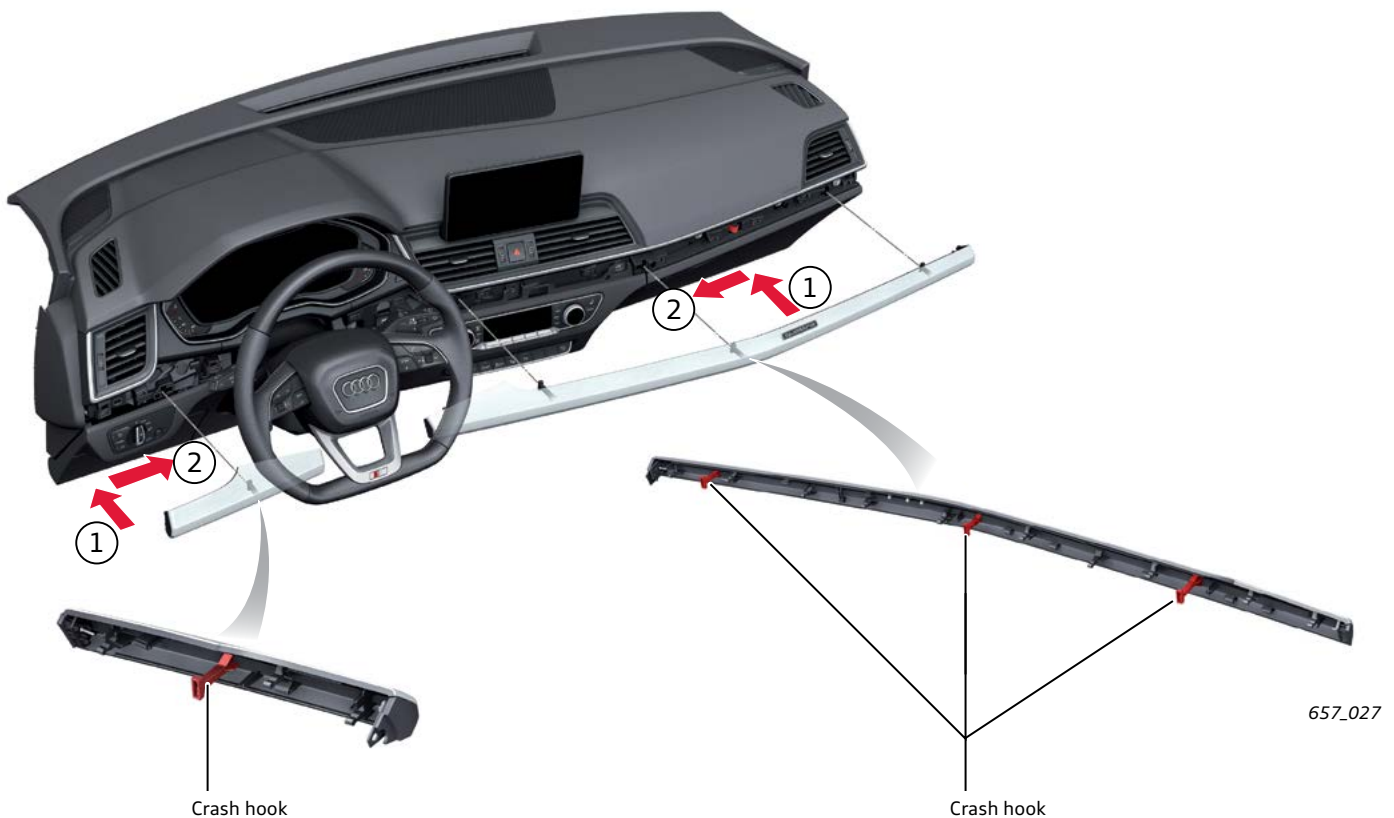


657_028

Instrument panel

The center and side air outlets on the front passenger side of the instrument panel are a single unit. It is attached to the instrument panel by eight screws. The trim pieces covering the screws are attached using a new concept.

The trim pieces are held in place by “crash hooks.” The trims are inserted into the instrument panel and then slid to the center of the vehicle to hold them in place. This helps ensure they cannot be detached during a collision. An allowance must be made for additional lateral movement of the trims during removal and installation.



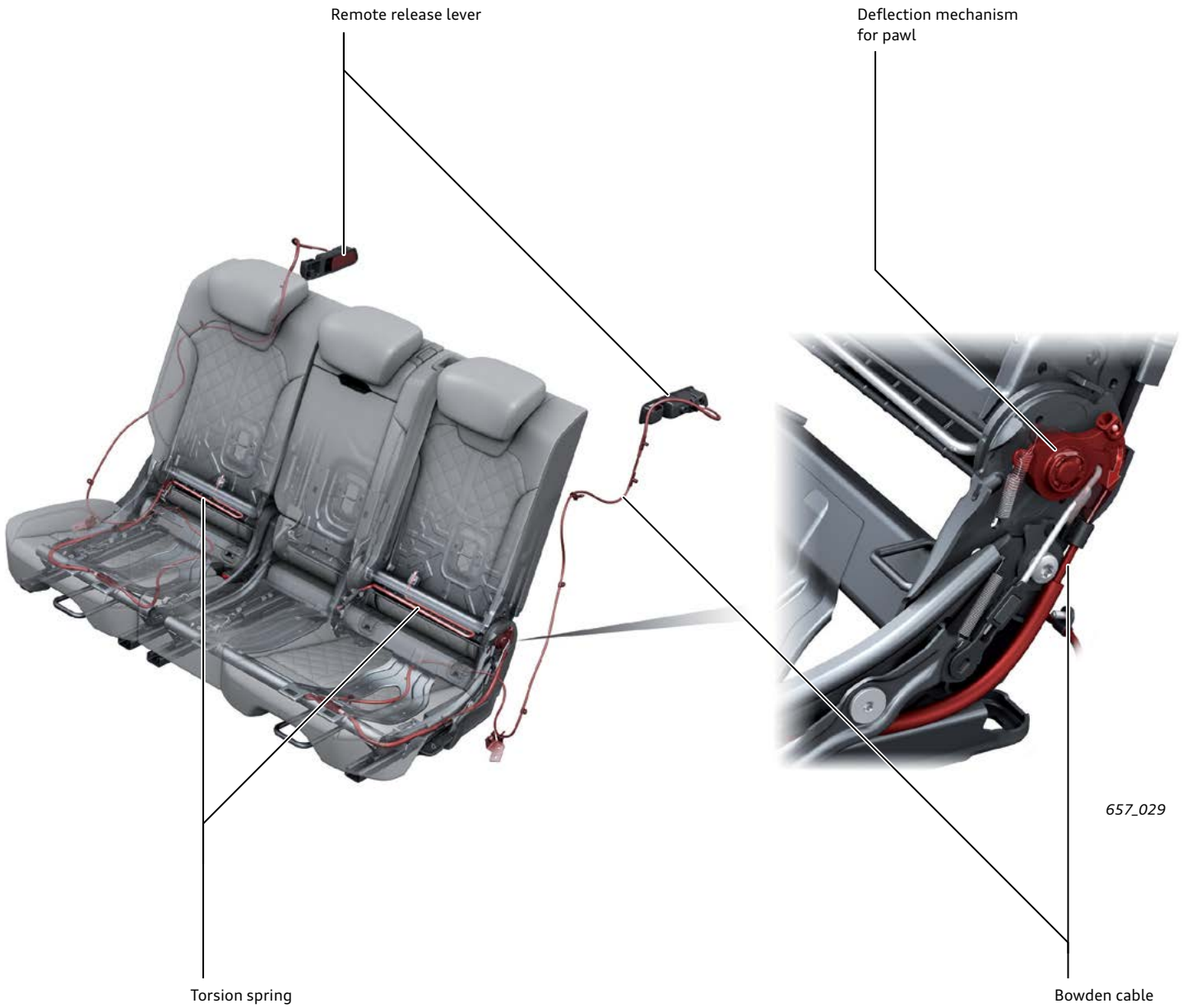
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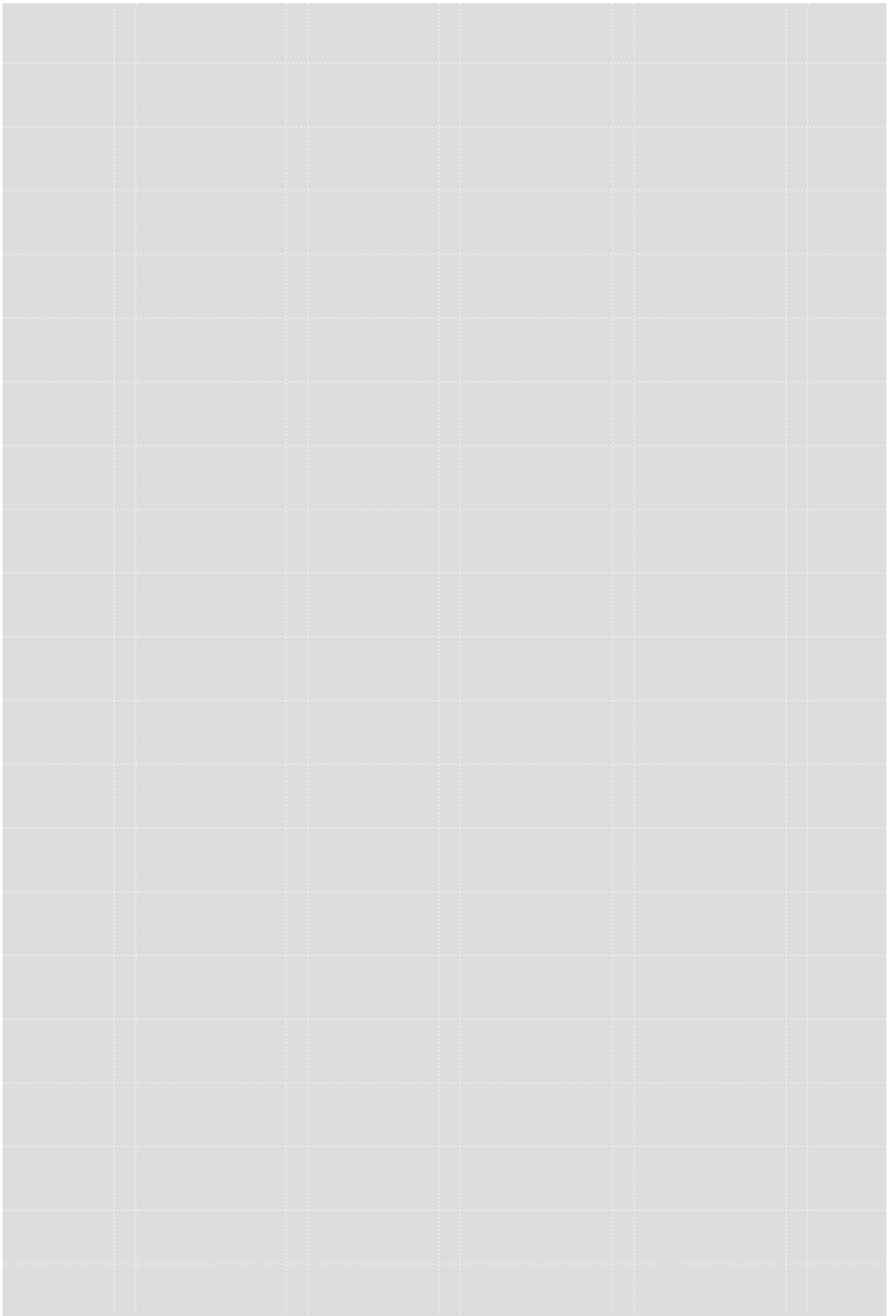
Seating systems

The seats of the 2018 Q5 have been redesigned to reduce weight. High strength steels are used in the underbody area while magnesium components and a light weight wire frame are used in the rear bench seat.

The rear bench backrest can be remotely released and the seat folded down.

When the release levers are pulled, pawls attached to Bowden cables release the load on the springs. The backrests fold forward and down onto the seat cushion. When folded down, the backrests are automatically raised about 45 degrees by the springs.





Hybrid Construction and Ultra Advanced Lightweight Materials

2017 Q7

(all S-line models included)

(All Parts in Illustration are Restricted)

The Audi Q7 is based on the second generation of MLBevo (Modular Longitudinal Platform Evolution). The lightweight body of multi-material construction represents, with its function and weight optimized design, a further example of a highly advanced modern vehicle body.

To meet the requirements of an SUV, the components were deliberately selected according to the principle of using the right material in the right place.

The high quality of the selected materials offers not only reduced weight, but also provides the basis for meeting the most stringent vehicle safety standards.

Aluminum components

Aluminum castings, extruded sections and panels are used in the front and rear of the vehicle as well as the super-structure.

They account for 4% of the body structure and are broken down as follows:

23% sheet aluminum.

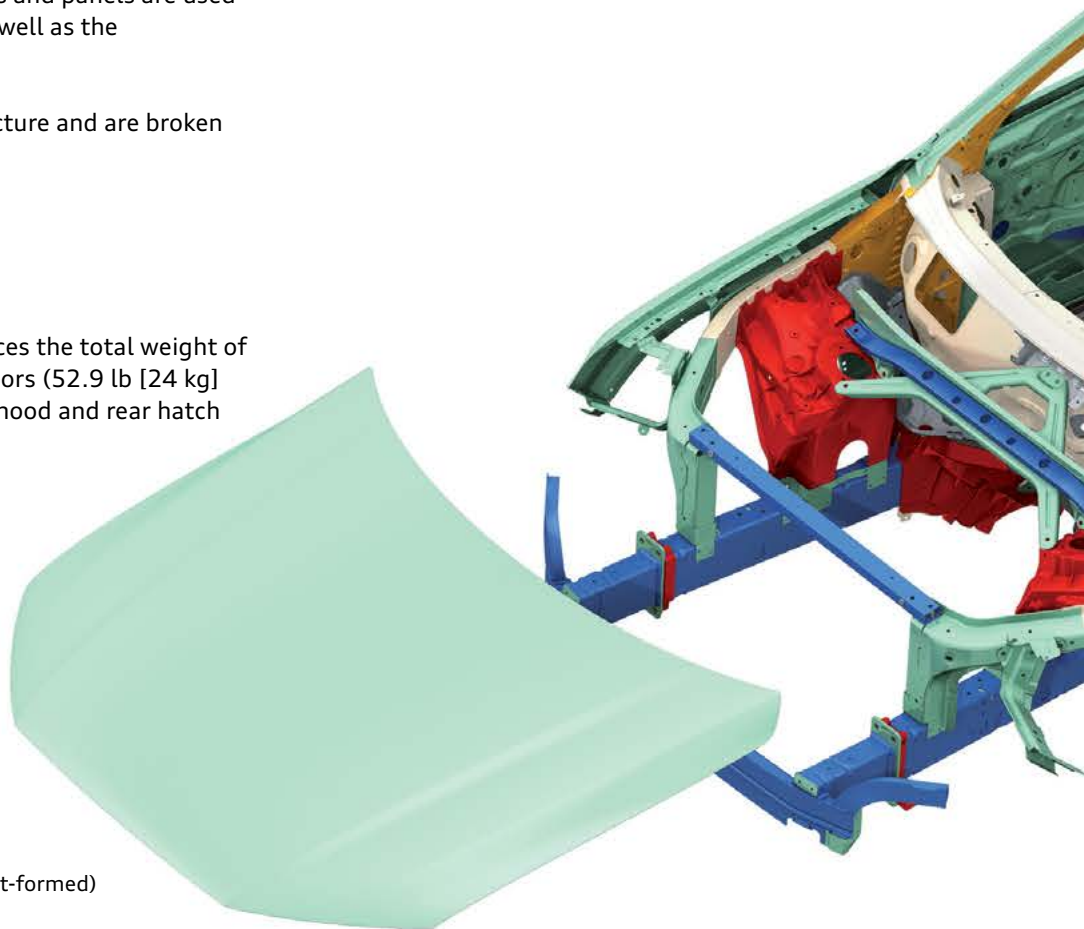
15% die-cast aluminum.

3% aluminum profile.

The multi-material construction reduces the total weight of the Q7 body by 156 lb (71 kg). The doors (52.9 lb [24 kg] lighter), as well as the front fenders, hood and rear hatch are made entirely of aluminum.

Key:

-  Sheet aluminum
-  Die-cast aluminum
-  Aluminum section
-  Ultra-high strength steel (hot-formed)
-  Advanced high strength steel
-  High strength steel
-  Low strength steel



No Pulling

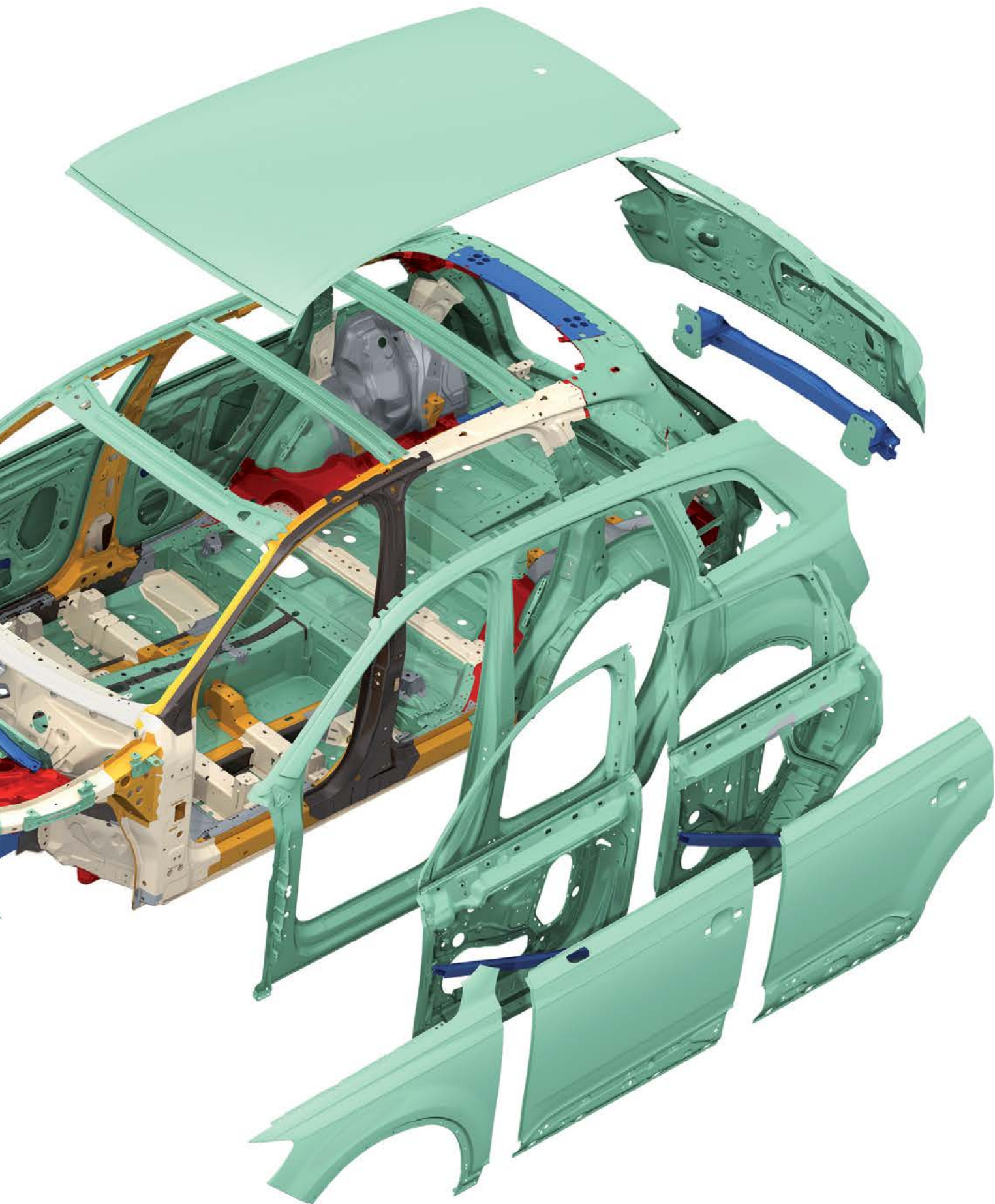


Note

Specialized structural parts are required to properly repair the Audi vehicles in this section; these parts may only be available to Audi Authorized Repair Facilities.

Audi trained repair technicians use factory-approved procedures for safer repairs.

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.



632.083



No Pulling



Note

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.

Ultra-high-strength hot-formed components

The use of ultra-high strength steel materials necessitates, in the event of body repairs, special repair methods adapted to the properties of the materials.

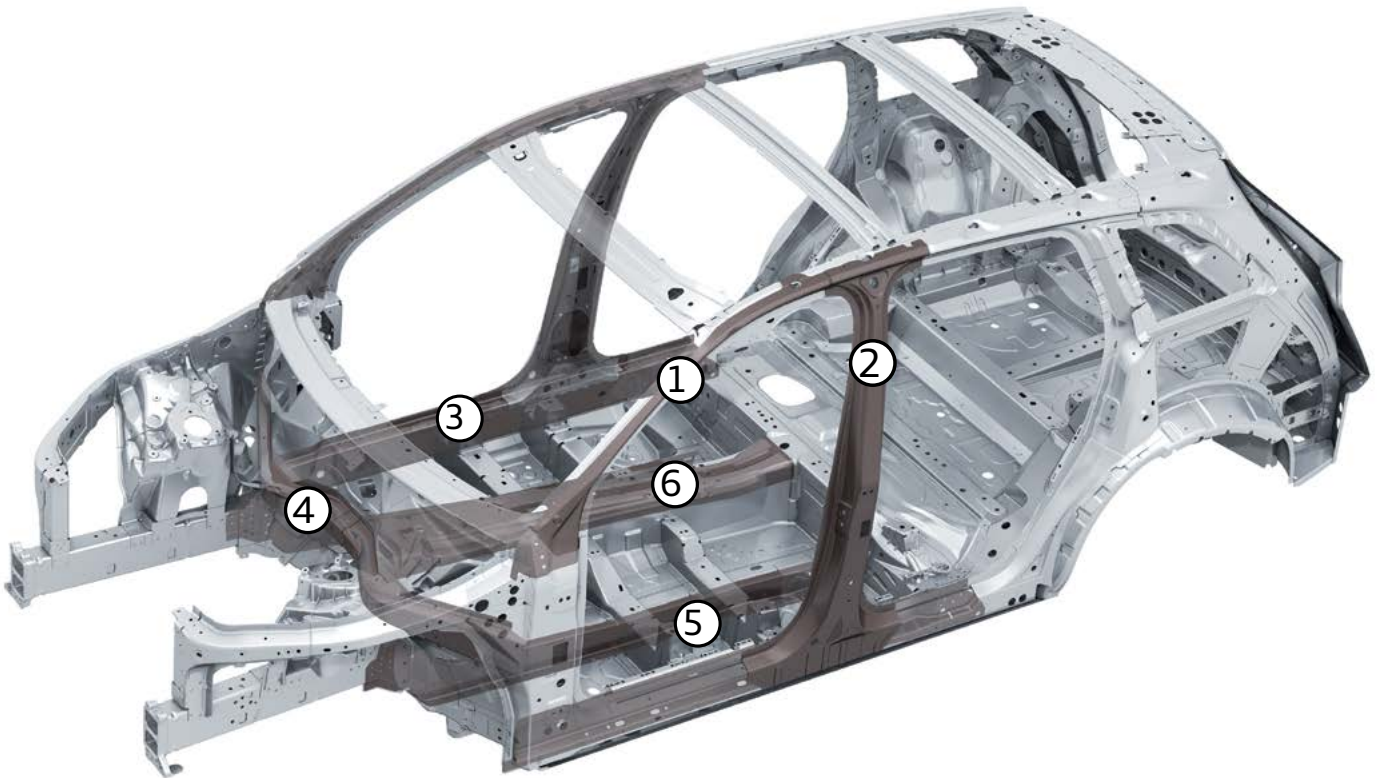
The high heat transfer in the welded areas significantly weakens the strength and structure of the component by altering the microstructure of the material. For this reason, the use of MAG inert gas welding for sectional repair purposes is only permitted on these high quality steels in isolated cases and in precisely defined areas.

Following miscellaneous tests and crash tests, approval was given for two sectional repair areas where MAG welding is allowable in the case of the Audi Q7:

- ① Outer top left /right 'A' pillar
- ② Inside left/right 'B' pillar

The following ultra-high strength hot-formed components have to be completely replaced if damaged:

- ③ Inside left/right sill
- ④ Cross-member of outside left/right bulkhead
- ⑤ End section of left/right cross member 2
- ⑥ Upper tunnel reinforcement



632_084

Joining technology

The key to optimizing the body structure is using "the right materials in the right place". The resulting challenge for the joining technology was to develop, universal and reliable solutions for the large variance in material/thickness combinations in the body.

The body is constructed using the following joining methods:

"Cold" joining methods

- > 2125 punch rivets (semi-hollow rivets).
- > 108 punch rivets (special semi-hollow rivets).
- > 610 flow-drill screws.
- > 58 clinching points.
- > 479 ft (146 m) of adhesive.
- > 14.7 ft (4.5 m) of seaming.

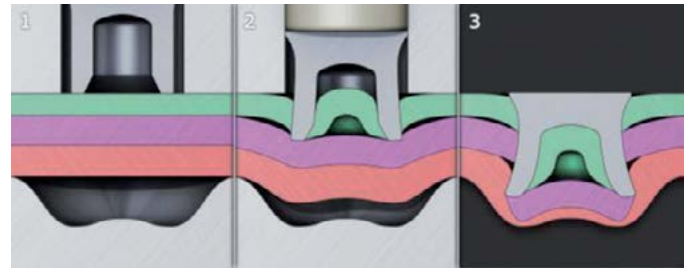
"Hot" joining methods

- > 2579 spot welds.
- > 105 friction elements.
- > 6.6 ft (2.0 m) of MAG weld seams.
- > 30.2 ft (9.2 m) of laser-welded seams.

Joining techniques

Punch riveting

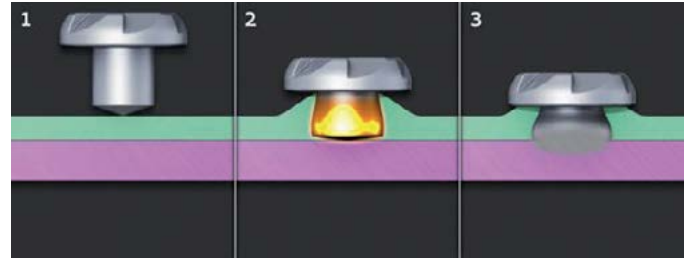
Punch riveting with semi-hollow rivets is a method in which non-prepunched workpieces are joined to form two or more layers. The rivet punches through the upper components and then expands into the basic component. The joining of ultra high strength hot-formed components requires a new special semi hollow rivet for the Audi Q7.



632_085

Friction element welding

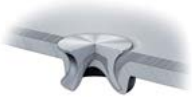

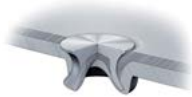
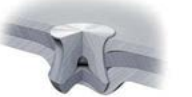



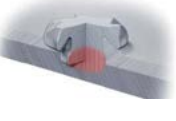
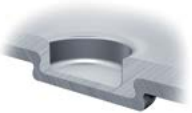
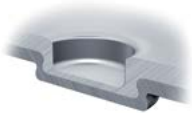



Friction element welding is used for the first time on the Q7 body. A friction element joins at least two workpieces together. In the case of the Q7, for example, friction elements are used to joint sheet aluminum with ultra-high strength hot-formed sheet steel. The rotating friction element initially penetrates the upper layer of the workpiece (aluminum) and then produces a frictional joint with the basic material (ultra-high strength hot-shaped steel) through the application of frictional heat and high axial pressure. The axial contact pressure is also maintained for a short time after welding the components together in order to homogenize the zones in which the microstructure is changed.



632_086



Joining techniques in overview

Similar types of joints		Mixed design	
Aluminum / aluminum	Steel / steel	Aluminum / steel with R_m of up to 800 MPa	Aluminum / steel with R_m of 800 MPa or higher
 Punch riveting with semi hollow rivets	 Resistance spot welding	 Punch riveting with semi hollow rivets	 Punch riveting with special semi hollow rivets
 Flow-drill screwing	 MAG welding	 Flow-drill screwing	 Friction element welding
 Clinching		 Clinching	 Seaming
 Laser welding		 Seaming	

2019 Q8 and Q8 48v Hybrid

(all S-line models included)

(All Parts in Illustration are Restricted)

Overview

The body of Audi Q8 has a multi-material construction; in terms of layout and construction, it is largely similar to the 2017 Q7. The lightweight body contains many aluminum and hot-formed steel components; these steel components form the ultra high-strength backbone of the occupant cell and are used for 14.4% of the bodyshell.

15% of the body is made of high-pressure aluminum die castings; this includes the suspension turrets in the engine compartment and the connections between the side members and longitudinal members. Aluminum panels are used for the side frame and large areas of the floor, the rear wheel housings and the roof, as well as for the frameless doors, the front fenders and the rear lid; they make up 23.7% of the body.

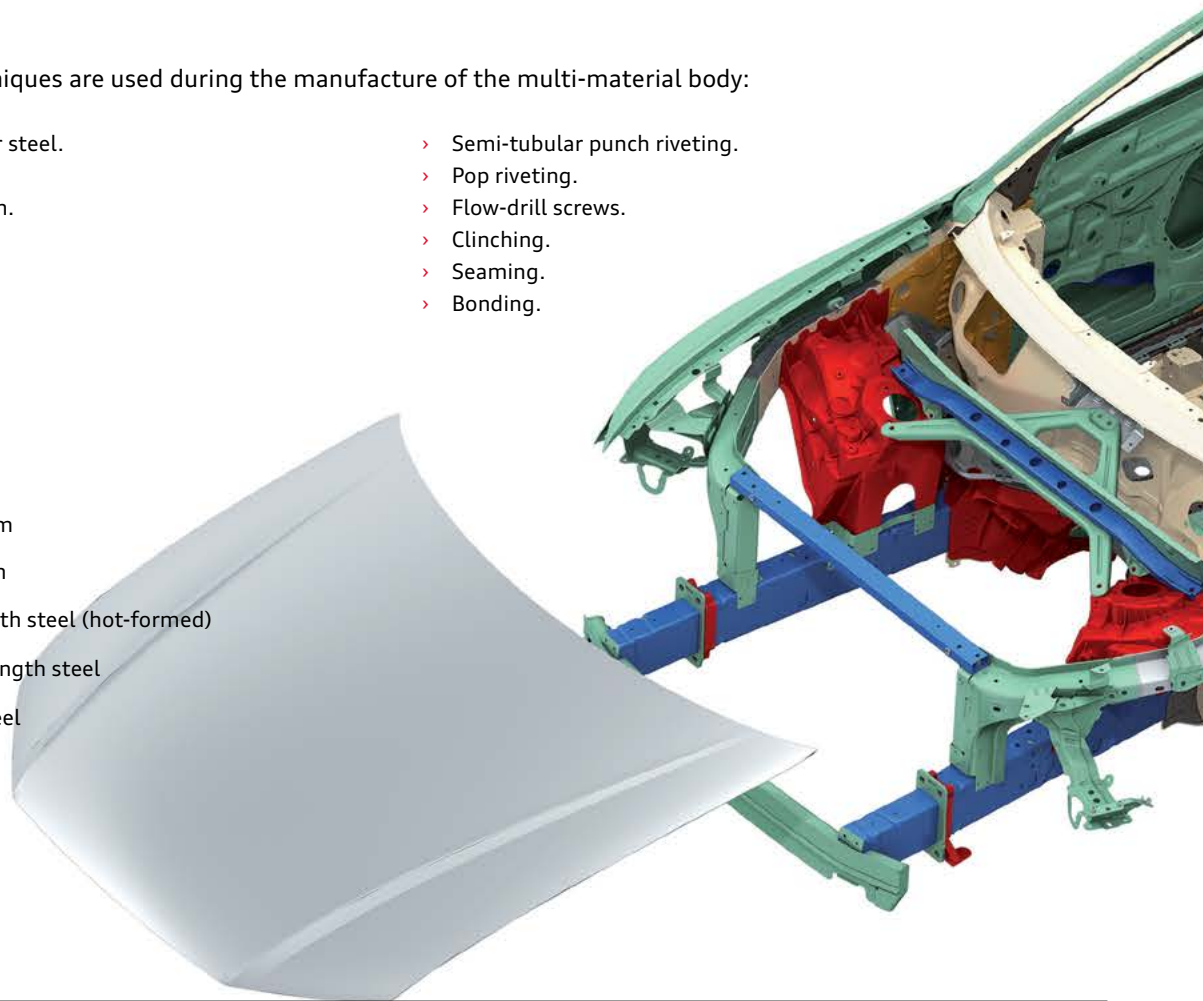
Joining techniques

The following joining techniques are used during the manufacture of the multi-material body:

- > Resistance spot welding for steel.
- > MAG welding.
- > Laser welding for aluminum.
- > Laser welding for steel.
- > MIG welding.
- > Friction element welding.
- > Semi-tubular punch riveting.
- > Pop riveting.
- > Flow-drill screws.
- > Clinching.
- > Seaming.
- > Bonding.

Key:

- Sheet aluminum
- Die-cast aluminum
- Aluminum section
- Ultra-high-strength steel (hot-formed)
- Modern high-strength steel
- High-strength steel
- Soft steel



Note

Specialized structural parts are required to properly repair the Audi vehicles in this section; these parts may only be available to Audi Authorized Repair Facilities.



Note

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.



No Pulling



Reference

For further information on the construction and structure of the body, please refer to the 2017 Audi Q7, [Page 52](#). The 2017> Q7 and 2019> Q8 have similar body structure.

General body repairs

Although it is very easy to see that the Audi Q8 is related to the 2017 Audi Q7 in technological terms, there are some

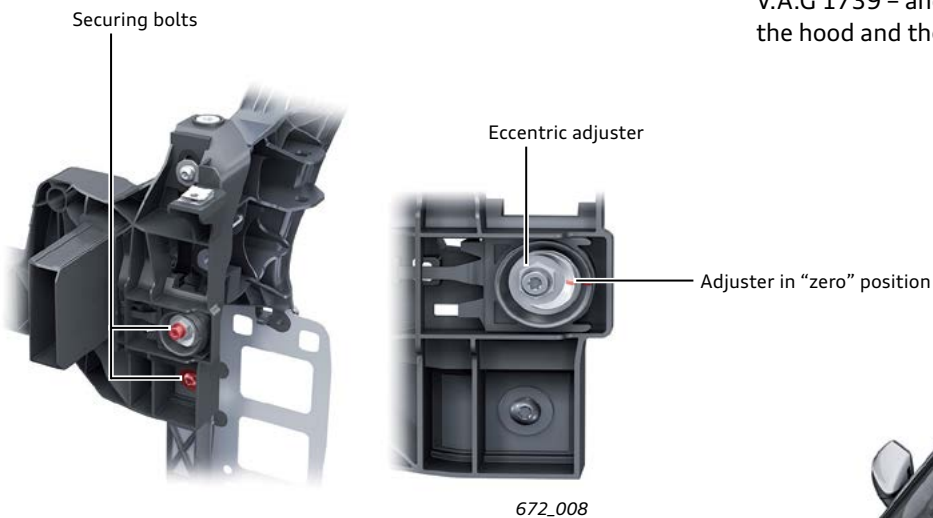
major differences with regard to several service-related aspects, including general body repair work.

Front bumper

The high quality standards of the body of the Audi Q8 are emphasized by extremely accurate and even gap widths. To ensure that the original gap widths are restored correctly, for example after any repair work performed on the body following an accident, there are numerous adjustments which can be made on the doors, hood, rear lid and bumpers.

To adjust the gap widths at the front end of the Audi Q8, a new type of eccentric adjuster is featured in the headlight mounting.

Once the two securing bolts have been loosened, the eccentric adjuster at the upper bolt can be turned – for example using the socket wrench from the rear window adjusting tool V.A.G 1739 – and the position of the headlight in relation to the hood and the bumper cover can be adjusted precisely.



Note

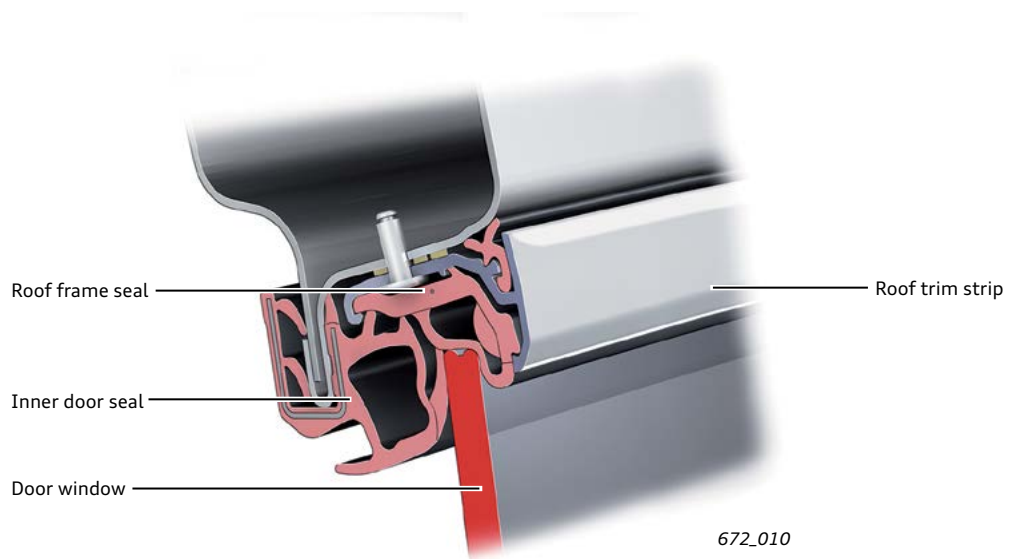
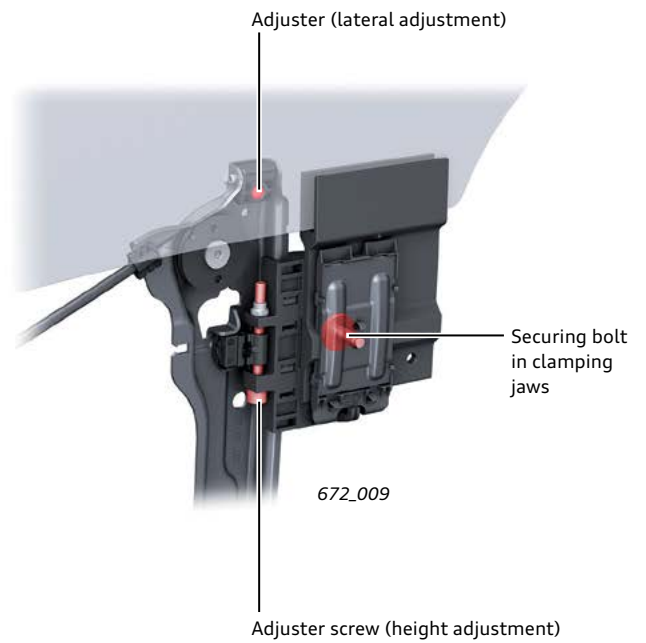
When installing the headlight mounting, it is important to turn the eccentric adjuster to the "zero" position. To ensure this, the two markings must align. If this is done, there will be no hindrances when adjusting the bumper during the subsequent installation procedure.

Frameless door windows

The door windows on the Audi Q8 are frameless. A lateral adjuster is used to determine the incline of the window and therefore the pressure it exerts on the inner door seal. To perform adjustment, the adjuster with which the window regulator is secured in the door must be rotated. The height adjuster determines the depth of the window in the roof frame seal. To perform the adjustment, the adjuster screw on the window mounting in the window regulator must be rotated.

Parallel adjustment of the rear door window to the front door window and to the side window is performed by moving the window in the clamping jaws of the window regulators.

If any windows have not been adjusted correctly, it may result in wind noise, moisture or frozen door windows in winter.



Electric luggage compartment cover

The Audi Q8 can be equipped with an electric luggage compartment cover as an option. In technical terms, the system is the same as the one in the 2017 Q7. However, when the rear lid is opened, the luggage compartment cover moves forward almost horizontally in the luggage compartment side trim rather than being raised into the D-pillar trim. Luggage Compartment Cover Motor 1 V473 is located on the rear cross panel and is activated by Rear Lid Control Module J605. Using a reel and Bowden cables, this moves two actuators forwards or backwards, depending on the direction in which the electric motor is rotating. This opens or closes the luggage compartment cover.

The number of motor revolutions is measured via Luggage Compartment Cover Sensor G758.

To prevent any folds or creases from forming in the cover, it is important for both actuators to run synchronously. It must therefore be ensured that the Bowden cables are routed correctly. In particular, they must not be twisted when they are secured in the double clips. If the actuators are still not positioned in parallel, the Bowden cable can be corrected using the adjuster.

When removing the actuators, it is essential to pull out the securing pins carefully to ensure that the entire drive unit cannot be damaged.



Panoramic sunroof

A two-part panoramic sunroof is optional; the front glass element can be opened electrically or can be tilted open at the rear.

The rear panel is fixed; it is also made of glass and ensures a particularly light-filled and friendly ambiance inside the vehicle.

The power-operated sunroof sun blind is light-proof; it offers 100% protection against the sun and therefore ensures that less heat builds up inside the vehicle.

A total of four water drain hoses make sure that rainwater, for example, which has entered between the glass panel and the sunroof frame is drained off reliably. The hoses are attached directly to ball-shaped couplings on the sunroof frame. At the bottom, the front drain hoses lead to the plenum chamber and the rear ones to the rear wheel housings. When routing the hoses, it is important to make sure that you do not pull on them while connecting them. They must be connected in such a way that they are not stretched; equally, they must not hang down.

To ensure correct installation, the front drain hoses have red markings, while the rear left hose has blue and the rear right hose green markings. The hoses must be secured in their retainers at these markings.



Water drain grommet in plenum chamber

672_012



672_013

Hose retainer



Colored marking

2019 e-tron

(All Parts in Illustration are Restricted)

Overview

The body of the Audi e-tron is a modern composite construction using various materials. In addition to various grades of steel, sheet aluminum is used in the rear part of the underbody and die-cast aluminum is used for the front suspension strut towers.

Outer skin:

- > Side panels.
- > Roof.

are made of steel.

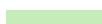





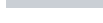
The bumper carriers with crash boxes, the suspension strut cross member and the reinforcement struts between the two front longitudinal members are manufactured from extruded aluminum profiles.

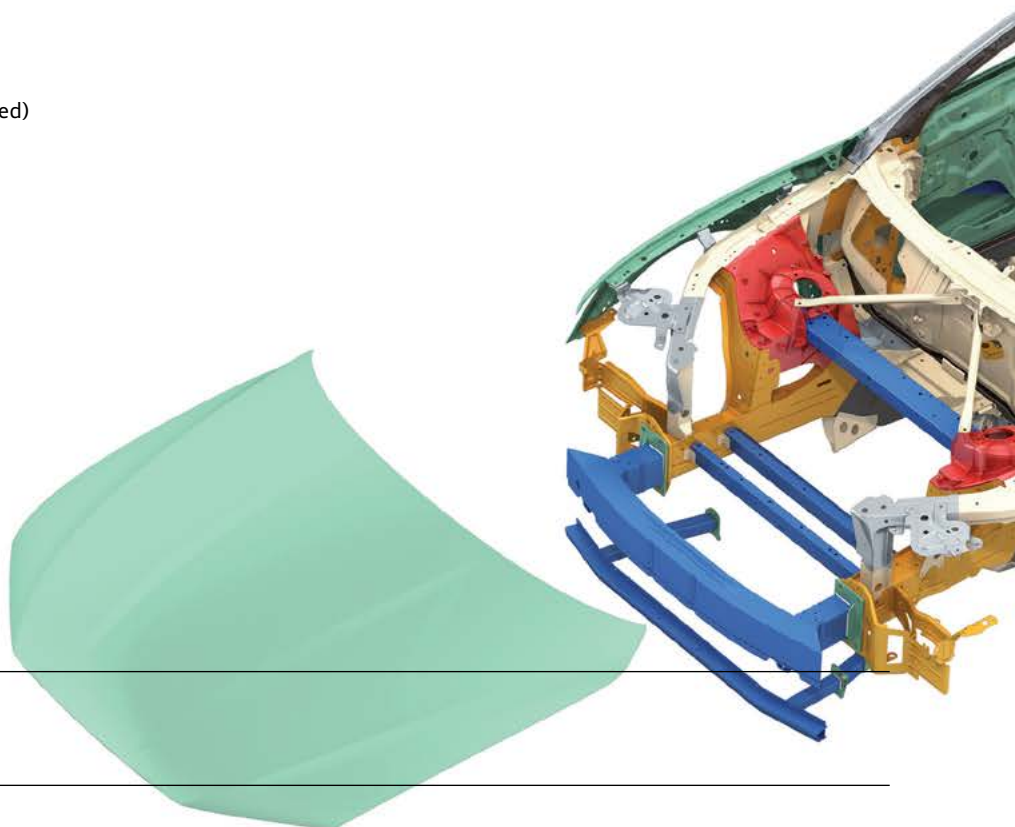
Attachments:

- > Hood.
- > Rear lid.
- > Doors.
- > Fenders.

are made of aluminum.

Key:

	Sheet aluminum
	Die-cast aluminum
	Aluminum section
	Ultra-high-strength steel (hot-formed)
	Modern high-strength steel
	High-strength steel
	Soft steel



No Pulling



Note

Check repair information in ElsaPro for special instructions for:



- De-energization of the High Voltage Battery

- Special Paint Drying, may be required to prevent damage to the High Voltage Battery.

Specialized structural parts are required to properly repair the Audi vehicles in this section; these parts may only be available to Ultra Audi Authorized Repair Facilities.

Audi trained repair technicians use factory-approved procedures for safer repairs.

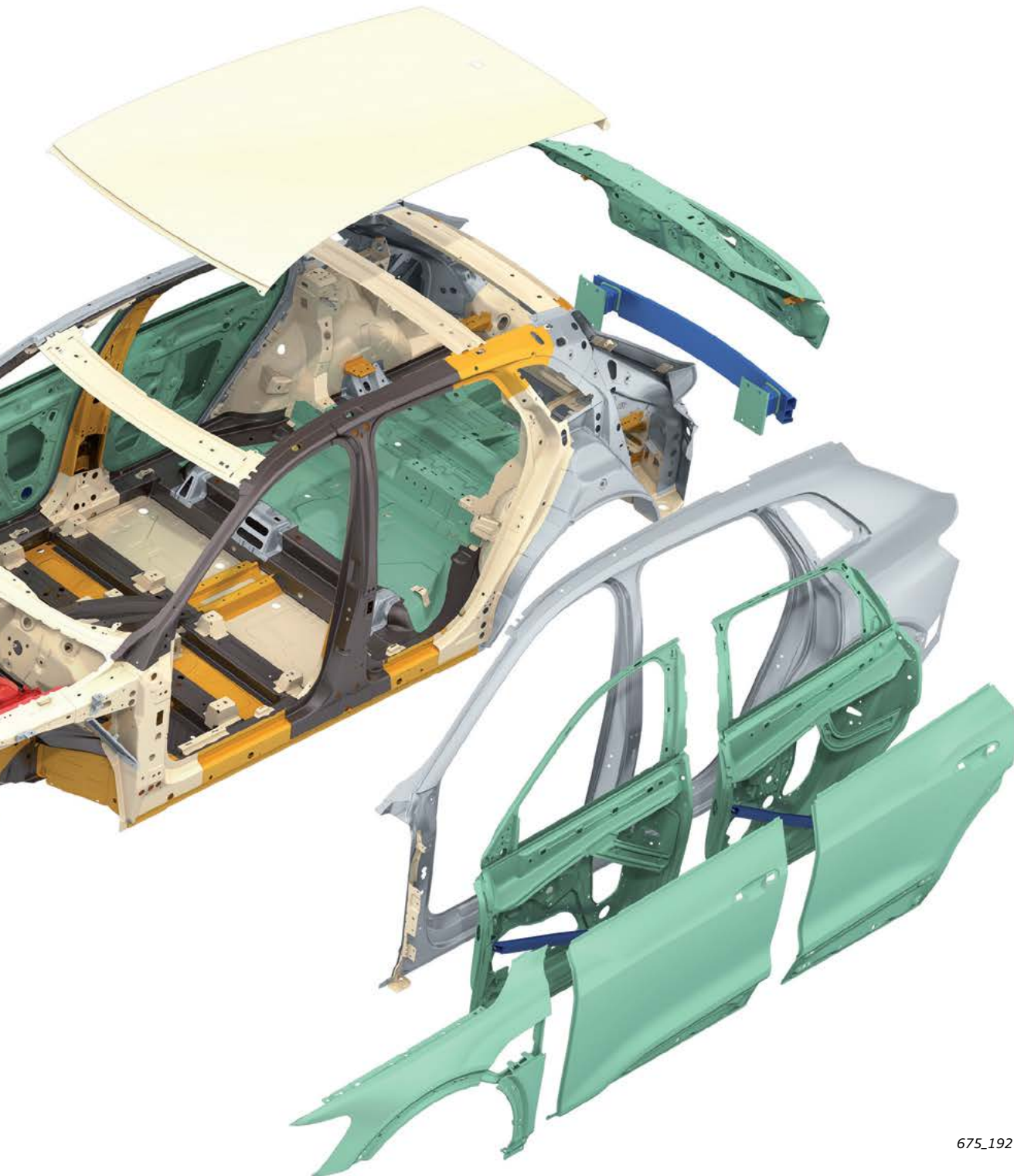
Joining techniques

A number of different joining technologies are used for the vehicle body of the Audi e-tron.

- > Laser welding for steel.
- > MAG welding.
- > Laser soldering/brazing.
- > MIG soldering/brazing for steel.
- > Friction element welding.
- > Resistance spot welding for aluminum.

In addition to classic resistance spot welding for steel, the following technologies are primarily used:

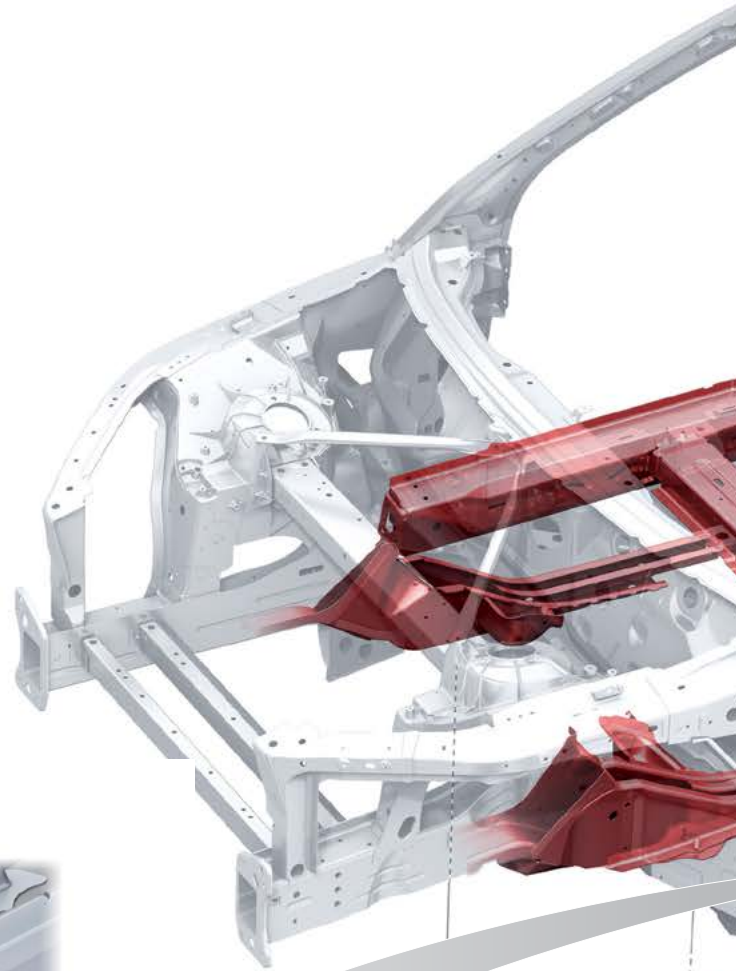
- > Seaming.
- > Bonding.
- > Semi-tubular punch riveting.
- > Flow-drill screws.
- > Pop rivets.



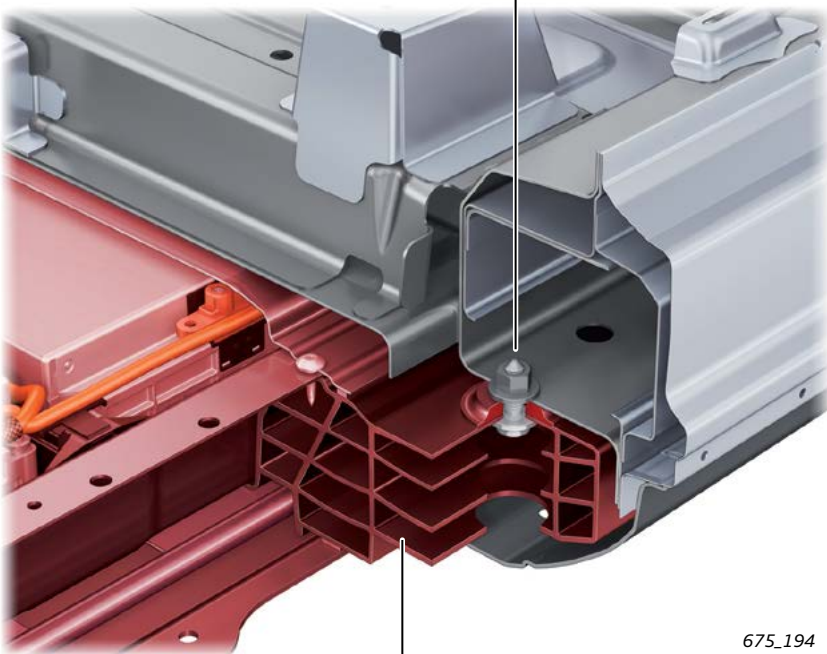
675_192

Underbody structure

One of the innovative features of the Audi e-tron is how the high-voltage battery is fully integrated in the load-bearing structure of the underbody. This requires a high level of precision when installing the battery. The underbody structure of the Audi e-tron (shown in red) consists primarily of ultra-high-strength hot-formed sheet steel parts. It not only provides the body with the necessary rigidity in the event of a side impact collision but also increases its strength, in areas that are critical for safety, such as the high-voltage battery.



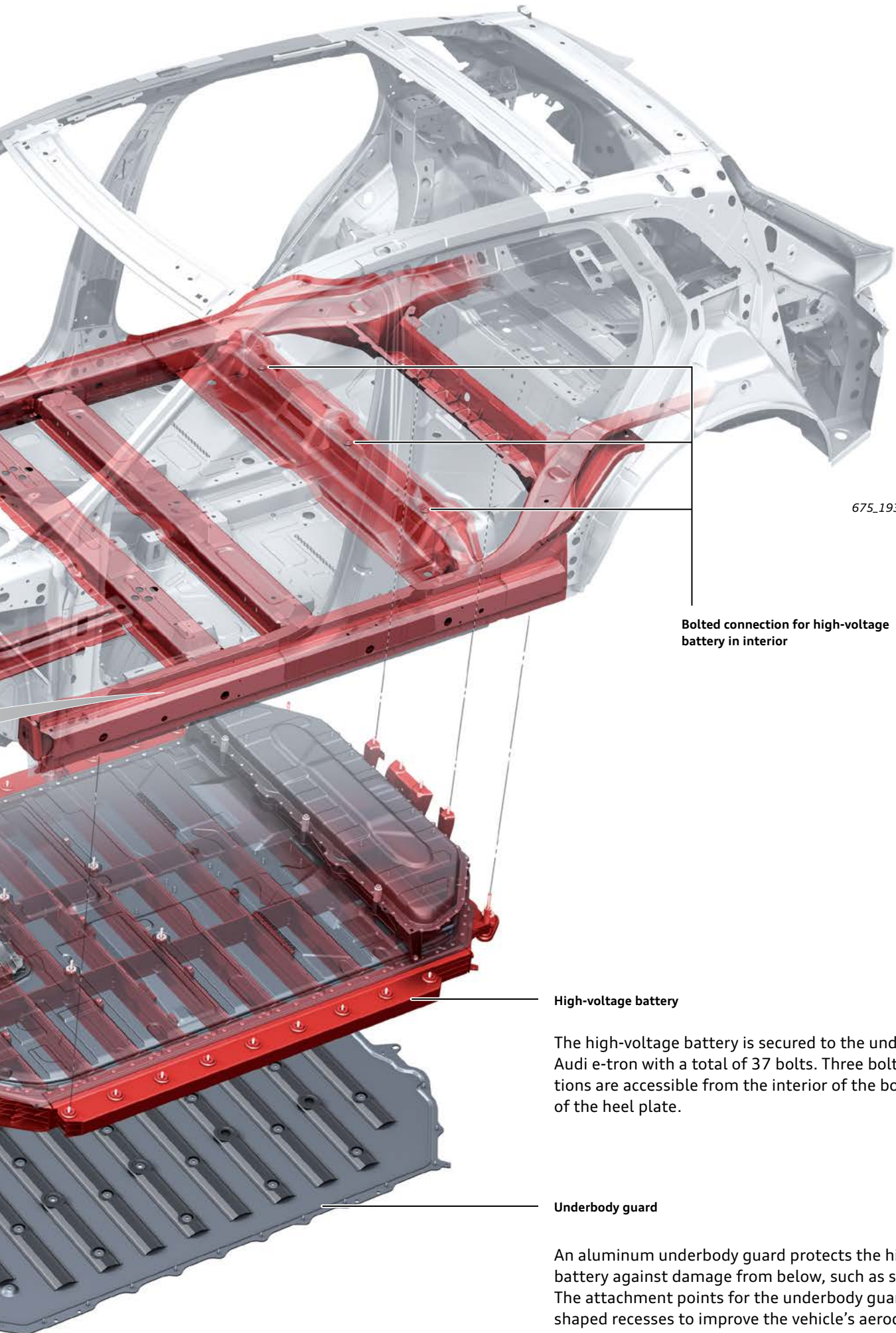
Bolted connection between high-voltage battery and side member/sill panel



Battery frame

675_194

During the development of the high-voltage battery, importance was placed on safe construction of the battery frame. The aluminum construction with a frame consisting of extruded profiles and node castings not only provides the highest possible protection in the event of an accident but also increases the body's torsional rigidity.



675_193

Bolted connection for high-voltage battery in interior

High-voltage battery

The high-voltage battery is secured to the underbody of the Audi e-tron with a total of 37 bolts. Three bolted connections are accessible from the interior of the body in the area of the heel plate.

Underbody guard

An aluminum underbody guard protects the high-voltage battery against damage from below, such as stone chipping. The attachment points for the underbody guard are in dish-shaped recesses to improve the vehicle's aerodynamics.

Body assembly

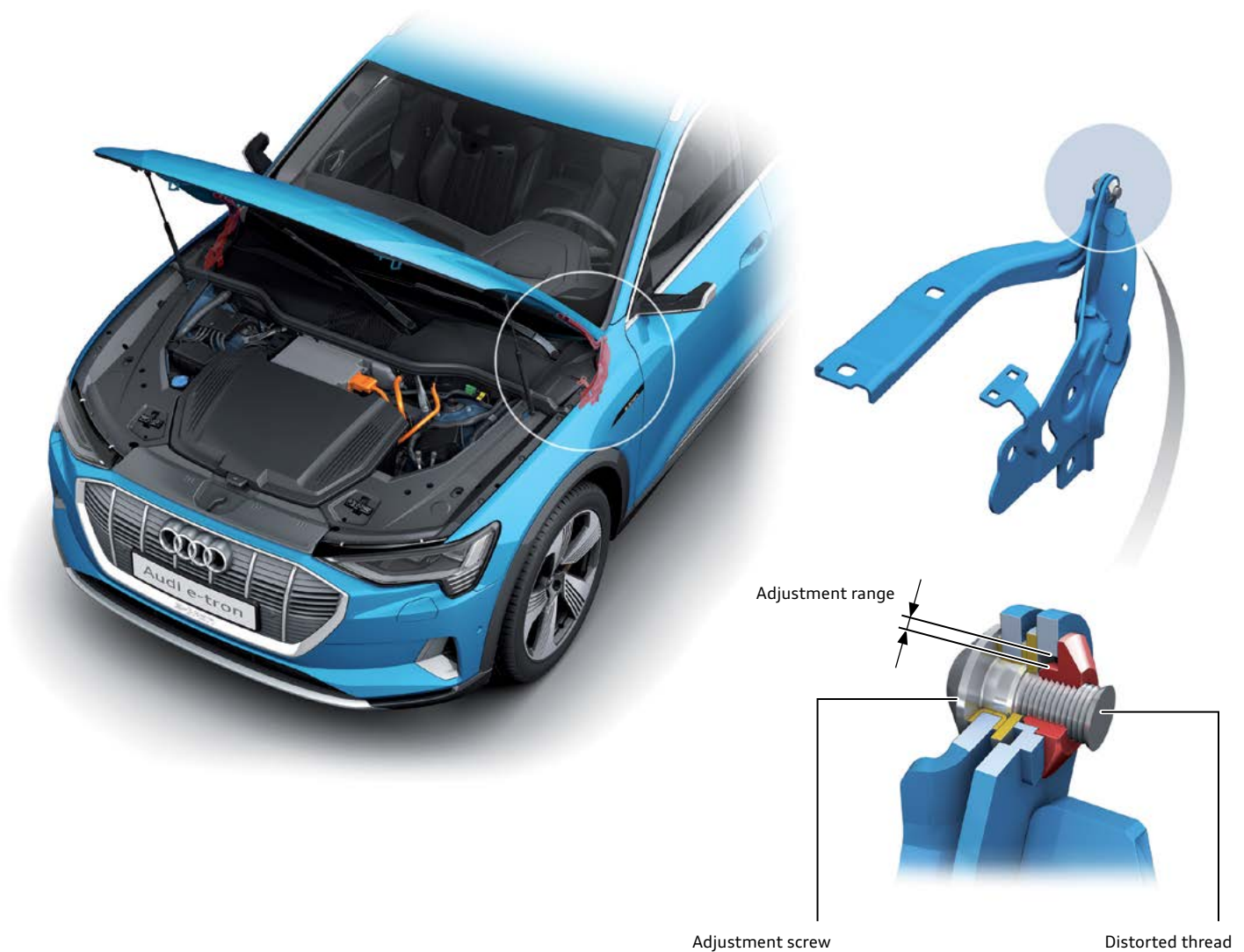
Hood

The Audi e-tron does not have a wrap-around hood. As a result, it was possible to install a simpler hood hinge on these models. On the Audi e-tron, the hinge is secured to the side of the fender mounting flange with three bolts. Elongated holes in the bottom part of the hinge allow the longitudinal positioning (X) and the height (Z) to be adjusted so that the hood can be aligned with the door and the fender. The e-tron, unlike the Q8, has an outward opening hinge with the pivot point under the fender. Because it is hidden under the water deflector strip, no hinge cover is required.

The hood is secured to the top part of the hinge with two studs. The top part of the hinge has elongated holes to enable the longitudinal and lateral positioning (X and Y) to be adjusted.

The axis of the hinge is formed by a bolt. The nut for this bolt has a flange with an outside diameter that is smaller than the inner diameter of the mounting in the bottom part of the hinge. This allows the axis of the hinge to be moved slightly while it is installed, enabling further fine adjustments to be made to the hood in the Z direction while the installed hood is closed.

To ensure the bolt cannot be removed (enabling access to the engine compartment), the thread is distorted after installation.

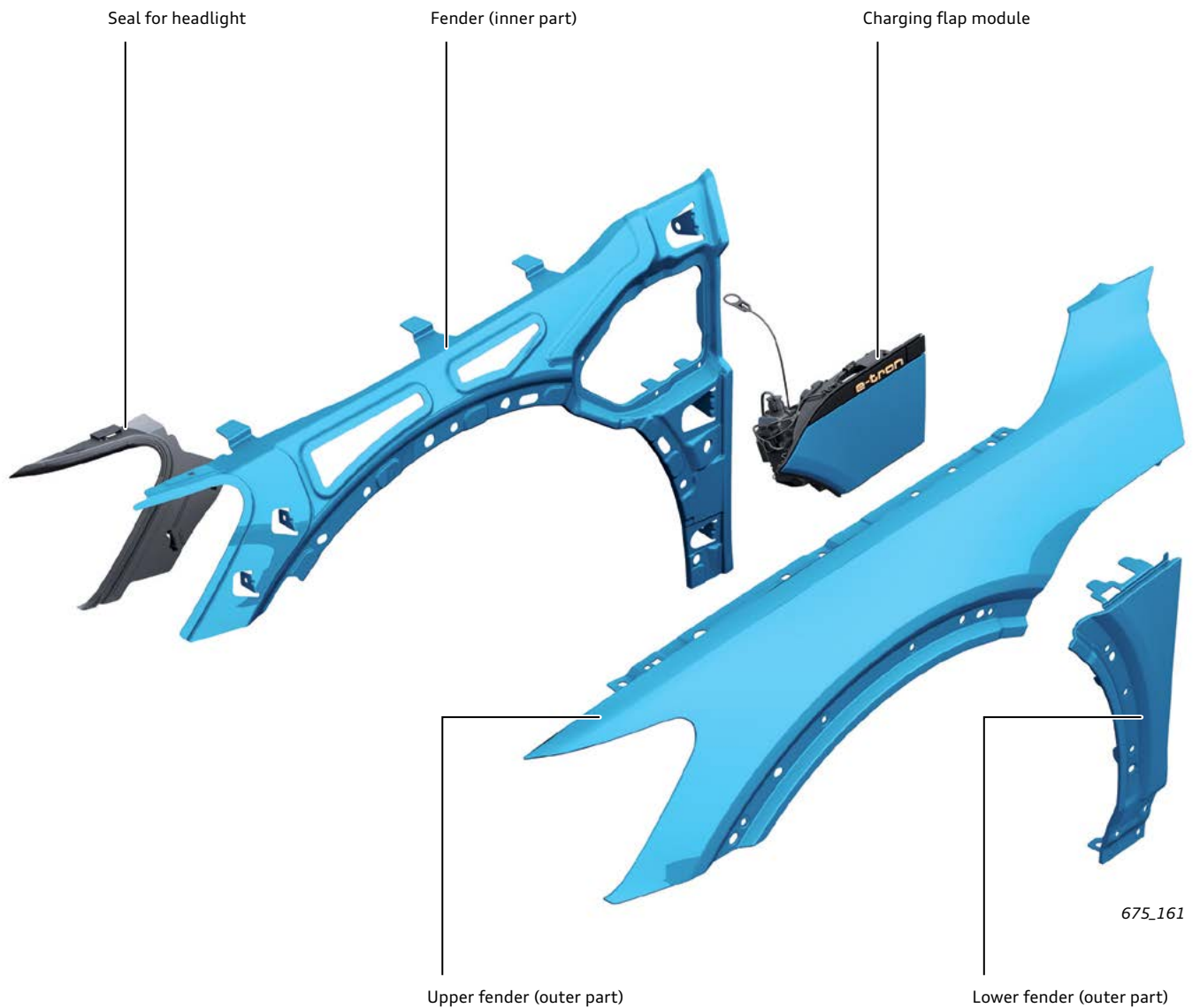


675_160

Fenders

The fenders of the Audi e-tron are made from three parts. Each fender has an upper and lower outer part joined to an inner part that acts as a carrier. These three aluminum parts are seamed, bonded and clinched together. The seal installed at the front acts as a stop for the headlight and seals the point where it meets the fender.

The charging flap module is attached in the space between the upper and lower outer parts. If the vehicle is not equipped with a charging flap on one side, the opening between the upper and lower part of the fender is sealed with a carrier part.



Charging flap module

Depending on the vehicle equipment and country, the Audi e-tron is either equipped with one (on the driver side) or two (on both sides) high-voltage battery charging sockets. They are located in charging flap modules behind the front wheels in the spaces in the fenders. When the vehicle is unlocked, the cover for the charging flap module will move downwards when Battery Charging Button Module EX32 or EX40 is pressed.

This allows access to the charging socket. If the vehicle is equipped with a convenience key, it does not have to be unlocked if the key is in the vicinity of the charging unit. The charging flaps move downwards to save space when they are opened. This ensures that there is enough space to easily plug in and unplug the charging cable.

Depending on the vehicle equipment, a button in Battery Charging Button Module EX32 is also used to unlock the charging connector to allow the charging cable to be unplugged from the vehicle after charging is completed.

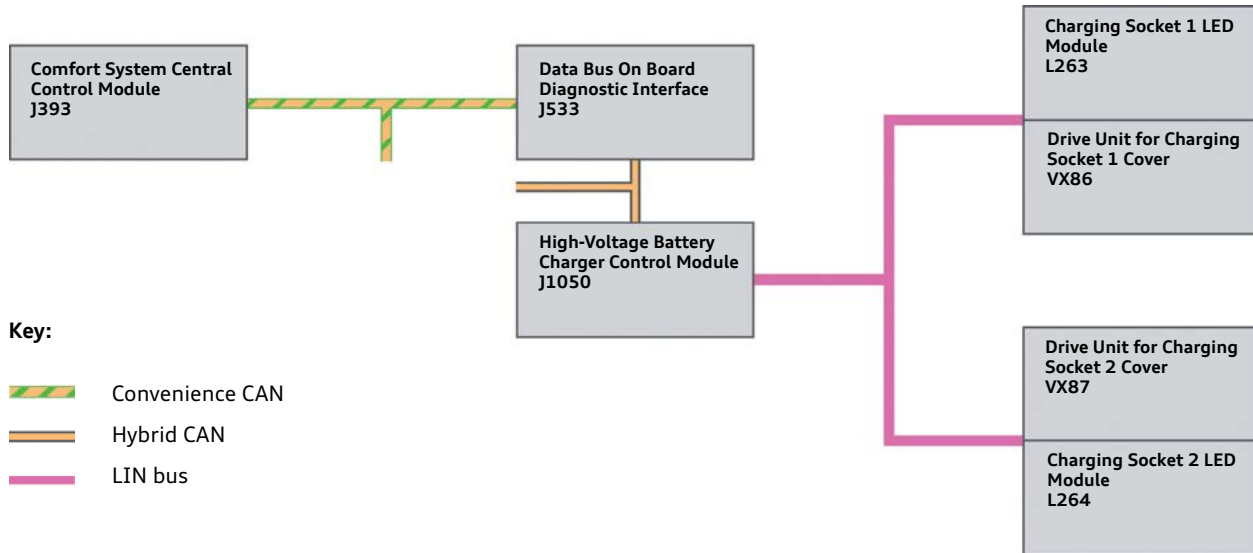
When the charging flap is open, High-Voltage Battery Charger Control Module J1050 actuates a light in the charging flap module via a discrete wire.



Charging flap manual release

The charging indicator is integrated into the charging flap module as an LED module and shows the charging status. A sticker on the inside of the charging flap module explains how different statuses are indicated. As a LIN slave, the charging flap module receives the command to open or close the charging socket cover from its LIN master, High-Voltage Battery Charger Control Module J1050.

In addition, the command for how Charging Socket 1 LED Module should be actuated is also transmitted via LIN. If a second charging flap module is also installed (PR number: JS1), it is connected to High-Voltage Battery Charger Control Module J1050 via the same LIN connection.



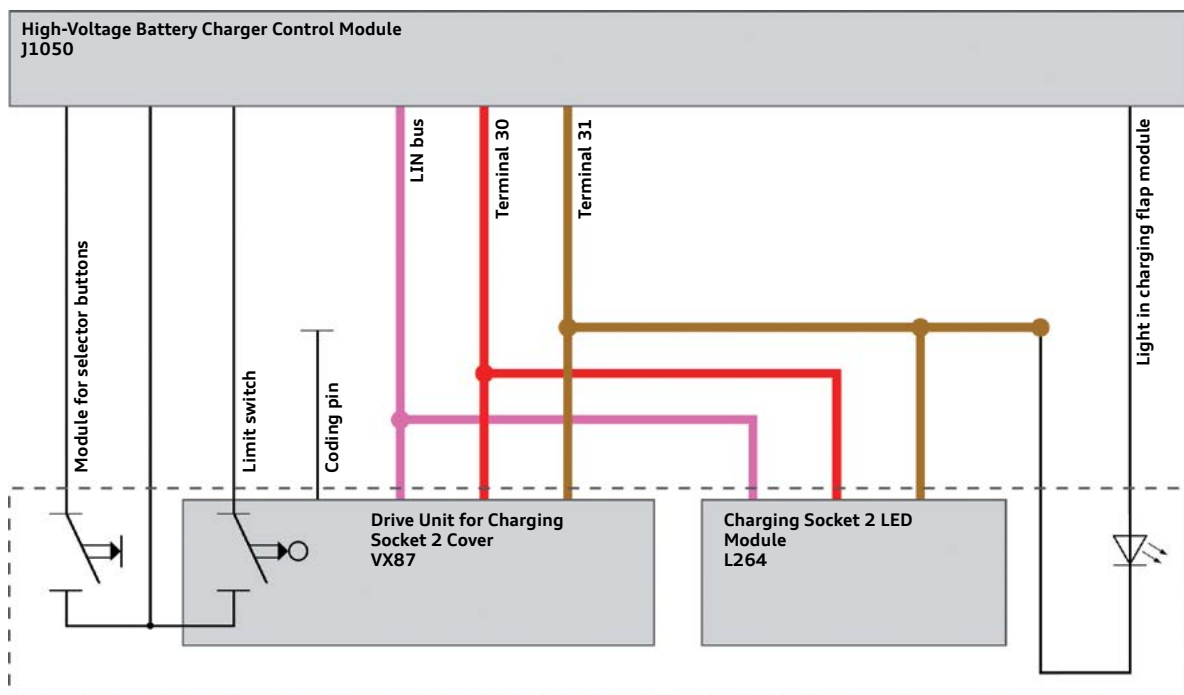
675_074

The drive unit for the charging socket cover is assigned to the side of the vehicle via a ground coding pin. On drive units on the right side of the vehicle, this pin is connected to ground.

The electric motor in the drive unit is self-locking. It was therefore not necessary to include an active locking mechanism for the charging flap.

High-Voltage Battery Charger Control Module J1050 receives feedback on whether the charging flap is closed via a microswitch.

If the drive unit no longer opens the charging flap module electrically, the charging flap can be released manually. The red loop under the cover in the motor compartment on the side of the affected charging connection must be pulled carefully. The charging flap can then be pushed downwards manually.



675_075

Overview of the charging sockets

Depending on the version, the vehicles may have different charging sockets on the driver/passenger side.

High-Voltage Battery Charger 1 AX4 monitors the temperature of the charging sockets via temperature senders. In the event of high temperatures, it gradually reduces the charging current and eventually stops charging. If the temperature is going down, the charging current is gradually increased.

Type 1 High-Voltage Battery Charging Socket 2 UX5

This charging socket can be used to charge the high-voltage battery with alternating current. Communication between the charging station and AX4 takes place via contacts CP and PE.



675_098

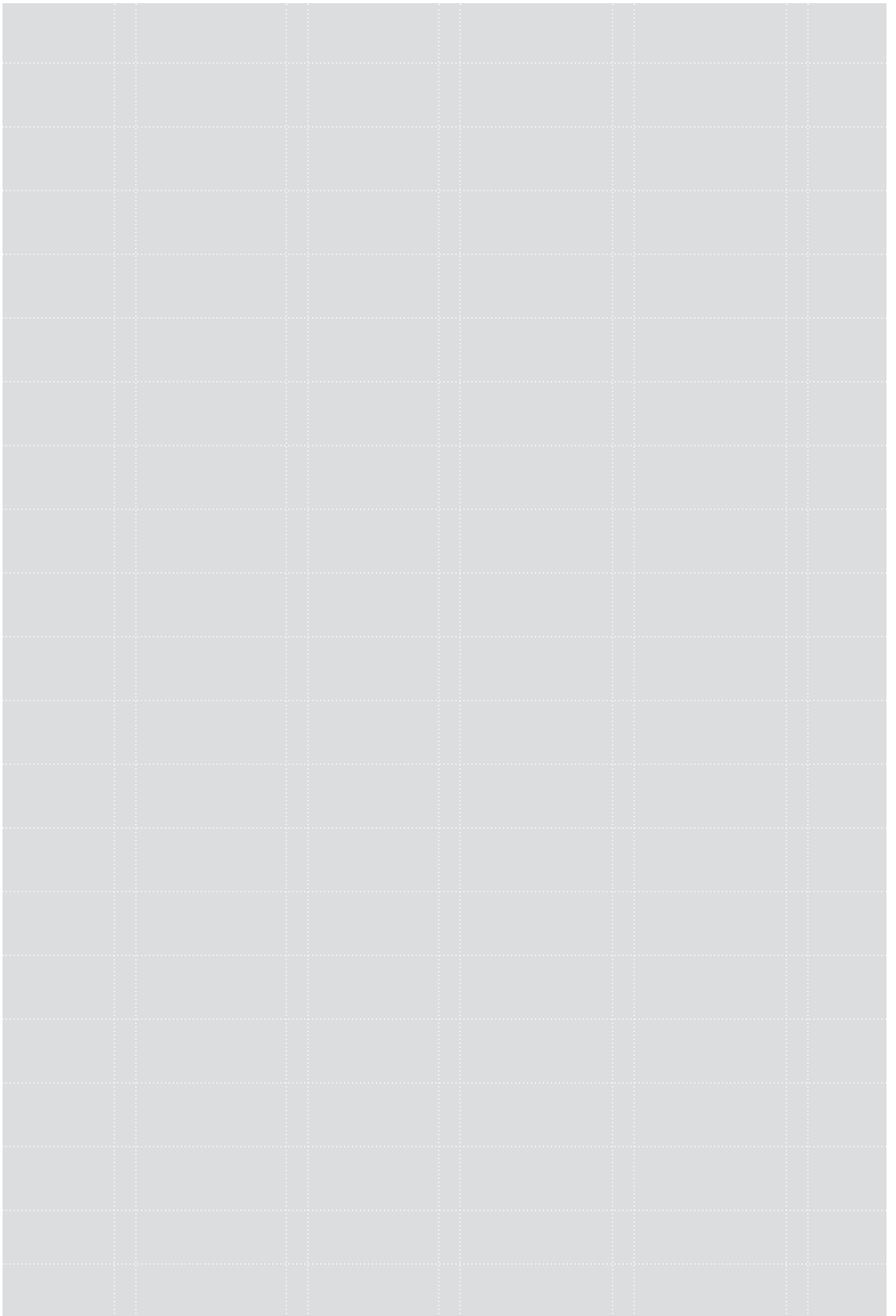
Combined Charging System Type 1 (CCS 1 or Combo 1) High-Voltage Battery Charging Socket 1 UX4

This charging socket can be used to charge the high-voltage battery with alternating current or direct current. The DC contacts are protected by a flap.

Communication between the charging station and AX4 takes place via contacts CP and PE.



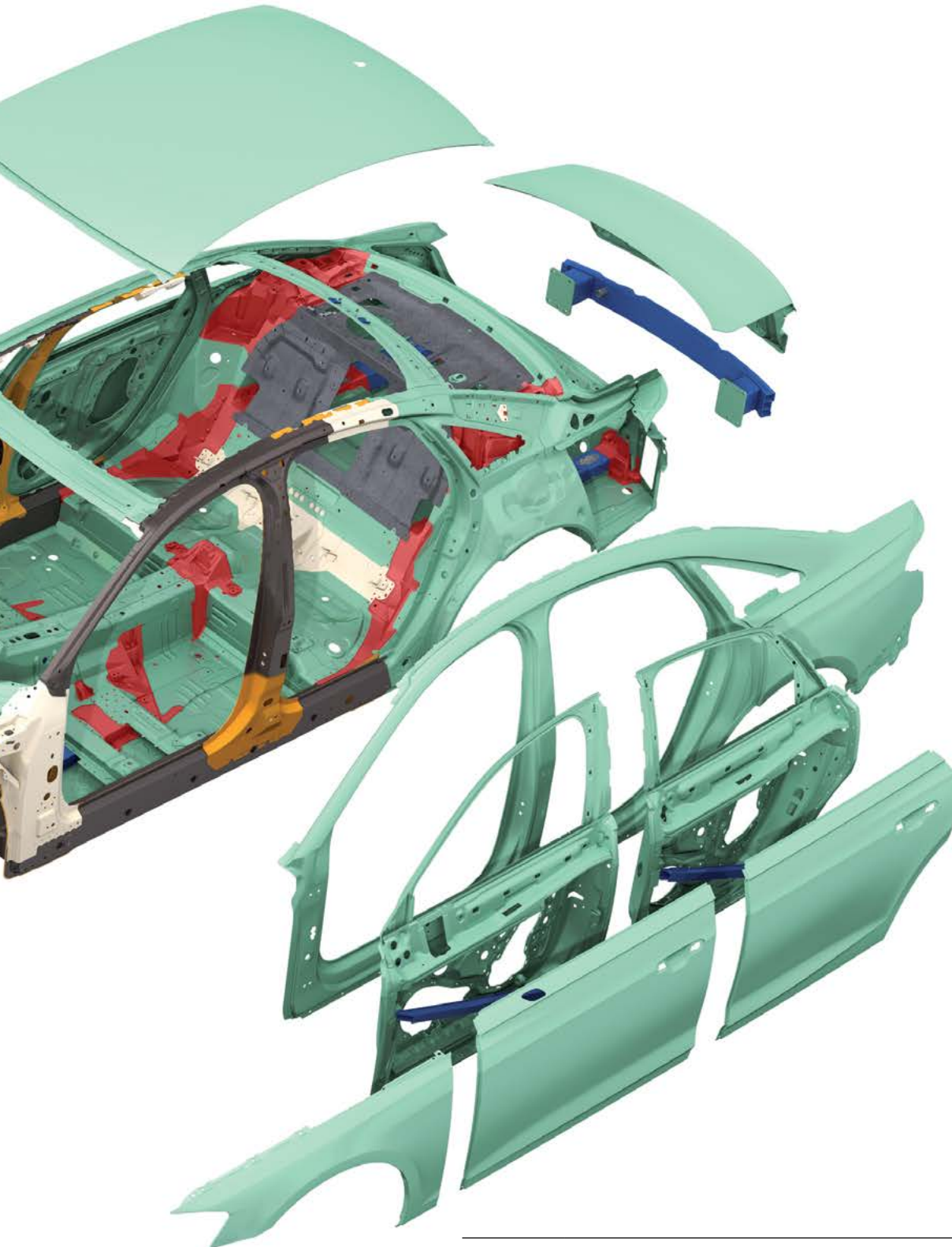
675_099



Joining techniques

The following connection systems are used when assembling the multi-material body:

- > Resistance spot welds on steel.
- > Resistance spot welds on aluminum.
- > MAG welds.
- > Laser welds on aluminum.
- > MIG welds.
- > Friction element welds.
- > Semi-tubular punch rivets.
- > Pop rivets.
- > Flow drill screws.
- > Clinch connections.
- > Seaming.
- > Bonding.



662_192



No Pulling



Note

Carbon fiber materials are restricted to Carbon Certified Ultra Advanced Lightweight Materials Audi Authorized Repair Facilities. Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.

Safety cell

The occupant cell, also called the safety cell, is made of aluminum and conventional hot-formed steel. The cell is comprised of the lower area of the end wall, the side sills, the B-pillars and the front area of the roof arch.

Some of these sheet metal blanks are produced with different thicknesses (tailored blanks) and are also partially tempered where necessary. This reduces the weight and increases the strength in extremely safety-critical areas.

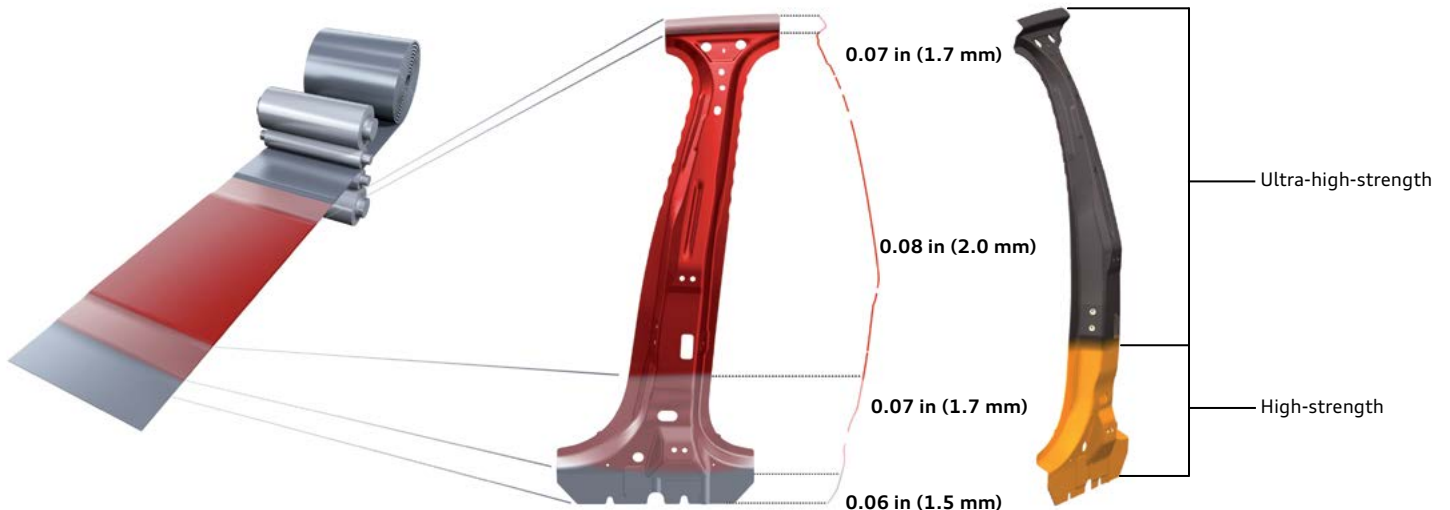


662_193

B-pillars

The B-pillars are specially formed to enhance rigidity and meet crash requirements. They are produced using tailor rolled blank technology. These are flexibly rolled blanks, where variations in sheet-metal thickness are produced by controlled opening and closing of the gap between the rollers. These variations in sheet-metal thickness not only save weight, but also create defined crumple zones which provide protection in the event of a side impact. The sheet metal thicknesses vary between 0.06 and 0.08 in (1.5 and 2.0 mm).

Partial tempering: The individual zones of the B-pillar are cooled in the mold at different rates during hot working, giving them different strength characteristics. During a side impact, the bottom section of the B-pillar deforms in order to absorb energy. However, less deformation takes place in the upper section of the B-pillar (at head height).

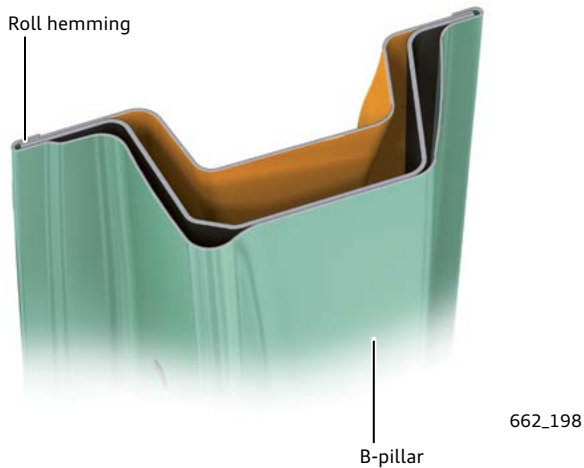


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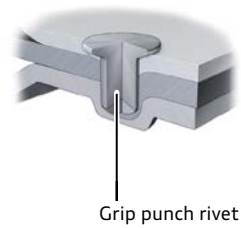
662_195

Roll hemming

Roll hemming is used all around for the entire front and rear door sills. This process increases the door opening area (better ingress and egress for the occupants) and improves the field of vision in the A-pillar area.



Roll hemming is complemented by grip punch riveting which fixes the side wall frame in its position. This is in addition to all around structural bonding. These joining techniques allow the aluminum side wall frame to be mated with the hot-worked, ultra high strength sheet steel of the B-pillar, roof arch and sill with narrow flanges.

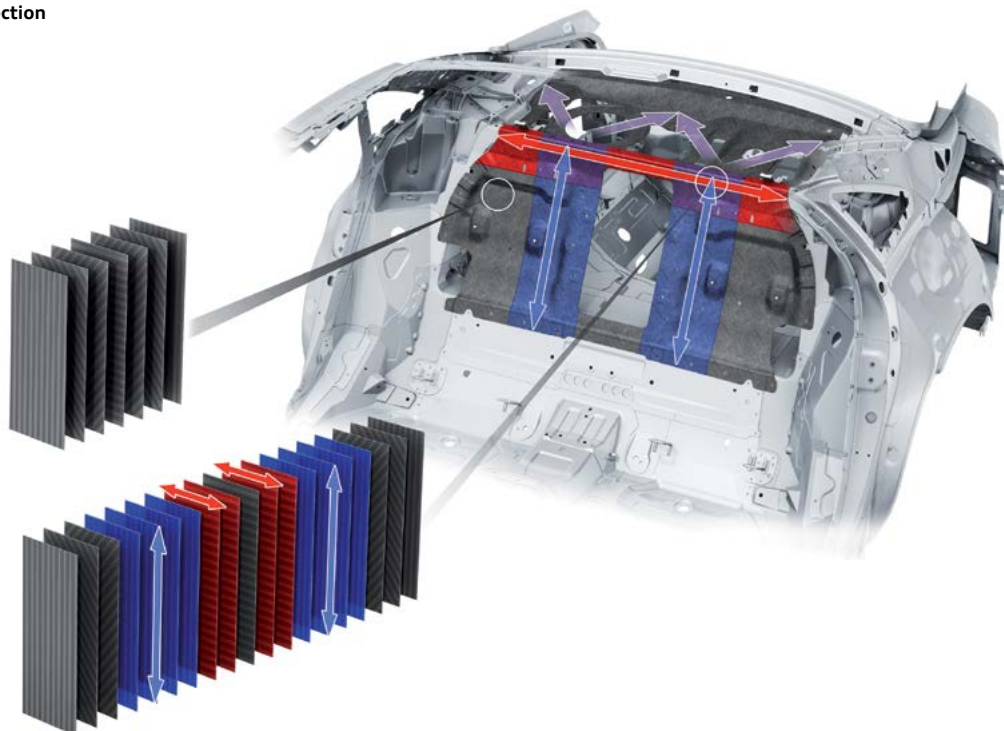


Carbon fiber rear bulkhead

An ultra high strength, torsion-resistant rear bulkhead made of carbon fiber is the largest component of the occupant cell and accounts for 33 per cent of the torsional rigidity of the overall vehicle. To fully absorb the loads in the longitudinal or transverse direction and shear forces, 6 to 19 fiber layers are placed on top of one another for load optimization. These individual fiber layers are composed of 1.96 in (50 mm) wide bands which can be positioned individually at any fiber angle and with a minimum cut to create a finished layer.

The carbon fiber rear bulkhead, which contains all attachment points for components such as the loudspeakers, the rear sunshade, the three-point safety belts and the rear center armrest, is inserted into the body through the rear window cutout during final assembly. It is connected to the body structure using two-component strength adhesive and rivets. The two-component adhesive prevents contact corrosion.

Load application direction



Attachments

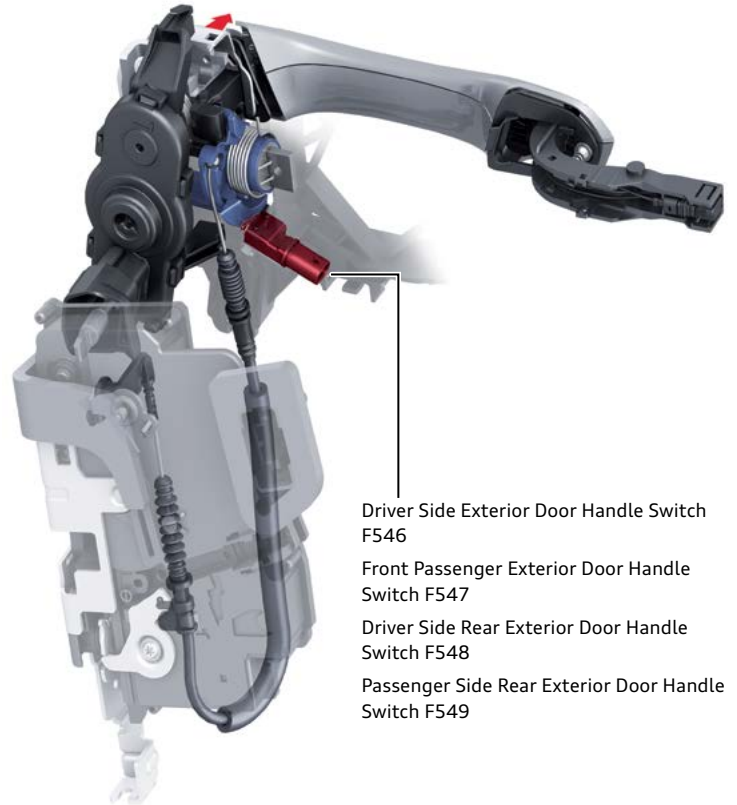
Fully electric door lock

Another new feature of the A8 is the actuation of the door locks. An “e-lock” is used in which an opening signal is transmitted electrically from the door inner handle or door outer handle to the door control module via a microswitch. The door control module in turn controls an electric motor which releases the rotary latch, opening the lock. The microswitch for the door outer handle is located in the support arm. It moves after a few millimeters of pressure on the door handle. The door control module triggers the electric motor in the “e-lock” and the door can be unlocked with very little effort.



662_103

Door handle, support arm and door lock in the rest state.



- Driver Side Exterior Door Handle Switch F546
- Front Passenger Exterior Door Handle Switch F547
- Driver Side Rear Exterior Door Handle Switch F548
- Passenger Side Rear Exterior Door Handle Switch F549

Normal exterior door operation via the microswitch.

662_104

Emergency release mechanism

To open the doors in the event of an electrical malfunction, two Bowden cables are used; one from the interior door handle and one from the exterior door handle.

To open the door from the interior, the interior door handle must be pulled far beyond the normal “e-lock” opening angle.

Opening the door with the exterior door handle can only be done after the lock cylinder or interior door handle have been actuated. The exterior door handle can then be pulled further than the normal actuation angle and with more force.



662_105

Interior door operation via a Bowden cable



662_106

Exterior door operation via a Bowden cable

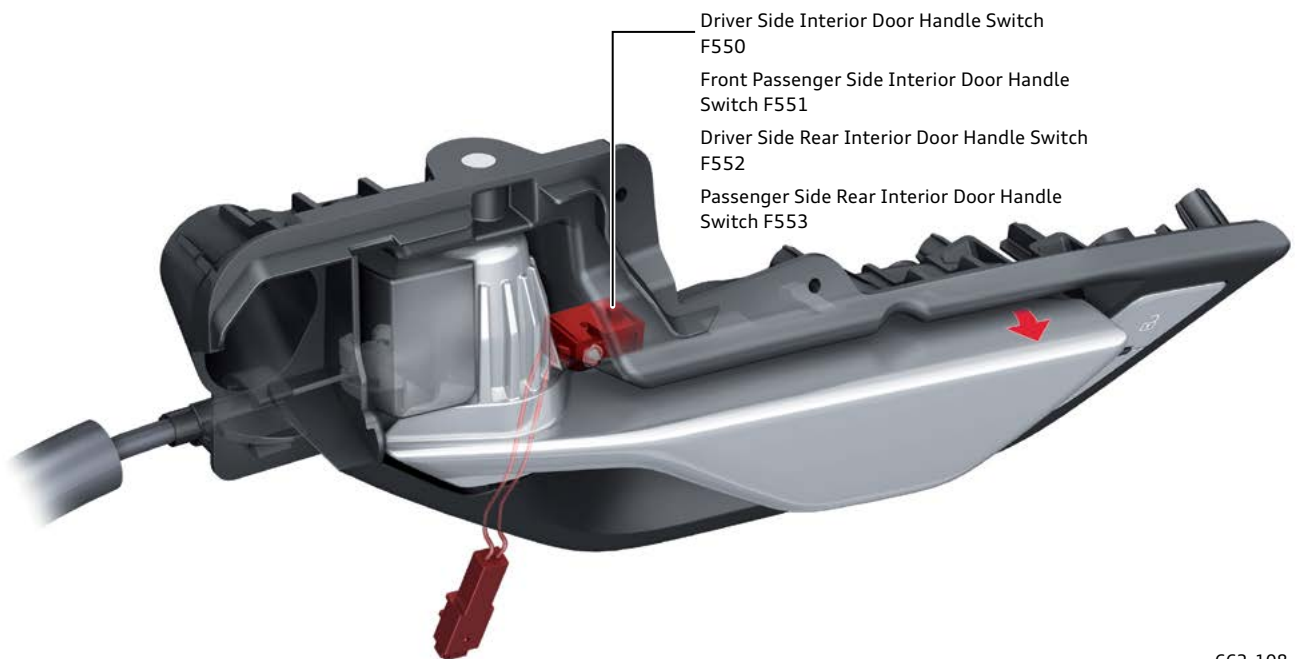
Door opening via the microswitch

The microswitch for opening the door is located in the interior door handle. When the door control module detects the switch being opened, it triggers the servo motor in the door lock.



662_107

Interior door handle in the rest state



Driver Side Interior Door Handle Switch
F550
Front Passenger Side Interior Door Handle
Switch F551
Driver Side Rear Interior Door Handle Switch
F552
Passenger Side Rear Interior Door Handle
Switch F553

662_108

Normal exterior door operation via the microswitch

In certain situations, for example, when another vehicle is detected within the danger zone by the exit warning system, the “e-lock” can delay the opening of the door and issue both a visual and tactile warning for a short period of time.

Power latching

The 2019 A8 can be equipped with an optional power latching system. The drive units for this system are different from previous versions. The Door Closing Aid Motors (V302, V303, V541 and V542) exert a pull via an integrated linear drive which moves the rotary latch in the door lock to the end position.



Note

Before disconnecting the 12 Volt battery, make sure that one door window is open or that the ignition key is not inside the vehicle or in the luggage compartment.



Reference

You can find further information on the electric door lock in eSelf-Study Program [970293, The 2019 Audi A8 Electrics and Electronics](#).

Interior equipment

Instrument panel

The upper trims for the instrument panel can be ordered with various wood inlays that form the wrap-around – the large arc that runs above the door trim panels as far as the rear. This area contains the air vents which are covered by these trims when not in use. When air from the climate control system flows directly into the interior, the shutters glide away upwards electrically while the air outlets move out towards the driver and the front passenger.



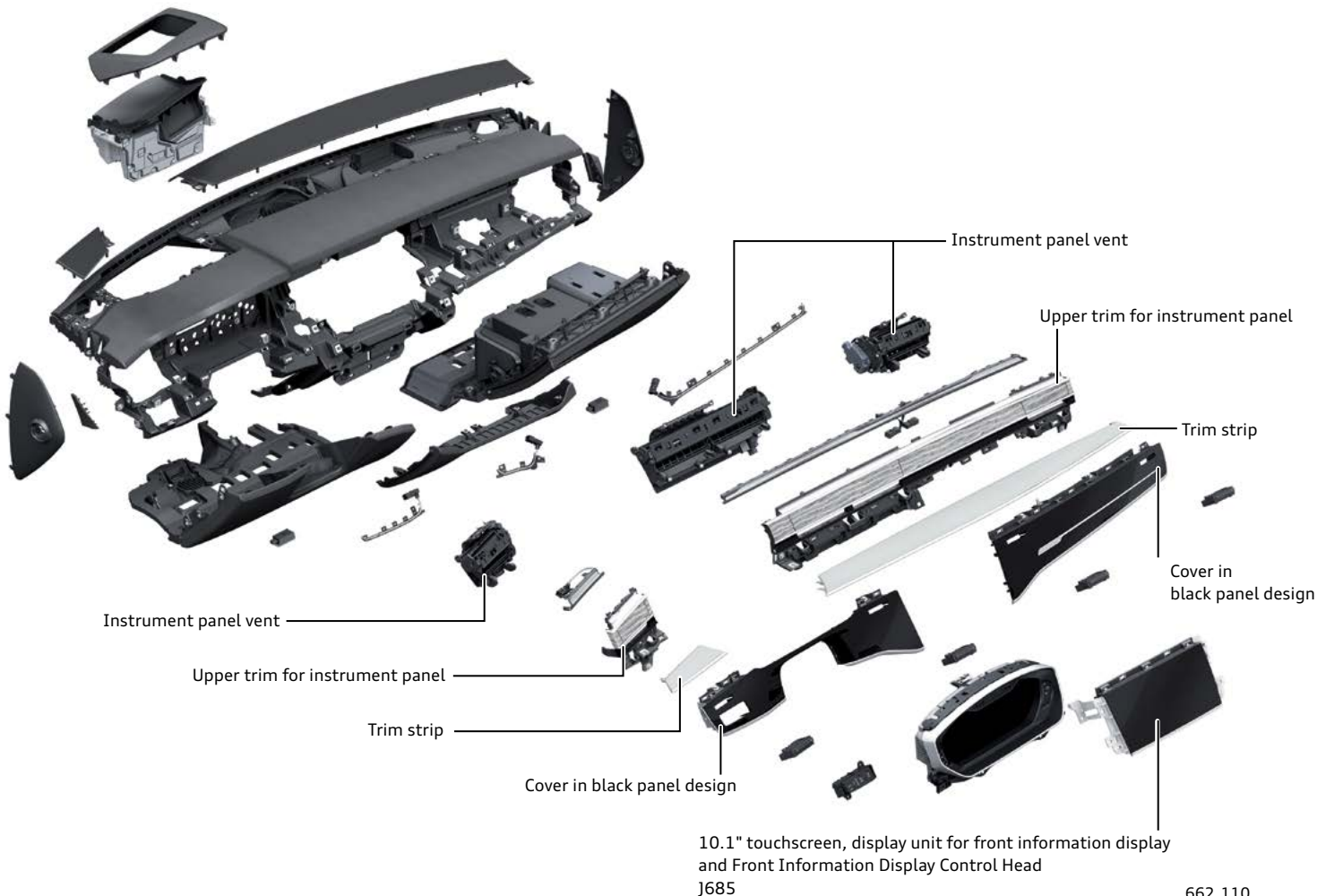
662_109

Design

Situated to the right and left of the central 10.1" touchscreen and around the light switch, covers with the same

black panel appearance as the display create an uninterrupted uniform look.

The transition between this level and the level of the air vents is in turn covered on the right and left by a trim strip.



662_110

Front center console:

The black panel appearance of the instrument panel is continued to the center console. The transition is made through a second, 8.6" touchscreen with an operator control module at the bottom.

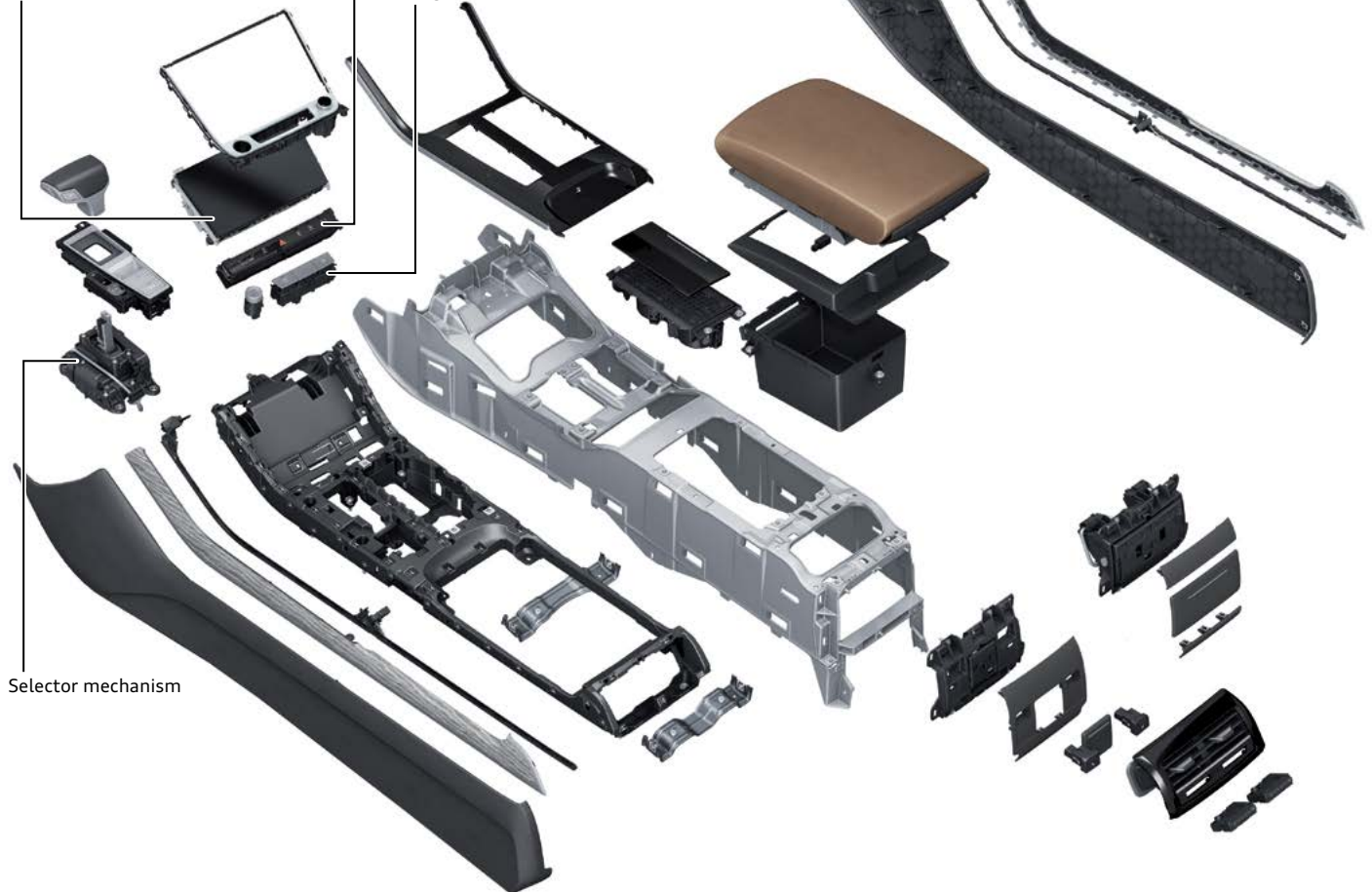


662_111

8.6" touchscreen, display unit 2 for Front Information Display Control Head 2 J1060

Switch Module in Instrument Panel Center EX22

Center Console Switch Module 1 EX23



Selector mechanism

662_112

Rear center console

The standard rear seat configuration of the A8 is a three-seat system. A load-through hatch is also available.

An individual rear seat system without a non-folding, continuous center console is optional. The console can be ordered with USB ports, phone box (with wireless charging) and SD card readers.

Irrespective of whether the long, continuous center console or the folding center armrest is installed in the rear backrest, the A8 can be equipped with the Rear Seat Remote operating concept. The Rear Seat Remote unit with its 5.7" OLED display is similar in size to a smartphone and is housed in the center armrest and can be removed. The Rear Seat Remote can be used to set convenience and infotainment functions in the rear. Another option is heated armrests in the center armrests at the front and rear, and in the doors.

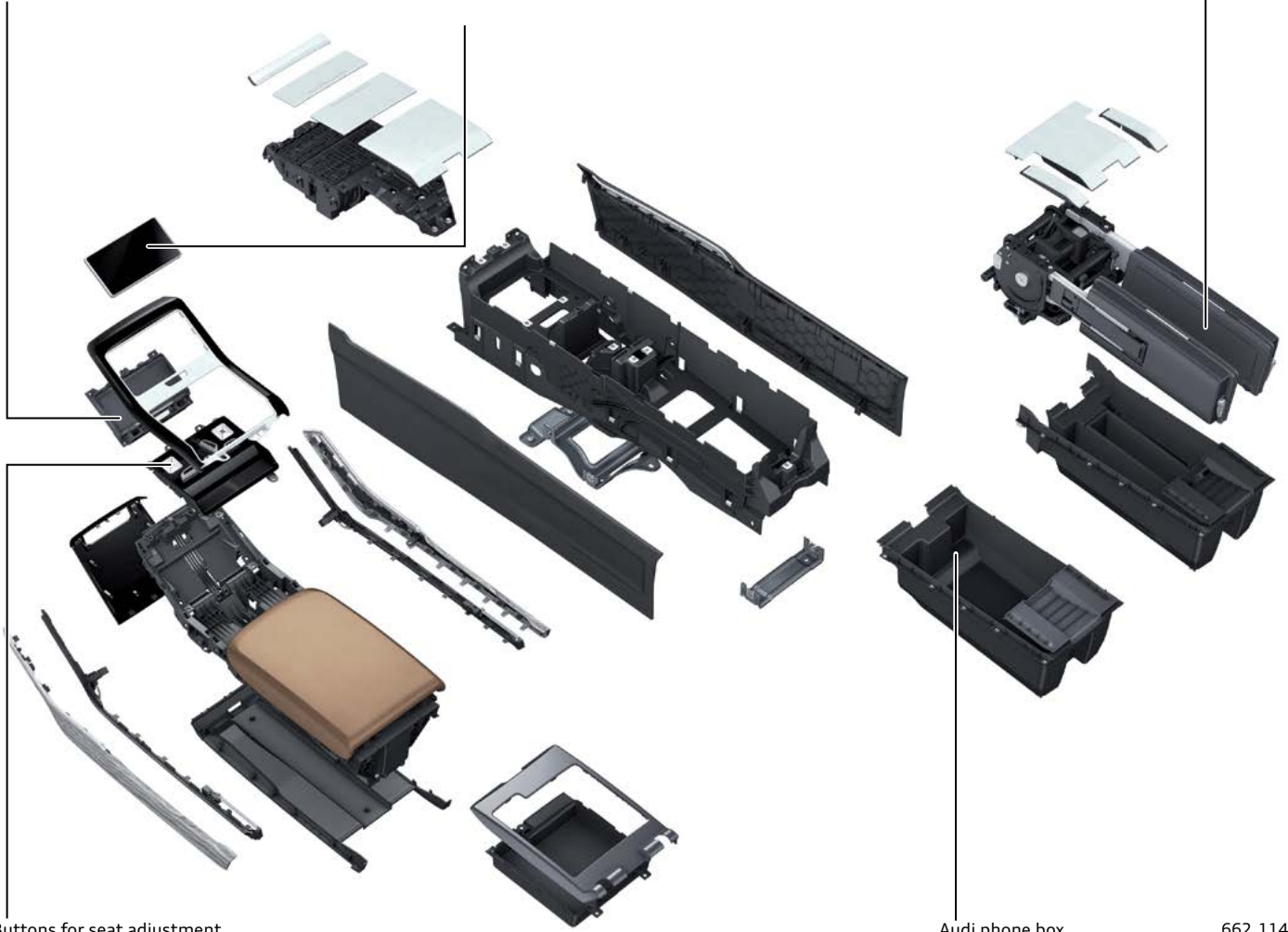


662_113

Mounting and charging cradle for Smart Remote Control

Wireless Control Head 1 E859

Folding tables



Buttons for seat adjustment

Audi phone box

662_114



Reference

You can find further information on the Rear Seat Remote unit in eSelf-Study Programs [990293, The 2019 Audi A8 Infotainment and Audi Connect Systems](#) and [980193, The 2019 Audi A8 Climate Control Systems](#).

Seats

The seats of the 2019 A8 are a new design. The front seats are approximately 8.8 lb (4.0 kg) lighter than in the predecessor model. They are constructed using glass fiber reinforced plastic (GFRP).

Front seats

The front seats are available in several designs. The top version is the comfort individual contour seat (PR no. Q2J). In addition to pneumatic seat and backrest bolster adjustment, it also features optional heating and ventilation, each separately controllable in three stages. The optional massage functions have also been extended.

Every backrest contains 16 small bubble-shaped air pockets. They massage the entire back. For this purpose, there is a choice of seven programs and three levels of intensity. A small compressor for each seat delivers up to 7.25 psi (0.5 bar) pressure.

Individual contour seat (PR no. Q2J)



662_116

Rear seat

With the rear three seat system, the outer seats can be heated as an option. The longitudinal position and the seat and backrest angle can also be adjusted electrically. The lumbar support can then be adjusted pneumatically.

If desired, a massage function is also available with 18 triple air pockets per seat. The individual seat system features the same adjustment options as those in the rear three seat system.

Reclining seat

Reclining rear seats are optional on the 2019 A8 in the Executive package. The rear passengers can move a seat to a reclined position and place their feet on an electrically folding area on the backrest of the special passenger seat. If required, the feet are warmed and massaged there in several stages. Three intensities, two programs and three foot sizes are available.

The entire foot reflex zones are also stimulated. The rear passengers can lean their head on the soft comfort head restraints in the new Kokon leather version whose height here can be adjusted electrically. The reclining seat package features the comfort individual contour seats with ventilation and massage, the long center console with a double folding table, the Rear Seat Remote operating unit, rear seat entertainment and four-zone deluxe climate control.



662_117

Foot massage

Rear Seat Remote

Massage,
back area

Massage,
shoulder area

Roof

Panoramic sunroof

The A8 has a two-piece glass roof. The front glass panel is movable while the rear glass panel is fixed. Since drainage is possible via the front windshield and rear window, no drain hoses are fitted here. A glass cover is securely mounted in front of the movable panel.



662_119

2017 R8

(All Parts in Illustration are Restricted)

Overview

The 2017 Audi R8 is based on the Modular Sportscar System (MSS). The MSS provides the body with high stability combined with low weight and represents an entirely new multi-material lightweight design concept.

This iteration of the Audi Space Frame (ASF) is very light and stiff. It offers occupants a high level of acoustic comfort and safety. The front end, roof frame and rear have a lattice design consisting of aluminum castings and extruded aluminum profiles. They are tailored specifically for their place and purpose.





In the event of a collision, the forces exerted on the side member structures are directed downwards and dissipated. For energy dissipation purposes, the side members should deform in a controlled manner and optimally transmit the residual energy to the next component.

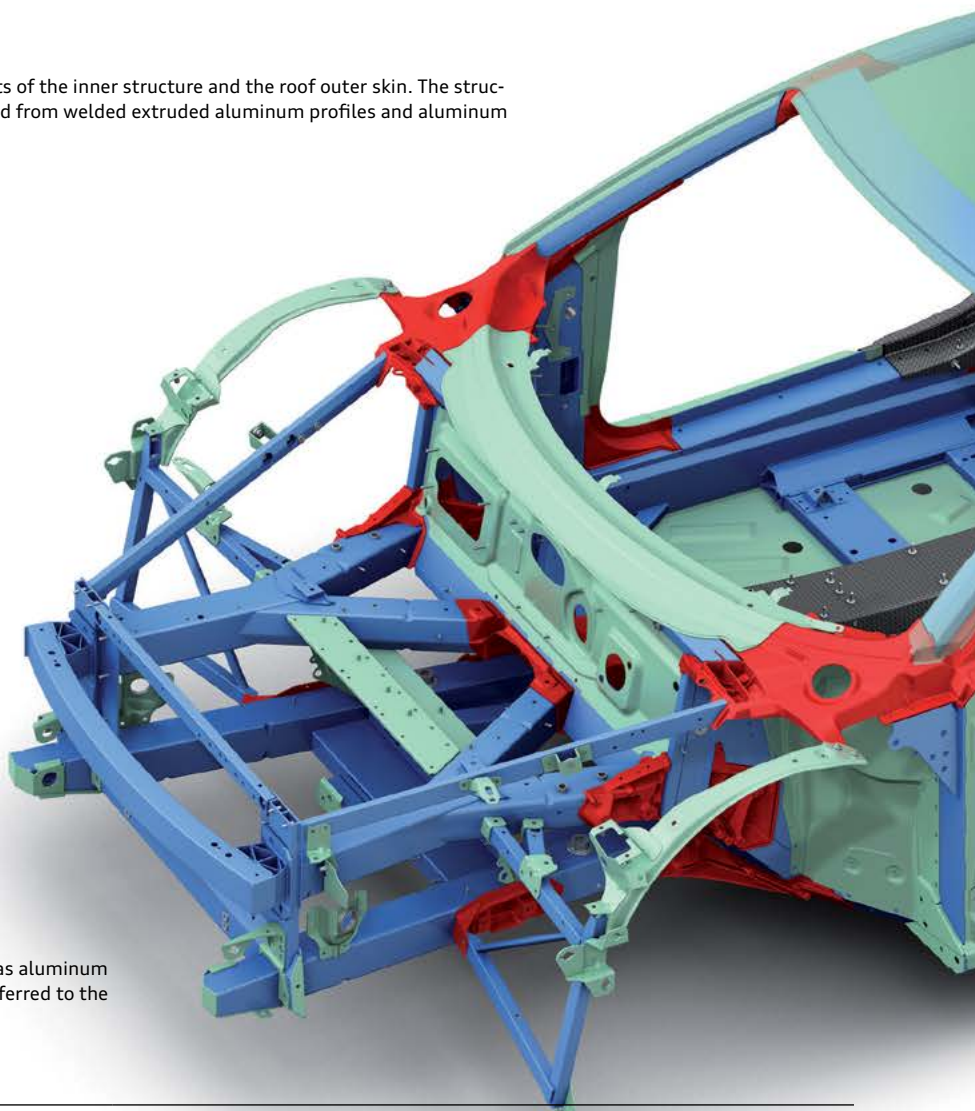
When repairing this body, it is important to keep these defined deformation zones intact and to not disrupt the transfer of forces. To help ensure that this is the case after repair work, the depth of allowable repair and repair methods are defined in detail in the current repair literature.

Body

The body consists of the inner structure and the roof outer skin. The structure is assembled from welded extruded aluminum profiles and aluminum castings.

Key:

-  Sheet aluminum
-  Die-cast aluminum
-  Aluminum profile
-  Carbon fiber reinforced polymer (CFRP)



Front end

The front end is made from extruded aluminum profiles and has aluminum castings for force absorption at the points where force is transferred to the vehicle interior.



No Pulling



Note

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.



Note

Carbon fiber materials are restricted to Carbon Certified Ultra Advanced Lightweight Materials Audi Authorized Repair Facilities.

Specialized structural parts are required to properly repair the Audi vehicles in this section; these parts may only be available to "Ultra" Audi Authorized Collision Repair Facilities.

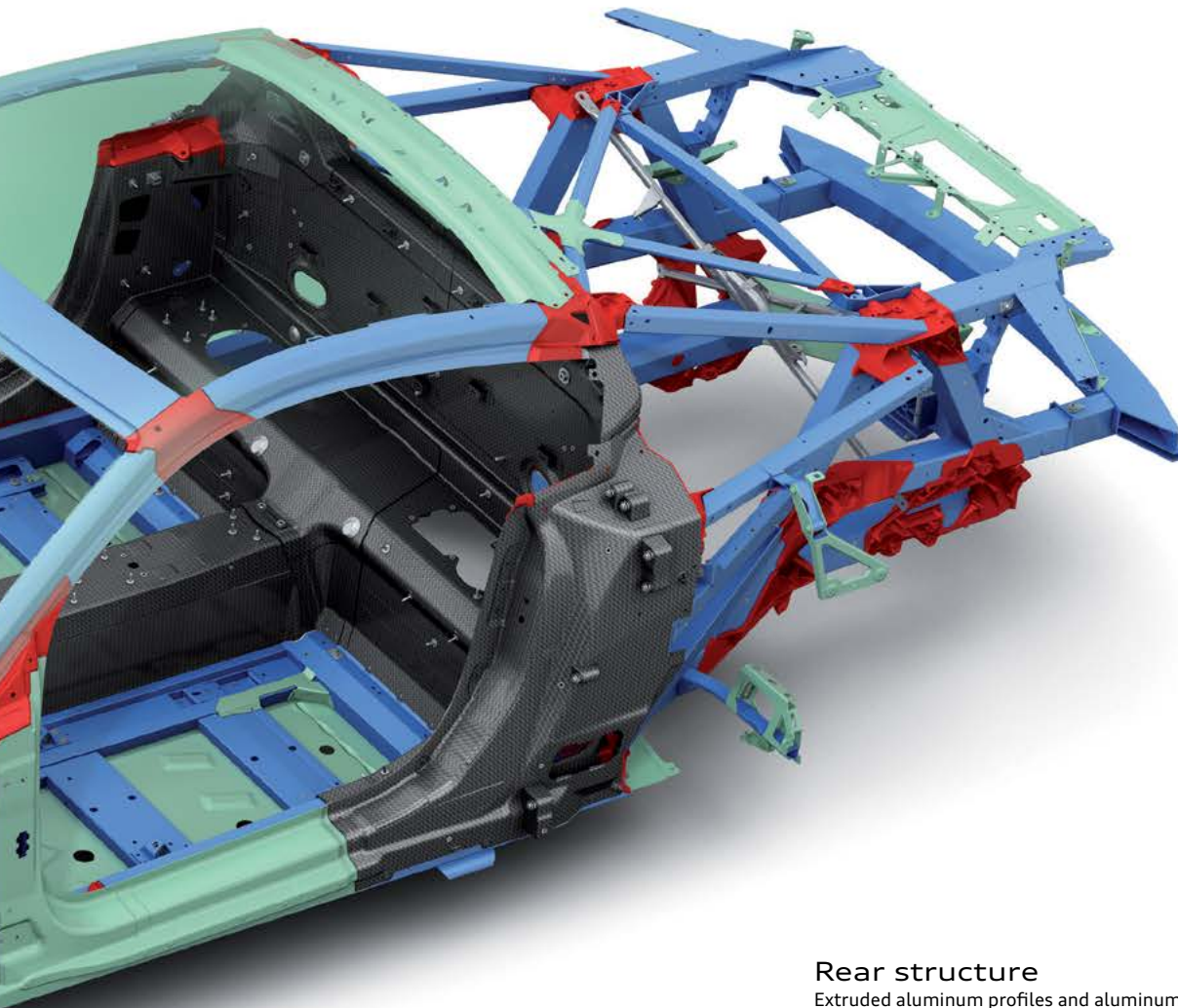
Carbon fiber reinforced polymer (CFRP)

Carbon fiber reinforced polymer (CFRP) is a modern and attractive composite material which fits in very well with the Audi lightweight design strategy. The material-specific advantages of CFRP are significant, particularly its weight to rigidity and strength ratios. The first generation of the R8 incorporated many large and small non-structural CFRP components that were attached to the aluminum structure, such as the side walls and the convertible top box lid of the R8 Spyder.

With the 2017 R8, Audi is using CFRP components made using the efficient RTM (Resin Transfer Molding) process for the first time.

In this process, the dry fiber rovings (twisted strands) are first shaped and then inserted into heated molds where an epoxy resin is injected under high pressure after closing the press. The fabric is completely saturated and hardened under pressure and controlled temperature.

Carbon fiber reinforced polymer is not only about 20% lighter than aluminum and 60% lighter than steel – but also gives designers the freedom to custom-design components to meet a variety of requirements.



641_110

Rear structure

Extruded aluminum profiles and aluminum castings form the rear. The suspension mounts are integrated in the castings.

Center floor pan

The center floor pan is composed of the tunnel side members, the seat cross members and the floor panels. It is subsequently enclosed by the CFRP tunnel.



No Pulling



Note

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Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.

Production of the R8 body

Due to the different temperature characteristics of aluminum and CFRP, the R8 body is manufactured in two stages.

Stage 1

Bodyshop 1 and the paint shop carry out the preliminary work on the bodyshell.

First, the ASF structure is completed. The front end, center floorpan, rear and body are assembled and prepared for painting as a complete body with attachments. After this, the bodyshell passes through a dip bath in the paint shop. This process is referred to as "cataphoretic dip coating" (CDC) and protects the body against corrosion. Before the body can be painted the CFRP adhesive surfaces must be masked. The coated and masked body is now painted and dried and hardened at a temperature of over 392 °F (200 °C).

Because the CFRP components are only able to withstand temperatures of up to about 248 °F (120 °C) due to the epoxy resin, they are assembled subsequently. Another reason for taking this approach is that aluminum and CFRP have different coefficients of thermal expansion.

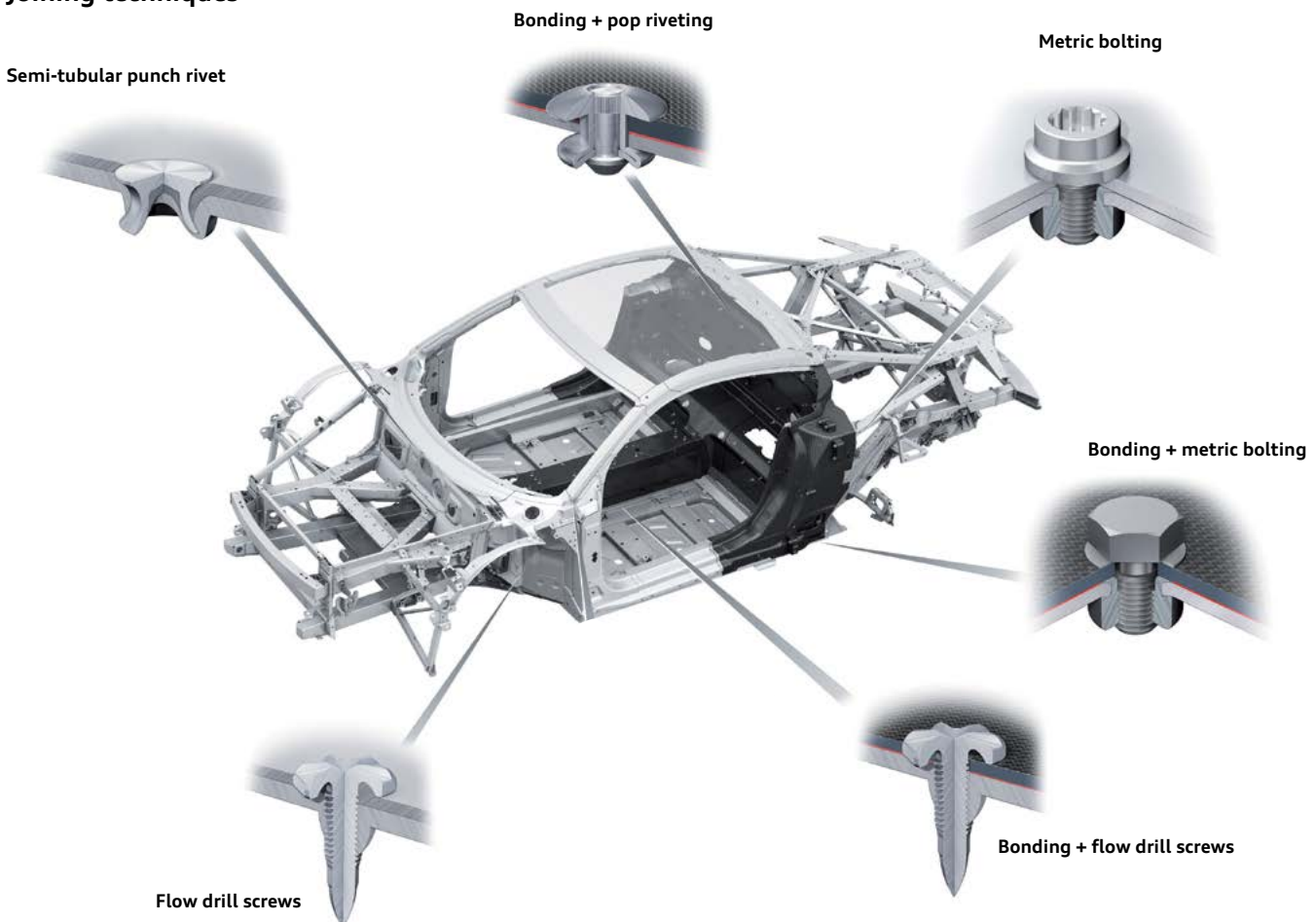
Stage 2

In Bodyshop 2 the bodyshell is completed together with the CFRP components.

Stage 1 is followed by manual removal of the painted attachments and demasking of the surfaces. Accessibility for subsequent process steps is improved by removing the attachments (doors, rear hatch and body side sections). After cleaning the adhesive surfaces, the CFRP components are installed on the painted body and integrated into the structure using bonding, bolting and riveting methods.

A further process step after joining and placement of the rivet elements is the sealing of the CFRP structural components. Edges, rivets and rivet nuts are sealed with polyurethane (PU) to prevent the ingress of liquid and moisture into the joined components. After this, the body is stored for 6 hours at room temperature before being hardened in an oven at 176 °F (80 °C) for about 45 minutes.

Joining techniques



641_111



No Pulling



Note

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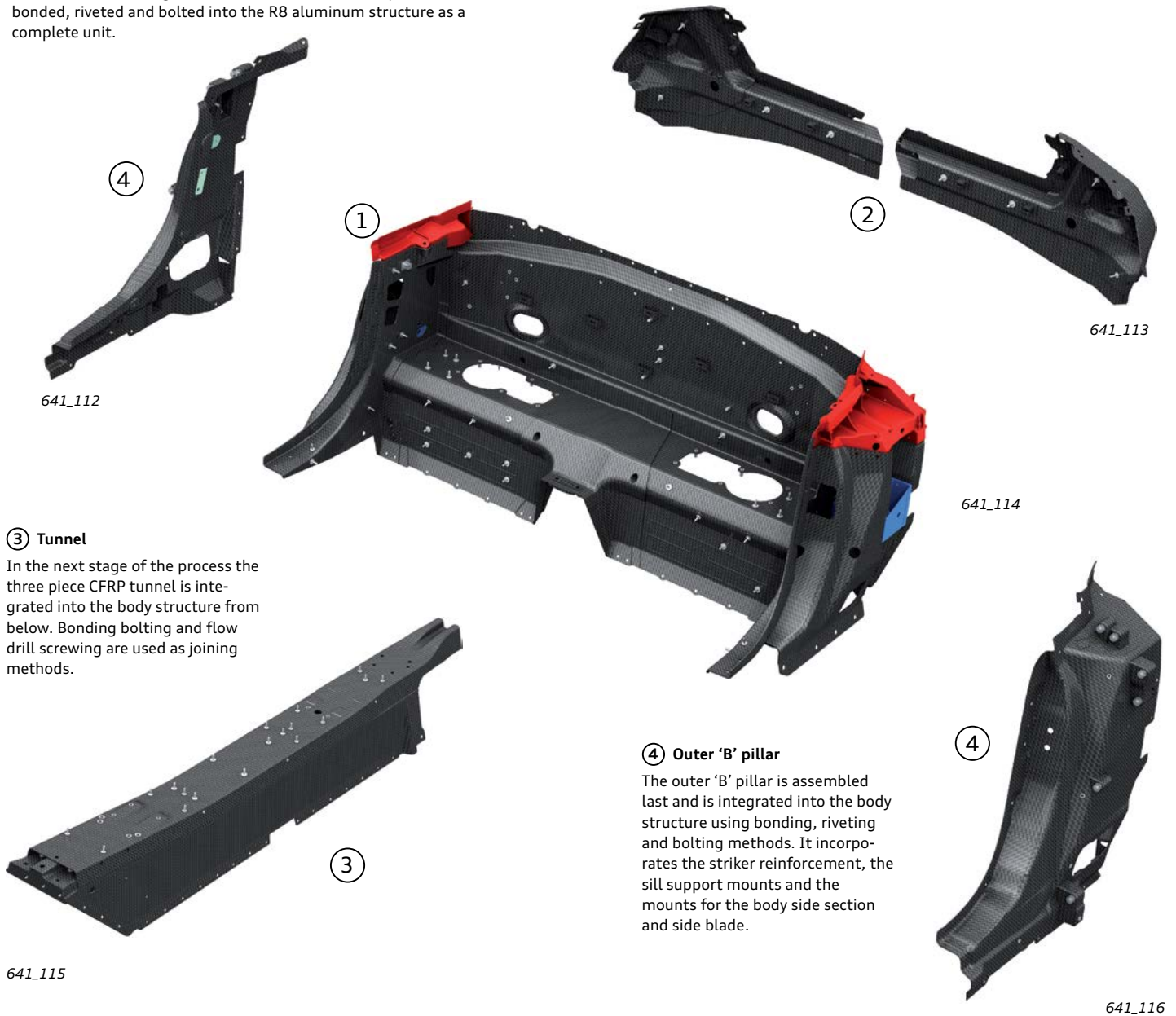
CFRP components

① Rear bulkhead

The complex rear bulkhead is assembled from 17 CFRP components, two aluminum castings and two extruded aluminum profiles. It is bonded, riveted and bolted into the R8 aluminum structure as a complete unit.

② Upper 'B' pillar

The CFRP upper 'B' pillars are bonded and riveted to the rear bulkhead providing additional support.



③ Tunnel

In the next stage of the process the three piece CFRP tunnel is integrated into the body structure from below. Bonding bolting and flow drill screwing are used as joining methods.

④ Outer 'B' pillar

The outer 'B' pillar is assembled last and is integrated into the body structure using bonding, riveting and bolting methods. It incorporates the striker reinforcement, the sill support mounts and the mounts for the body side section and side blade.

641_115

641_116

Stage 1

Stage 2

Bodyshop 1

CDC/paint

Bodyshop 2



Note

Consult Repair Information Carbon fiber materials are restricted to Carbon Certified Ultra Advanced Lightweight Materials Audi Authorized Repair Facilities.

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No Pulling

Audi lightweight design technology

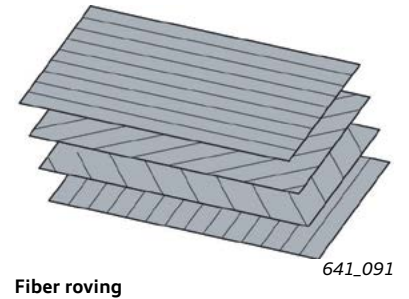
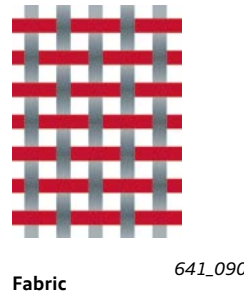
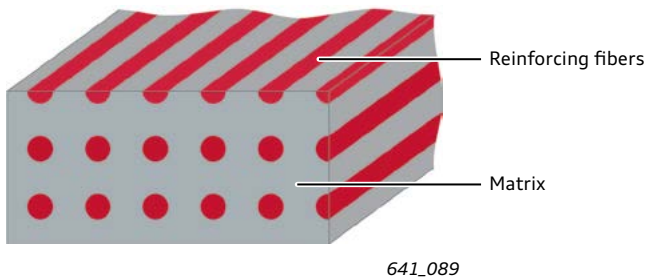
At Audi, lightweight design technology applies the maxim “the right material in the right quantity in the right place.” To achieve this, CFRPs are used as structural components of the 2017 R8 to reduce vehicle mass.

Force = mass x acceleration. Reducing the mass of the vehicle has several advantages. Less force, and therefore less fuel is required to achieve the same acceleration. Conversely, the same force produces higher acceleration.

Carbon fiber reinforced polymer (CFRP)

CFRP is a composite material. It is a combination of two or more components: a reinforcing fiber and a matrix which bonds the fibers together. The combination forms a component of very high strength and rigidity.

The task of the fiber is to transfer load and absorb elongation. They also define the rigidity, strength and thermal expansion of the fiber composite. Fibers are, in principle, only able to absorb tensile forces but not compressive forces. If the fiber composite needs to be rigid in more than one direction, it is usually woven or layered at different angles.



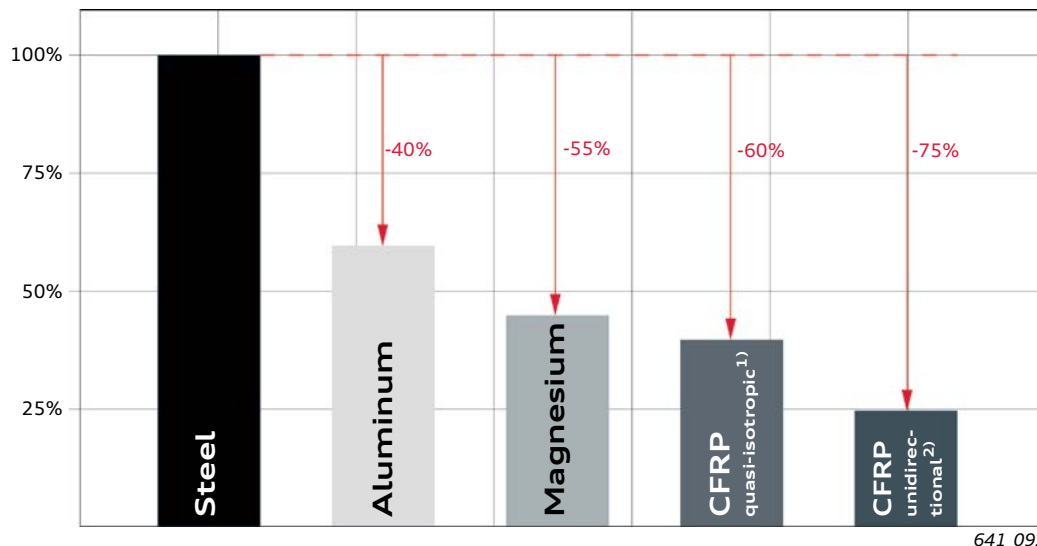
Resin is the matrix of the CFRP composite. The matrix bonds and protects the fibers and prevents them from buckling.

The rigidity, strength and thermal expansion of the fiber composite are, likewise, partly defined by the matrix.

Advantages of CFRP

The main advantage of CFRP is the saving of weight. CFRP also offers advantages such as low thermal expansion, high corrosion resistance, good aging properties / fatigue strength, design freedom and good absorption properties (crash behavior).

The following comparison shows how much component weight can be saved while retaining full functionality by using different materials.



¹⁾ CFRP quasi-isotropic – the properties of the material are virtually the same in all directions.

²⁾ CFRP unidirectional – in this connection, the fibers are oriented in one direction only.

Resin Transfer Molding – RTM

The CFRP parts for the Audi R8 are manufactured at Audi using the Resin Transfer Molding method. The basic steps of this RTM process are described below.



641_093

A parting agent is applied to both sides of the mold to make removing the finished component easier.



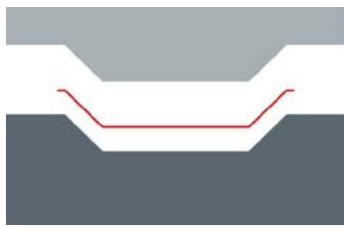
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Multiple tailored layers of the textile structures are stacked on top of each other inside the mold.



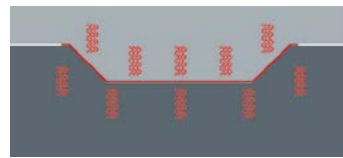
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The mold is then closed.



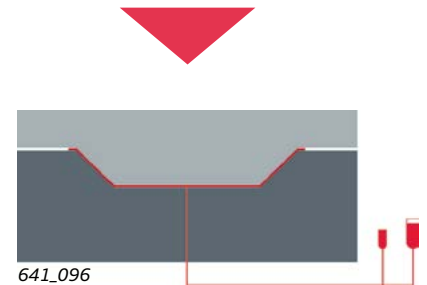
641_098

After setting, the mold is opened and the component removed.



641_097

The resin sets within 5 to 10 min at a temperature of between 176 -248 °F (80 - 120 °C)



641_096

Epoxy resin and hardener are injected into the component for between 10 to 60 seconds. The fibers are completely saturated with the liquid resin.

Carbon fiber reinforced polymer at Audi

Depending on application, a distinction is made between visible CFRPs, Class-A CFRPs and structural CFRPs.

Visible CFRPs are used, for example, in the making of interior trim panels or door mirrors. The surface of the CFRP part is protected by a clear coat.

Until now, Class-A CFRPs have mainly been used for exterior attachments, such as body side sections and the convertible top box lid on the R8 Spyder.



641_101



641_099



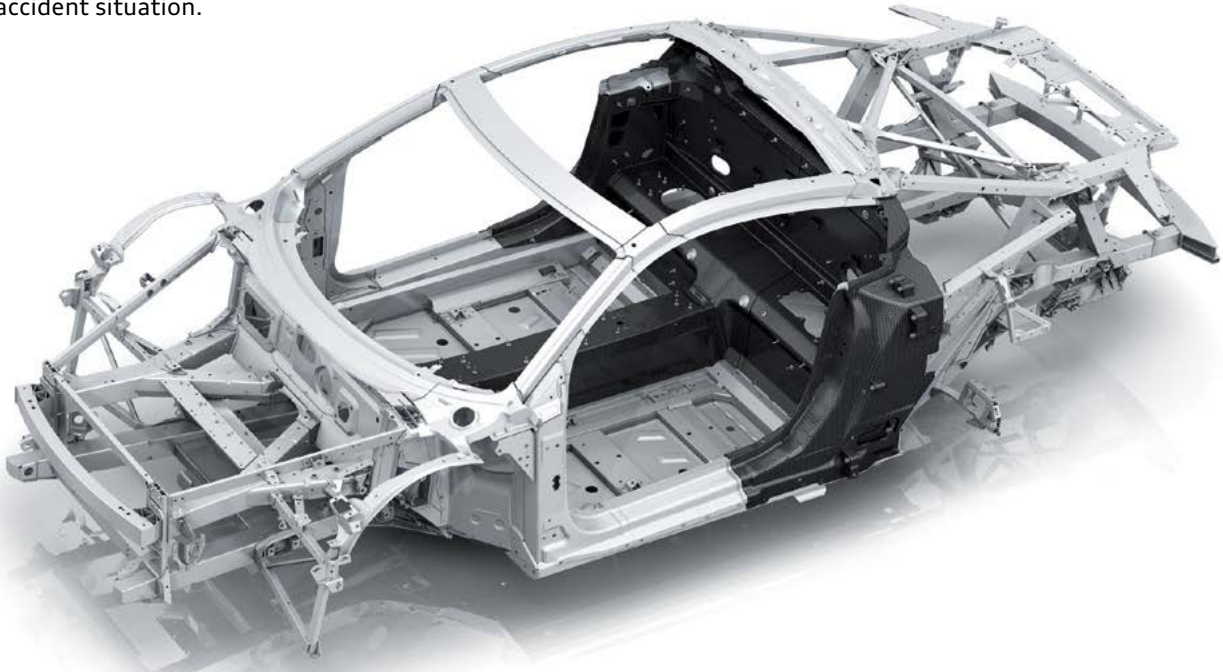
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Structural CFRPs

Structural CFRPs do not have a visual function in the automobile but are relevant to safety. Structural CFRP components are integrated in the vehicle body and replace a part of the bodyshell which would otherwise be made from aluminum or steel.

The structural CFC must, therefore, be capable of withstanding and absorbing high loads during vehicle operation or in an accident situation.

Structural CFRPs have to meet exacting quality requirements. The center tunnel, the upper and outer 'B' pillars and the rear bulkhead of the R8 are all manufactured from structural CFRPs.

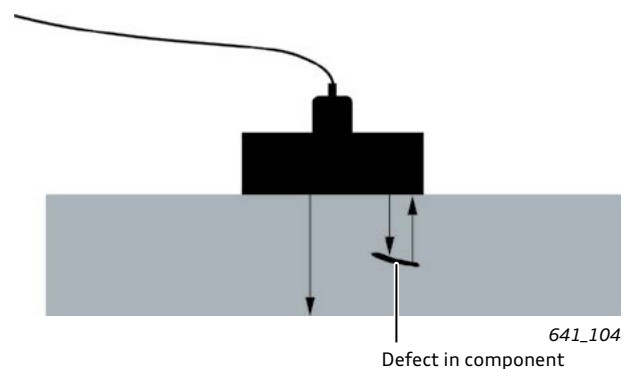
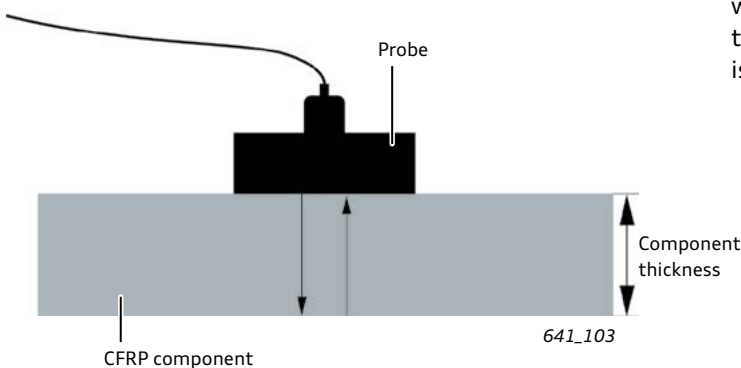


641_102

Non Destructive Inspection (NDI)

After an accident, it may not be possible to visually detect potential damage within the CFRP structure. CFRP components can be dramatically impaired by minor damage. Delamination (layer separation) can occur due to an impact which will impair strength, rigidity, flexural stability and dent resistance of the laminate.

Components can be non-destructively inspected using an ultrasound testing device. Ultrasonic pulses which have a very short duration (1 - 10 microseconds) are directed through the component being tested. These sound waves are reflected by the wall of the component under inspection and return to the testing device. Special software computes the depth at which the sound was reflected (rear wall or defect) on the basis of the time elapsed between transmission and reception of the signal. This information is then displayed on a monitor using different colors.



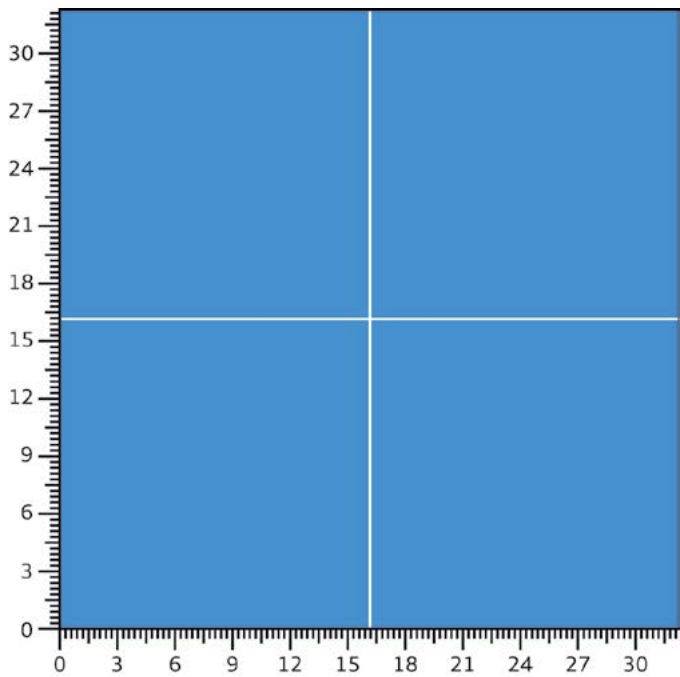
Note
Carbon fiber materials are restricted to Carbon Certified Ultra Advanced Lightweight Materials Audi Authorized Repair Facilities.

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.



Evaluation

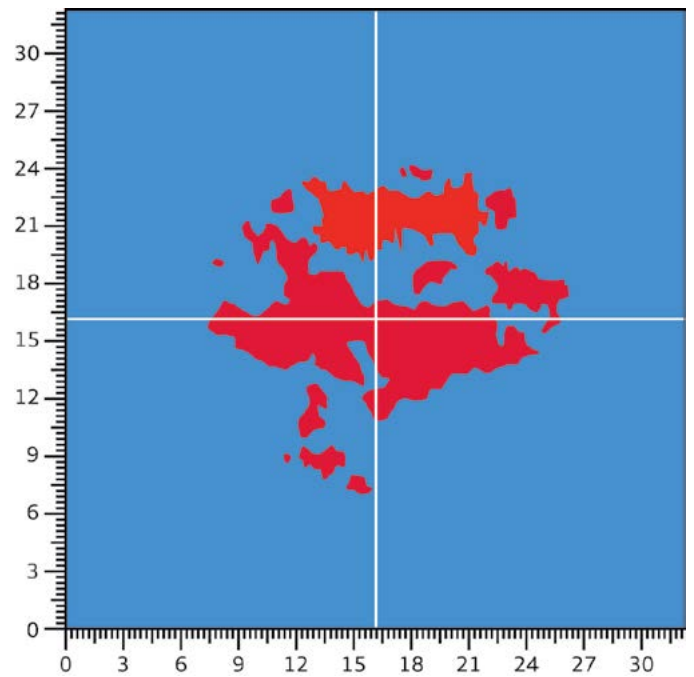
The color coding in the evaluation shows the defect or damage to the component. If no defect is detected, a monochrome image will be displayed.



Defect-free region

641_105

The positions in which a defect is found are indicated in color.



Region with defective CFRP

641_106



Reference

For further information about the non destructive inspection of CFRP components, refer to the current service literature in ElsaPro and ServiceNet.

Important service information

- › Do not drill, saw, sand and perform other machining operations on CFRP components.
- › CFRPs are electrically conductive. However, it is not permissible to make electrical connections to ground through CFRPs.
- › Avoid all contact with CFRP components while carrying out work on electrical wiring (danger of short circuit).
- › Avoid hard contact with CFRP parts when repairing vehicles, for example, when removing or installing units (danger of non-visible irreparable damage to the CFRP structure).
- › Only manufacturer-approved materials, for example, primers, adhesives, rivets, may be used when performing work on the body.
- › Work on the body may only be performed using methods approved by the manufacturer.
- › Work on the body may only be performed using tools approved by the manufacturer.

Aerodynamics

Sports cars are built to achieve one thing above all else: driving performance. A key requirement for this is the aerodynamic design – in addition to high engine output low weight, a rigid chassis and a balanced weight distribution.

An important factor to consider with regard to aerodynamics is the strong correlation between downforce and drag because the higher the downforce of a vehicle, the higher its drag coefficient that is, it takes more propulsive force to generate the energy needed to produce drive.



Audi R8 V10 with extended rear spoiler

641_107

Compared to other supercars, the Audi R8 V10 has a very low drag coefficient: 0.34 with the rear spoiler retracted, 0.35 with the rear spoiler extended and 0.36 in the R8 V10 plus version with fixed rear spoiler.

To improve downforce at higher speeds, the rear spoiler of the R8 V10 automatically extends electrically when the vehicle exceeds a speed of about 75 mph (120 km/h). To produce more downforce, the Audi R8 V10 plus has a fixed wing made of CFRP.



Audi R8 V10 plus with fixed rear spoiler

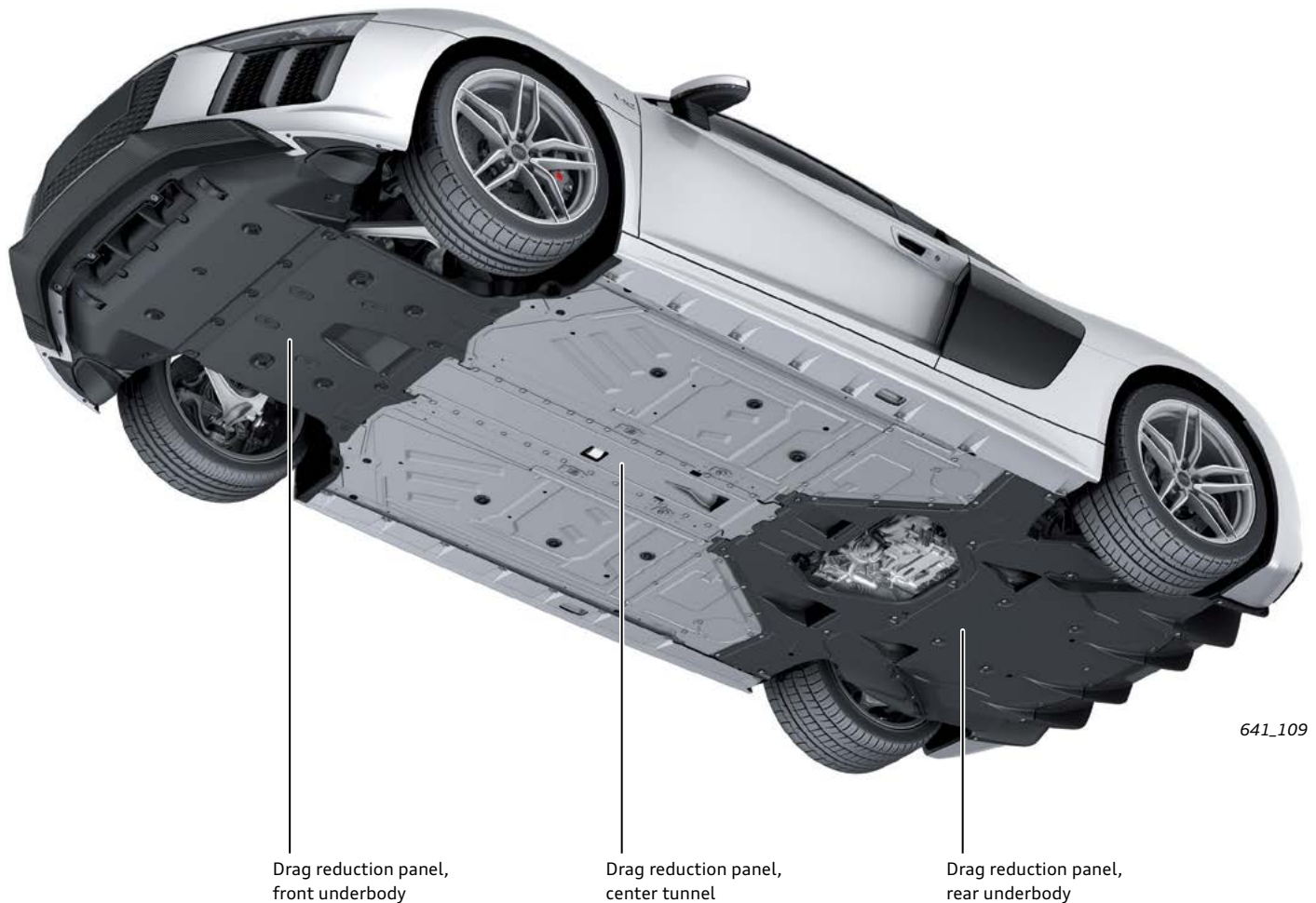
641_108

Drag reduction panels

The drag reduction panels at the front and rear of the underbody and at the center tunnel ensure that the surface of the underbody is smooth.

NACA ducts¹⁾ in the underbody trims allow additional air to be channeled around the fuel tank and into the engine bay without causing a significant increase in drag.

A long, rising diffuser in the underbody exerts downforce on the rear axle at higher speeds.



Note

To achieve highest levels of driving performance and driving safety and to ensure that the suspension components, drive units and brakes are properly cooled, all underbody panels and wheel arch linings, front and rear spoiler elements and air ducts must be installed correctly.

¹⁾ NACA: National Advisory Committee for Aeronautics (precursor to NASA). An NACA duct is an air intake integrated in the outer skin of a vehicle.

Seating systems

2 different seat versions are available for the new Audi R8 – the R8 sports seat and the R8 bucket seat.

Seat heaters are standard equipment on all models.

R8 sports seat

The sport seat is standard on the V10, and optional on the V10 plus. All sports seats have 18-way power adjustment (pneumatic side and leg bolsters, lumbar adjustment, and power thigh extension).

- > Sport seat.
- > Racing shell seats (aka bucket seats).

Depending on seat version, new features for the Audi R8 are an integrated head restraint, electrical seat depth adjustment and pneumatic adjustments.



Fully electric sports seat

641_021

Fully electric sports seat

R8 bucket seat

The R8 bucket seat is based on a carbon seat shell. It also tilts forward for rear access, but the backrest angle is not adjustable. The R8 bucket seat has manually adjustable fore and aft movement as well as electric height adjustment.



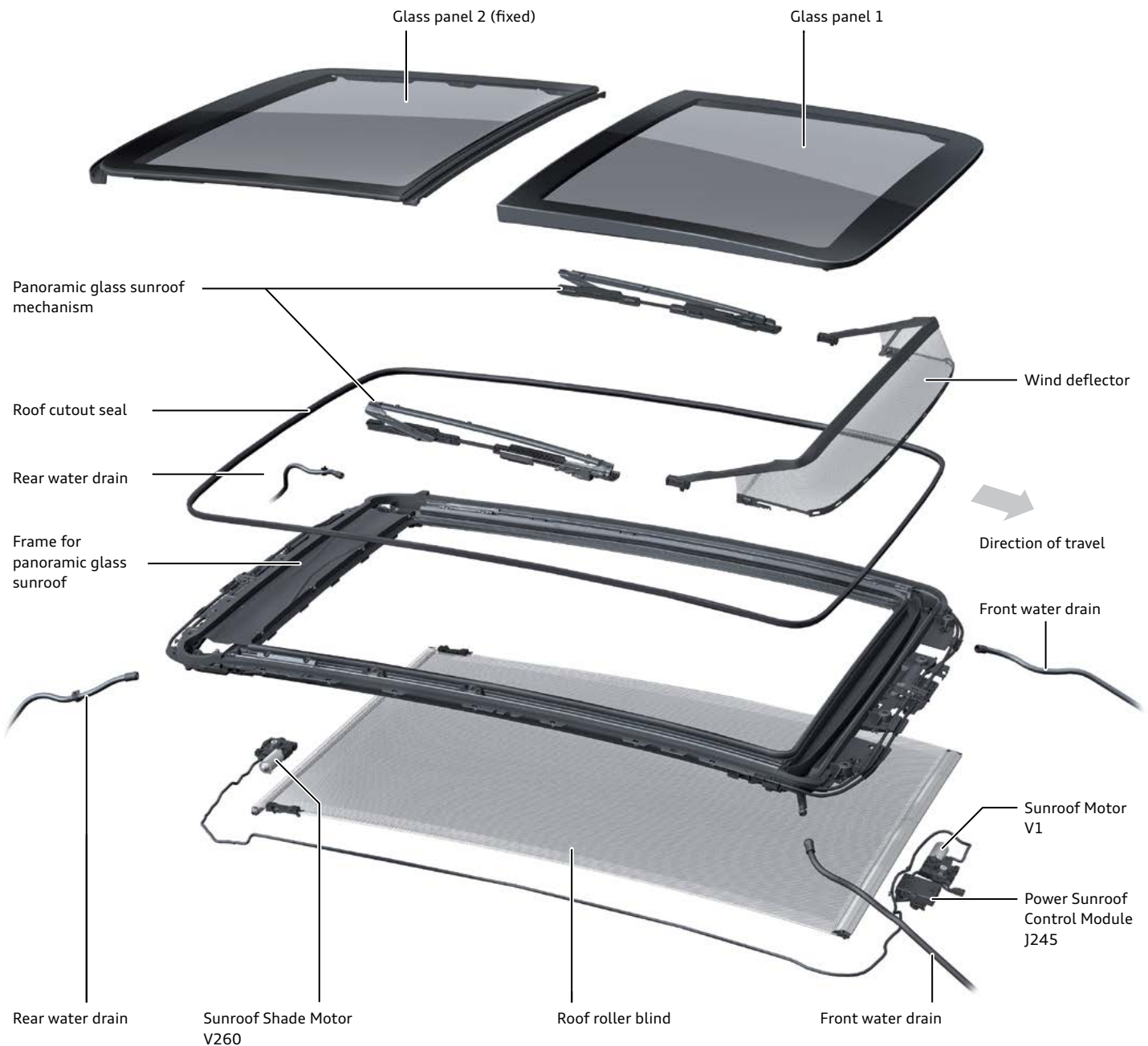
Panoramic glass sunroof

Unlike in the previous model, the panoramic sunroof on the new Audi Q7 is a two-piece design only. The front glass panel is movable and can be tilted or slid back. The rear glass panel is fixed.

This reduces the gross weight of the panoramic glass sunroof by about 22.0 lb (10 kg) while increasing the headroom in the rear passenger compartment.

Reinforced roof elements at the guide rail and above the third row of seats increase body stiffness to such effect that there is no longer any difference in stiffness compared to an Audi Q7 without a panoramic glass sunroof.

A power operated roller blind for both glass panels provides protection against sunlight if needed.



632_066



Note

To ensure proper functioning of the panoramic sunroof after removing/installing/replacing the motor, a Basic Setting Test Plan must be done using the VAS Scan Tool.

Aerodynamics and aeroacoustics

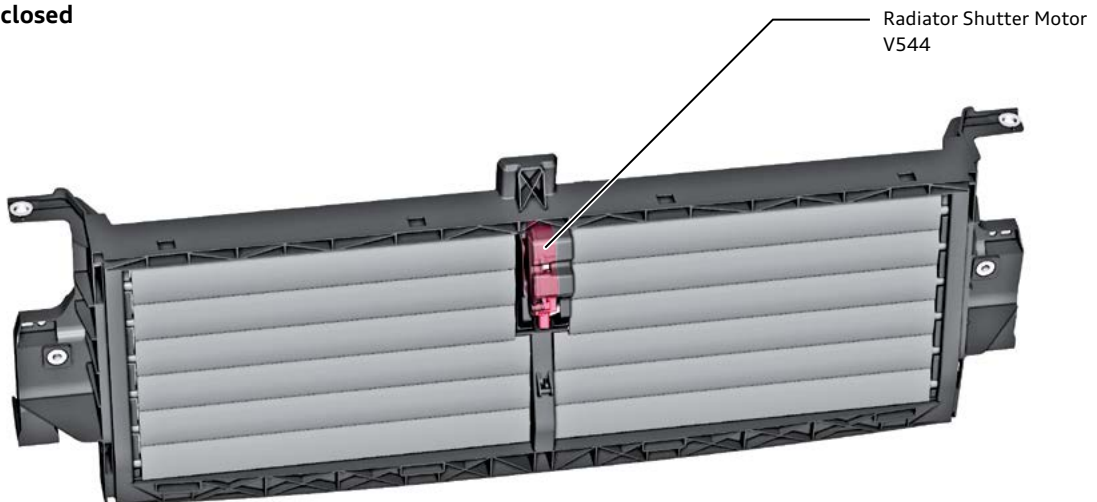
The underbody is almost completely clad and a small spoiler on the rear axle area provides added downforce.

Radiator louver

A radiator louver (shutter) has been installed between the single-frame grille and the upper section of the main radiator. The slats open or close as required to provide better aerodynamic performance.

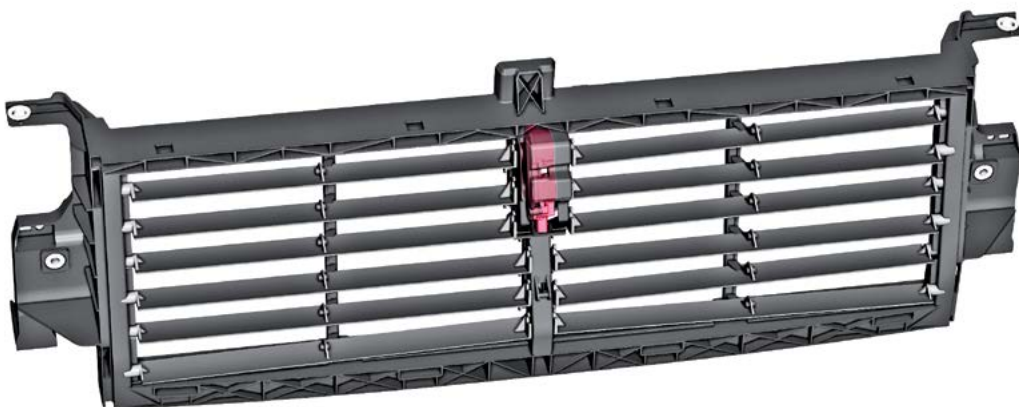
This measure also allows better fuel economy and lowers CO₂ emissions. The closed louver is also beneficial to the thermal management of the engine.

Radiator louver closed



632_080

Radiator louver open



632_082

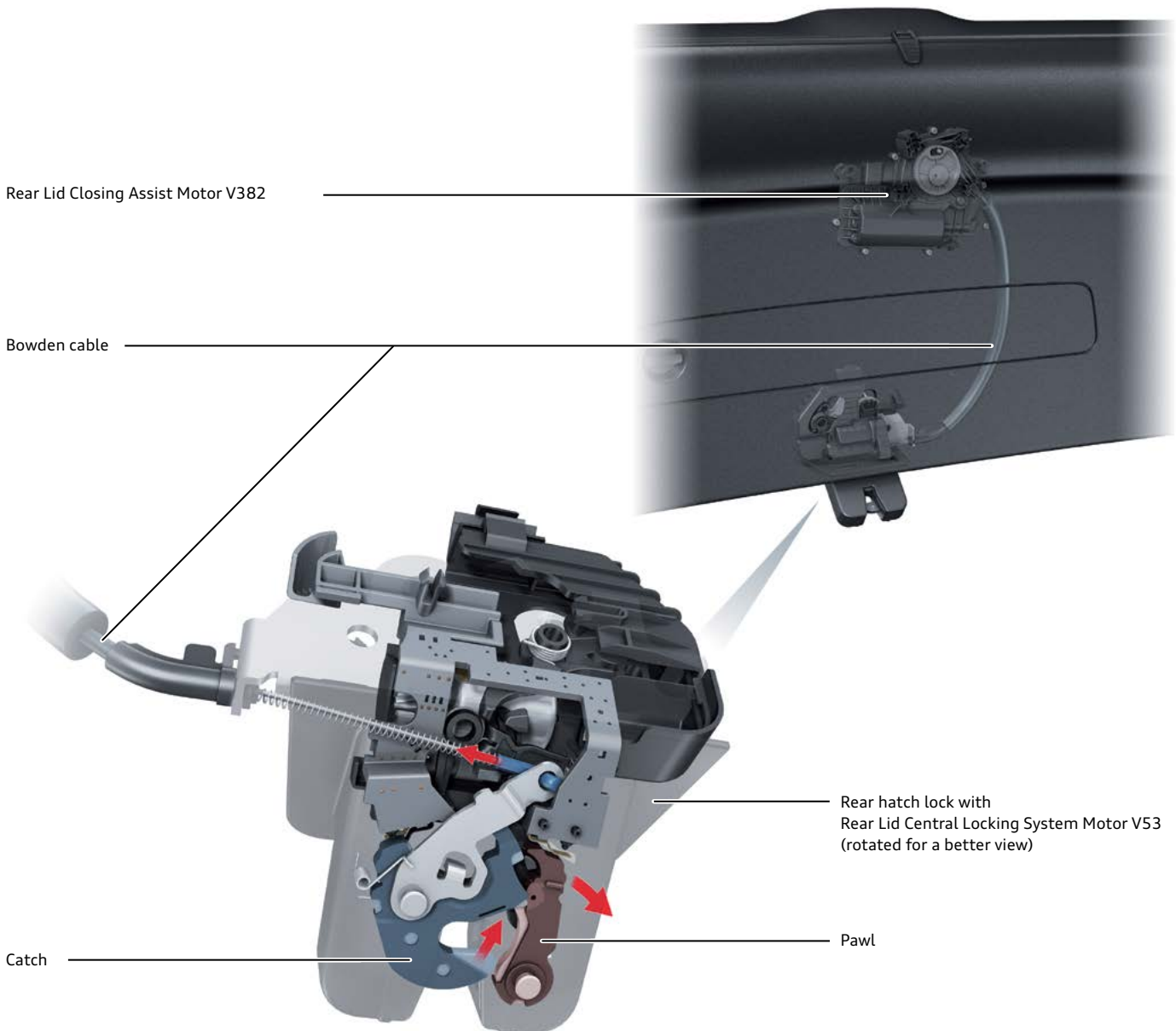
Electric rear hatch

The wrap-around rear hatch embracing the sharply inclined "D" pillars - a typical design element of the Audi Q models - is made entirely of aluminum. An electric rear hatch drive is standard equipment.

The power latching system is new. In the Audi Q7 this function is performed by the rear hatch lock; in other Audi models the striker on the rear bumper mount is used.

When the microswitch in the rear hatch lock indicates that the striker is in the prelock position and the Rear Lid Control Module J605 indicates that the rear hatch is in the "closed" position, an eccentrically mounted cam wheel in Rear Lid Closing Assist Motor V382 pulls the catch in the rear hatch lock further into the fully locked position by means of a Bowden cable - in much the same way as the power closing feature of the door locks.

The end position of the cam wheel is monitored by J605, while the position of the catch is monitored by Comfort System Central Control Module J393 via microswitches.



Seat systems

Depending on seat variant, a seat heater, seat ventilation, pneumatic seat backs, pneumatic lumbar support and a pneumatic massage function could be installed.

The second row seating has three seats all with adjustable seat backs. The second row seats can be moved manually fore and aft up to 4.3 in (110 mm). Third row seating is standard.

Folded down, the seat backs are integrated in the load floor and can be electrically raised or lowered. The switches are located in each 'C' pillar area and in the luggage compartment.

The seats in the second row have a fold-up function for easier entry and exit from the third seat row. The seat back is folded forward, after which the entire seat can be folded vertically. All seats in the second and third rows have LATCH child seat restraints. This means that customers can secure up to six child seats in the Audi Q7.



Electrical seat adjustment

Head restraints, horizontally and vertically adjustable

Sliding rear seats as individual seats, with fold-up function

Individual contour seating

The contour seating option offers the following functions:

- > Electrical seat adjustment.
- > Pneumatic side bolsters in the seat base and back.
- > Pneumatic lumbar support adjustment.
- > Seat heating.
- > Seat ventilation.
- > Massage functionality.
- > Memory function and seat contour customization (each seat contour is assigned to a specific vehicle key).

Seat ventilation is optional for the front seats and for the two outer rear seats in the second row. The seats have an intake system for this purpose.

The front seat ventilation controls communicate with Vehicle Electrical System Control Unit J519 by LIN data bus. The rear seat ventilation controls are connected to Rear A/C Display Control Head E265.

Driver Multi-Contour Seat Control Module J873

Seat back bolster, pneumatic

Massage cushion, pneumatic

Seat back ventilation

Seat base ventilation



Third row seating

The Audi Q7 is available with a third row of seats. It is a two seat bench with two electric folding backrests.

The head restraints on these seats must fold in when the seats are folded down.

This is done automatically by the kinematic mechanism inside the seat or can be done manually using a pull-tab below the head restraint. After the backrest has been raised, the head restraints must be raised manually. This is done by swivelling them upwards until they lock into place.

Pull-tab for manual fold-down of the head restraint

Right Third Row Backrest Adjustment Locking Latch Motor F525

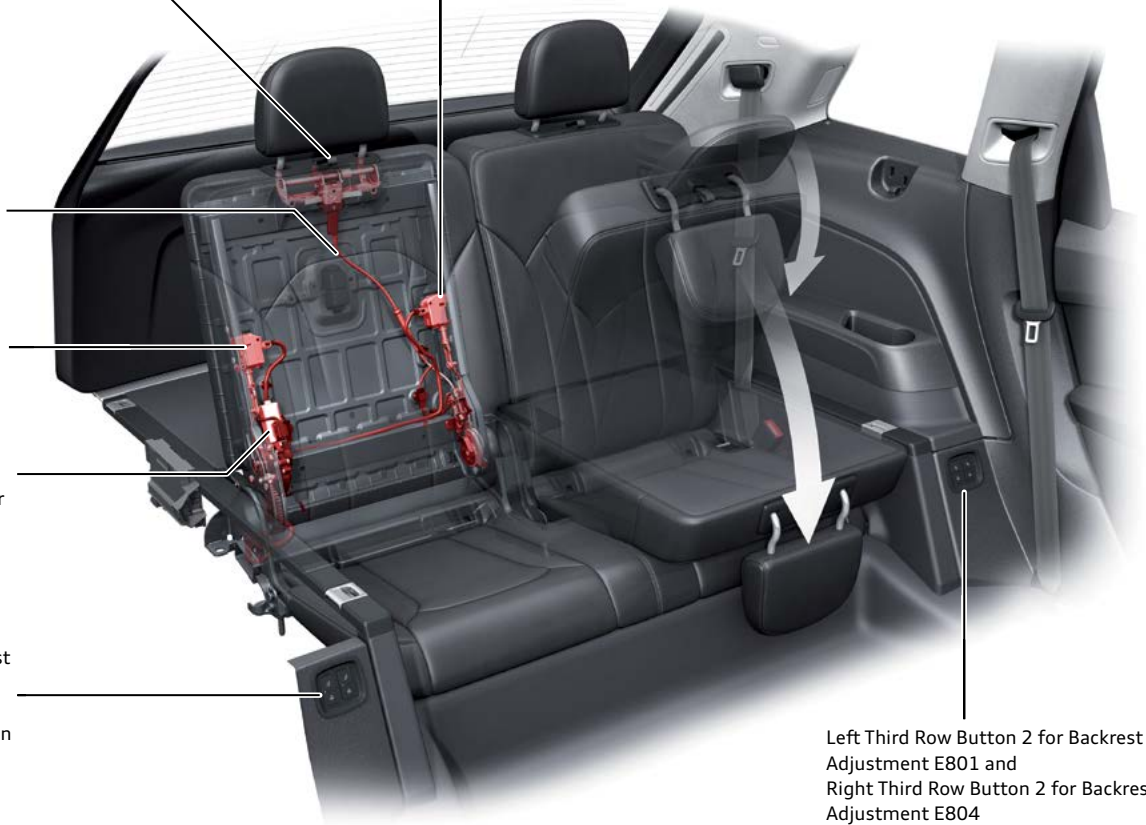
Bowden cable for automatic fold-down of the head restraint

Right Third Row Backrest Adjustment Locking Latch Motor 2 F544

Right Third Row Seat Backrest Adjustment Motor V361

Left Third Row seat Backrest Adjustment Button E565
Right Third Row Seat Backrest Adjustment Button E549

Left Third Row Button 2 for Backrest Adjustment E801 and Right Third Row Button 2 for Backrest Adjustment E804



632_051

Operation

The backrests fold down using the operating buttons in the rear passenger compartment and in the luggage compartment. You must press the buttons until the backrest is completely folded down or unfolded.

An electric motor unlocks and moves each backrest; the end position is monitored by two microswitches. If a backrest has not reached its end position, the backrest warning lamp appears in the DIS and the LEDs in the operating buttons begin to flash.

Operating buttons in the rear passenger compartment



632_031

Operating buttons in the luggage compartment



632_030

2016 TT

(all S-line models included)

(All Parts in Illustration are Restricted)

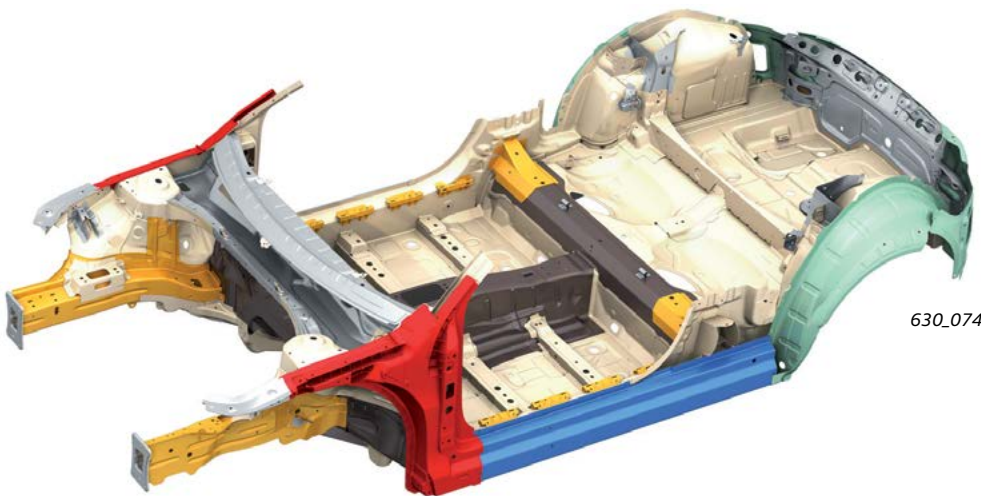
With its hybrid material concept, the bodyshell of the Audi TT represents a new evolutionary stage of Audi Space Frame technology (ASF). The bodyshell of the 3rd generation uses components of the Modular Transverse Platform (MQB) At 98.62 in (2505 mm), the TT has the shortest wheelbase of any vehicle in the MQB concept.

The substructure is formed from the cross members, sections of the A-pillars, the bulkhead, floor pan, rear wheel arches and the rear tail panel. The hot-formed steel in the sub-structure weighs 87.08 lb (39.5 kg) and accounts for almost a quarter of the total structural weight.

Prior to forming, the steel is heated to approximately 1832 °F (1000 °C). It is then cooled immediately to about 392 °F (200 °C) in a water cooled pressing tool during the forming process. This drastic change in temperature produces an extremely strong iron-carbon micro-structure. The form-hardened steel has a relatively low wall thickness and is correspondingly light.

Advanced high strength, cold-formed steel components together with extruded aluminum sections for the outer sills and aluminum panels for the rear wheel arches complete the sub-structure of the Audi TT.

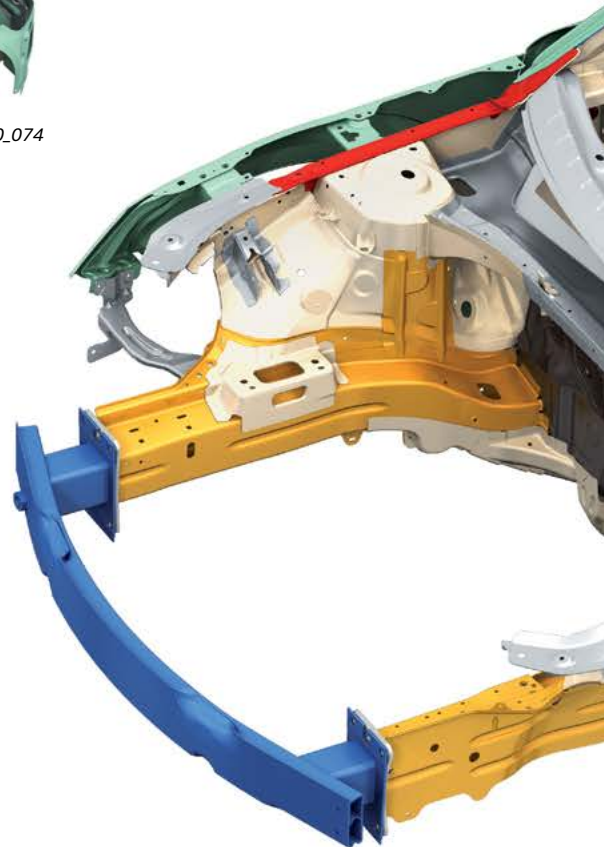
Body sub-structure



Sub-structure integrated into the MQB platform

Torsional rigidity

Compared to the predecessor model, the hybrid ASF of the new TT has a 23% higher static torsional rigidity while retaining a high level of dynamic rigidity.



Consult Repair Information for Pulling



No Pulling on Side or Rear

Note

Specialized structural parts are required to properly repair the Audi vehicles in this section; these parts may only be available to "Ultra" Audi Authorized Collision Repair Facilities.

Audi trained repair technicians use factory-approved procedures for safer repairs.

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.

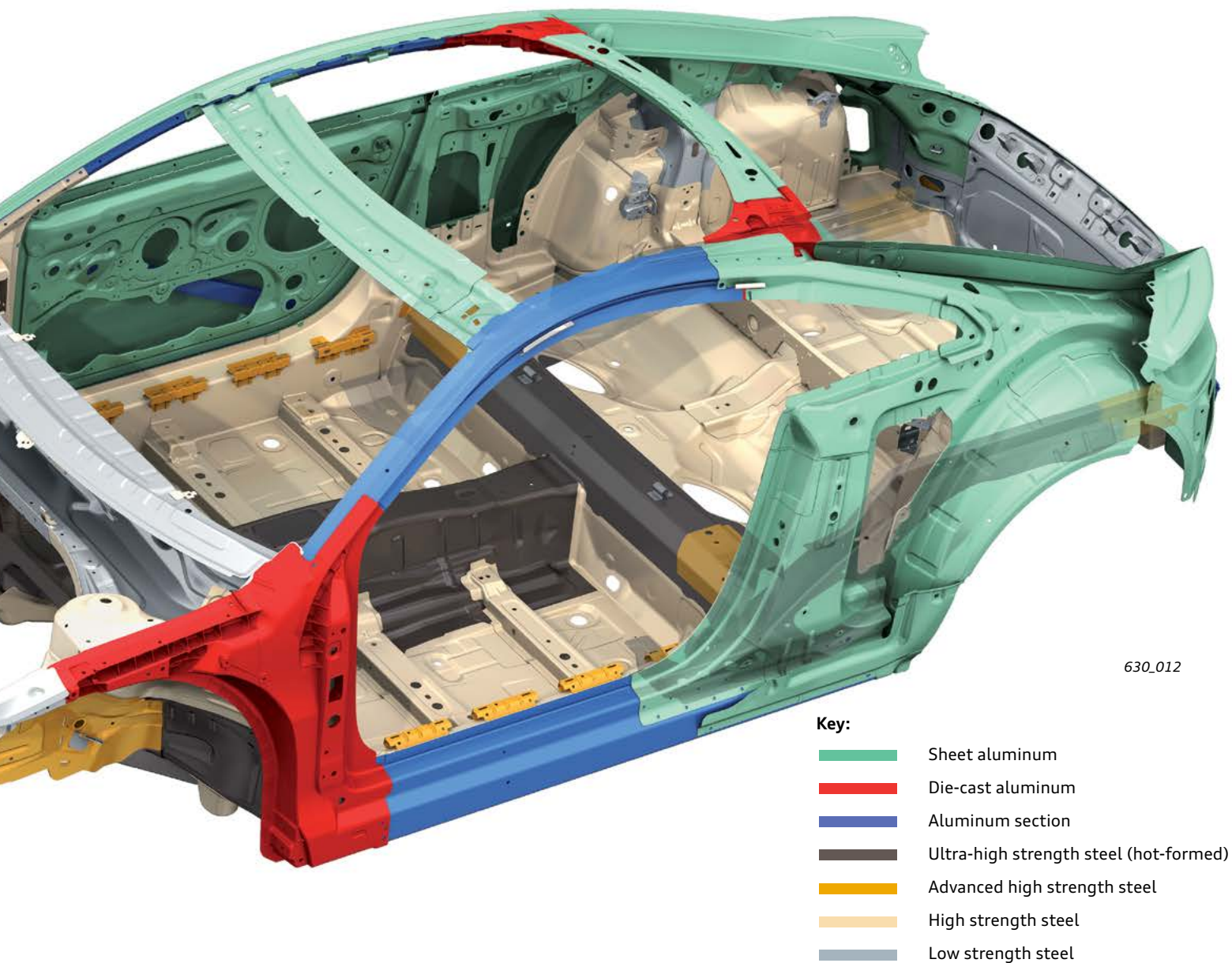
The occupant cell, which weighs only 149.41 lb (68 kg), is an aluminum lattice with four castings that form the nodal elements of the body shell. Large nodal sections of the A-pillars connect the side roof frame profile, sill, window cross member and the upper longitudinal section at the front end.

Two smaller cast nodal elements above the rear window connect the roof arch to the flat C-pillars and the rear roof cross member.

The entire outer skin of the Audi TT is made from aluminum:

- > Front fenders.
- > Sidewalls.
- > Roof.
- > Attachments: hood, doors and trunk lid.

In total, the complete bodyshell with attachments weighs approximately 608.47 lb (276 kg).



630_012

Key:

- Sheet aluminum
- Die-cast aluminum
- Aluminum section
- Ultra-high strength steel (hot-formed)
- Advanced high strength steel
- High strength steel
- Low strength steel



Note

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.



Consult Repair Information for Pulling

Joining technology

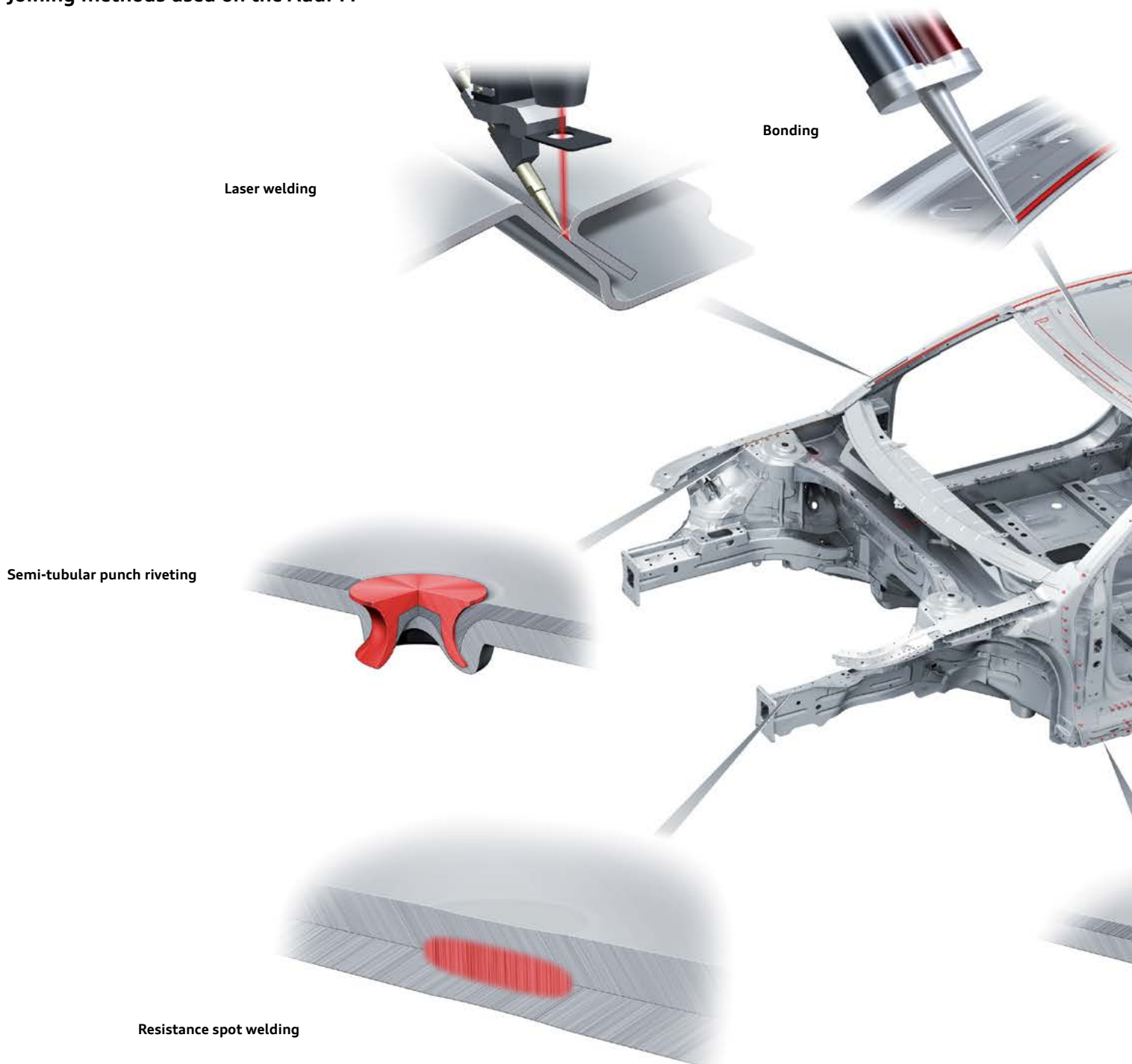
The key to optimizing the body structure is using "the right materials in the right place". The resulting challenge for the joining technology was to develop universal and reliable solutions for the large variance in material/thickness combinations in the body. On the TT, Audi uses "cold" joining techniques such as riveting, flow-drill screwing and clinching to create the aluminum/steel hybrid structure.

Adhesive is also used to strengthen the connection and to prevent contact corrosion of the aluminum/steel joint.

The body is constructed using the following types of joining methods:

- > 3020 spot welds.
- > 1113 punch rivets.
- > 44 solid punch rivets.
- > 128 flow-drill screws.
- > 199 clinching points.
- > 6.23 ft (1.9 m) of MIG/MAG welds (metal inert gas/metal active gas).
- > 16.07 ft (4.9 m) of laser-welded seams.
- > 249.34 ft (76 m) of adhesive.

Joining methods used on the Audi TT



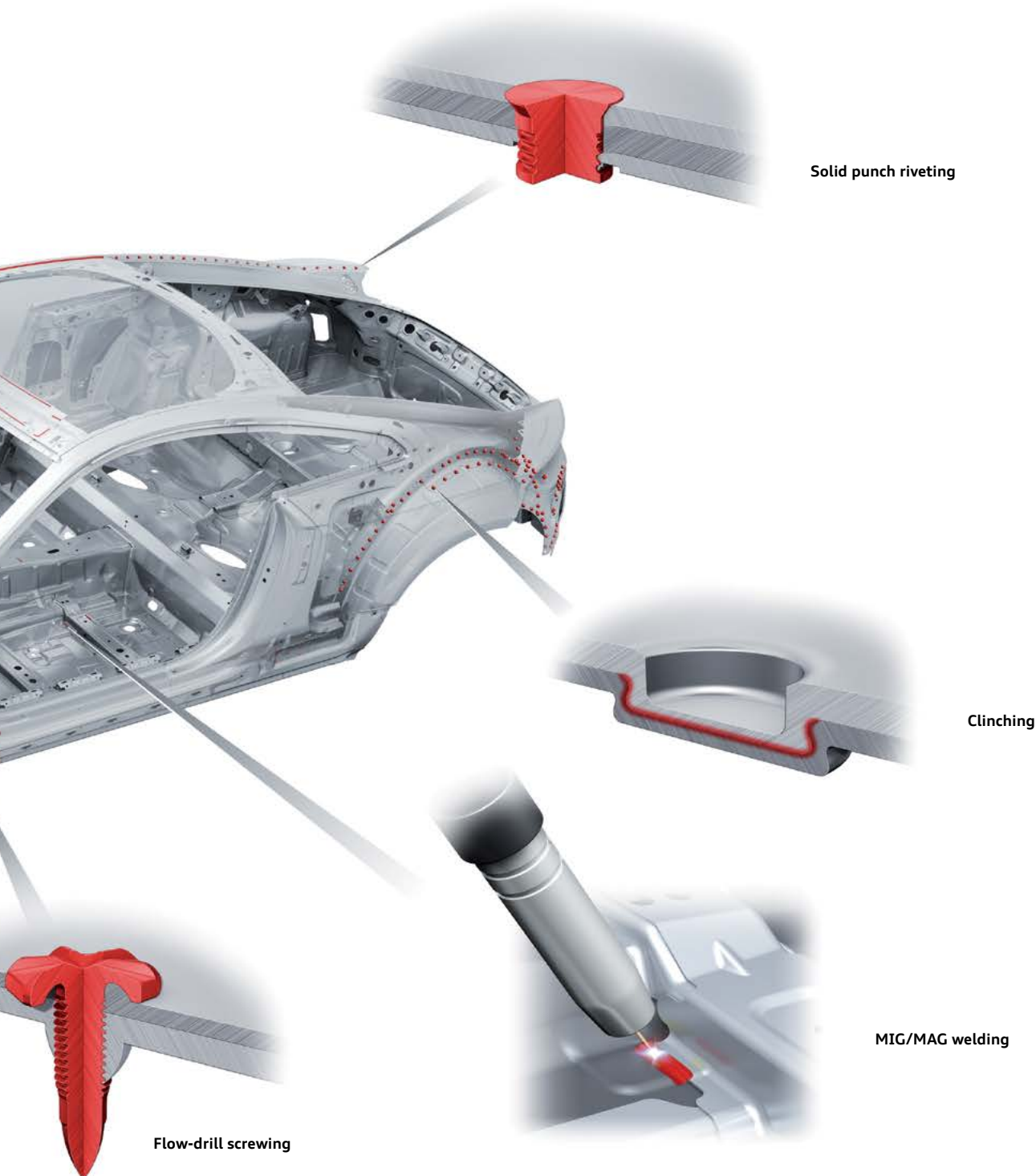
Safety precautions against contact corrosion

Aluminum has a naturally occurring (passivating) surface oxide layer that protects the underlying material from corrosion. This is why an unpainted aluminum component does not normally corrode.

However, if aluminum comes into contact with a metal which has a positive electrical potential relative to aluminum and is in an electrolyte, such as salt water, contact corrosion will occur.

The greater the difference in electrical potential, the greater the corrosion will be. Since aluminum is usually the less noble metal, it is degraded.

Contact corrosion can also occur if unsuitable connecting elements (screws, nuts, washers, etc.) are used. Therefore, a number of precautions must be taken in order to prevent this process from occurring during body production and repair work. Audi uses only connecting elements with a special surface coating for the aluminum/steel hybrid construction used in the TT. In addition, all rubber and plastic parts and all adhesives are made of non-conductive materials. As a further precaution, all hybrid metal connections are sealed with polyvinyl chloride (PVC) or with wax after cathaphoretic dip primer coating. The cathaphoretic coating (sometimes referred to as E-coat) is an electrically induced surface treatment that provides resistance to corrosion and oxidation. See the complete definition on the following page.



Thermal "hot" and mechanical "cold" joining techniques

The choice of the right joining technique in modern body construction is material-dependent. Welding similar materials is still the most frequently used joining technique. These welding and soldering techniques are called "hot" joining techniques and have a large variety of applications. However, the heat input causes high internal stresses in the component, which often can only be compensated through time-consuming re-work.

The mechanical "cold" joining technique has the decisive advantage over the thermal joining technique in that hybrid joints can be reliably produced between different types of materials. The positive properties of the material are not adversely affected by thermal influences.

"Hot" joining technique in the Audi TT

MIG/MAG welding

With the MIG/MAG (MIG = metal insert gas, MAG = metal active gas) welding technique, an electric arc forms between the automatically fed welding wire (electrode) and the workpiece. A shielding gas protects the electric arc and the welded surface against the ingress of ambient air. The inert gas and welding wire have to be adapted to the basic material.

Advantages:

- > Versatility in use.
- > High weld seam strength.
- > Outstanding thin panel properties.

Resistance spot welding

In the case of resistance spot welding, panels are welded together using opposed electrodes under the application of force, pressure and electrical current.

Advantages:

- > No additional connecting element.
- > No heat influence zone.
- > Short welding time.

Laser welding

With laser welding, the focused laser beam serves as an energy source. In the welding head, the laser beam is focused by a lens and reflected back onto the workpiece by mirrors. At the point of contact, the laser beam melts the workpiece. Welding can be performed both with and without welding filler material.

Advantages:

- > Less influence of heat.
- > Less thermal distortion.
- > Less time spent on re-work.

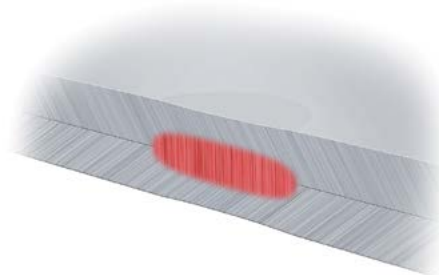
The following "cold" joining techniques are used:

- > Punch riveting.
- > Clinching.
- > Flow-drill screwing.
- > Seaming.
- > Bonding.

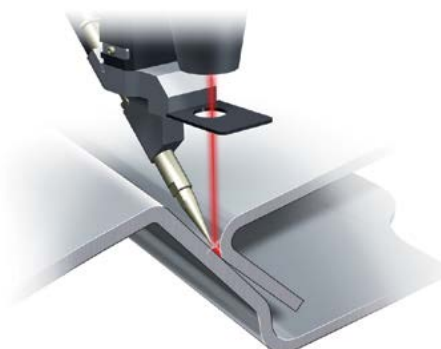
It makes good sense to combine the mechanical spot joining techniques with bonding methods. First, it increases the strength of the joint and, second, the adhesive also acts as insulation in the case of hybrid aluminum/steel joints. This, in combination with seam sealing, prevents direct contact between the metals and ensures that corrosion cannot occur. In addition, a carefully selected adhesive concept also helps to absorb the differing degrees of thermal expansion of the individual materials. Cataphoresis is a fully automated process of painting by immersion, which is based on the movement of charged particles in an electric field (paint) towards an oppositely charged pole (metallic surface to be painted). The main objective of the coating process is to protect the surfaces from corrosion, and its properties make it the ideal treatment for this purpose. This technique also allows areas which are hard to reach, such as recessed areas, piping etc to be painted.



630_076



630_077



630_065

"Cold" joining technique in the Audi TT

Punch riveting

Punch welding is a method where pieces that have not been pre-punched are joined together by inserting a rivet (semi-tubular rivet or solid punch rivet) into two or more layers of the workpiece, the rivet piercing the upper workpiece layers and then expanding in the lower workpiece layer.

Advantages:

- > No pre-punching needed.
- > High dynamic strength.
- > Form-fitting and non-positive connection.
- > Ideal for hybrid joining.

Semi-tubular punch rivet



Solid punch rivet

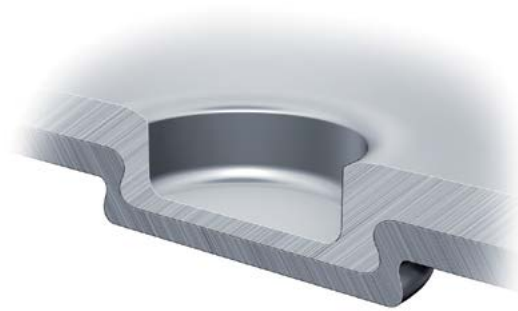


Clinching

With clinching, panels or sections are joined together by cold-forming the materials to produce a form-fitting and non-positive connection without the need for an auxiliary joining element such as a rivet. In this case, the connections can have two or more layers.

Advantages:

- > No additional connecting element.
- > Protects the surfaces of coated workpieces.



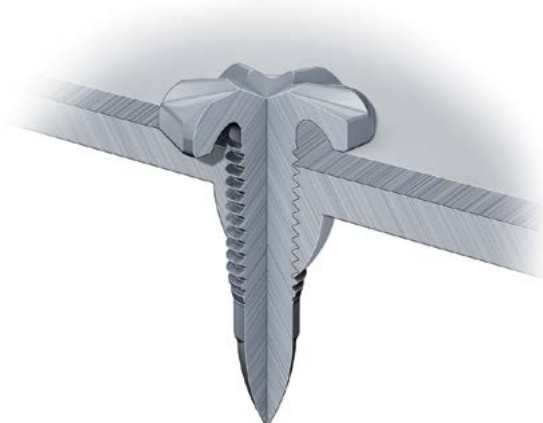
630_063

Flow-drill screwing

A special, coated screw is inserted through partially non-pre-punched workpieces by applying high contact pressure. Due to the high pressure and high RPM, the screw forms a thermoflow hole without producing a burr. The screw penetrates the material and, in the process, cuts its own thread.

Advantages:

- > High strength through thermo-flow process.
- > Ideal for applications in which the material is accessible on one side only.
- > Easy to disconnect.



630_064

Bonding

In addition to punch riveting, clinching, solid punch riveting, flow-drill screwing and resistance spot welding, additional adhesive bonds are used in certain areas. These bonds increase the strength of the connection. Adhesive is also used in seamed connections, as is the case at the rear wheel arch. In other areas of the bodyshell, use is made of adhesive beads to provide sealing and insulation between aluminum and steel, as well as for noise reduction.

Advantages:

- > Large area connections are possible.
- > Unchanged surface and micro-structure.
- > Suitable for connecting different materials.
- > Sealing connection.



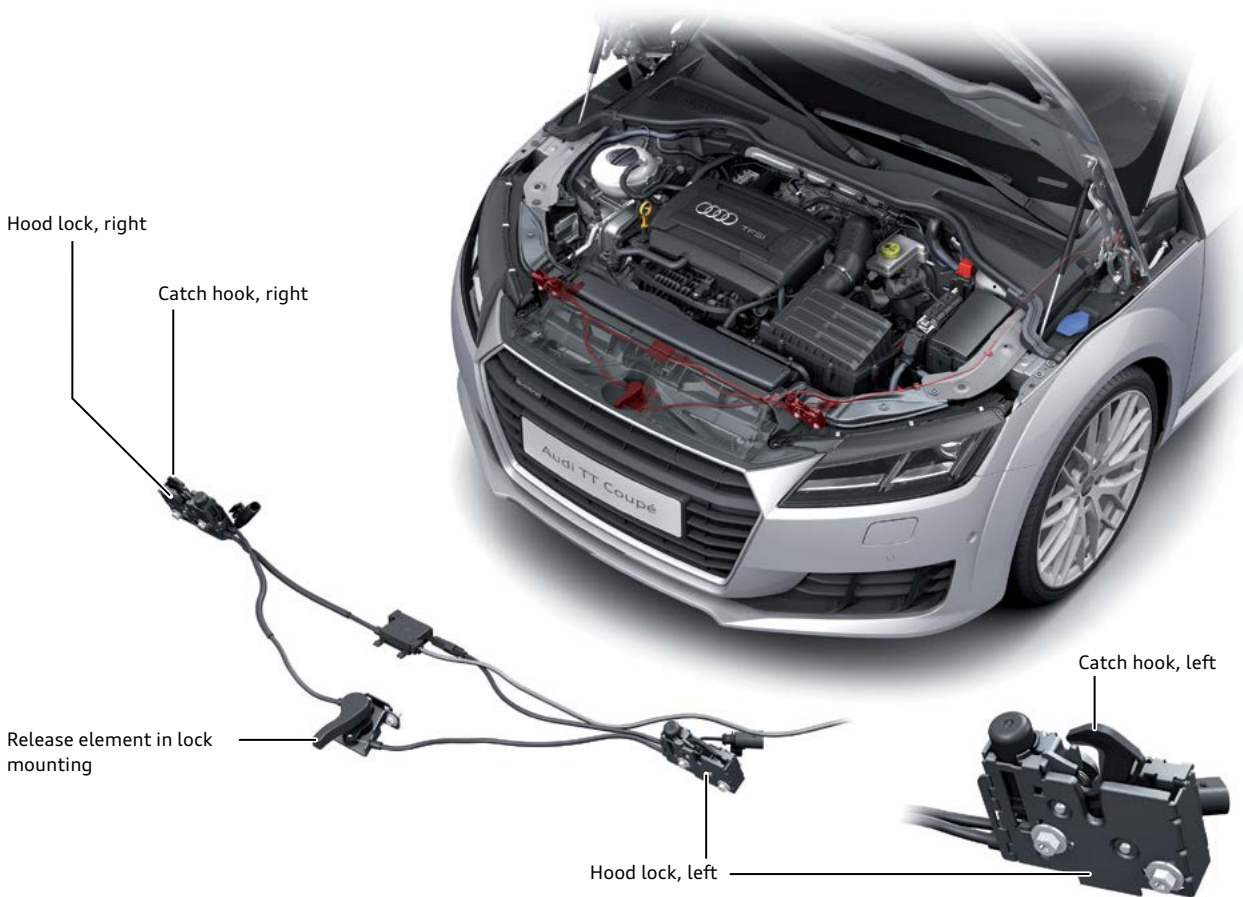
630_078

Attachments

Hood lock with integrated catch hook

A new hood release mechanism is being introduced with on the 2016 TT. This design will be used on other vehicles of the Modular Transverse Platform in the future. The advantage of this system is its improved ease of use for the customer.

As in the predecessor model, the two hood locks are released by pulling the lever at the left side lower 'A' pillar. Next, the two catch hooks at the sides of the hood are released via an additional Bowden cable that is actuated by a release lever on the lock mount.



630_079

Filler flap module

The new TT is the first Audi model to eliminate the fuel filler cap. The fuel filling nozzle slots directly into the filler neck. Two flaps are pushed to the side when the nozzle enters the filler neck and seal the neck after refueling has been completed.

The fuel filler flap is opened by lightly tapping on the embossed TT logo. The flap is locked and unlocked automatically when the central locking system is actuated.



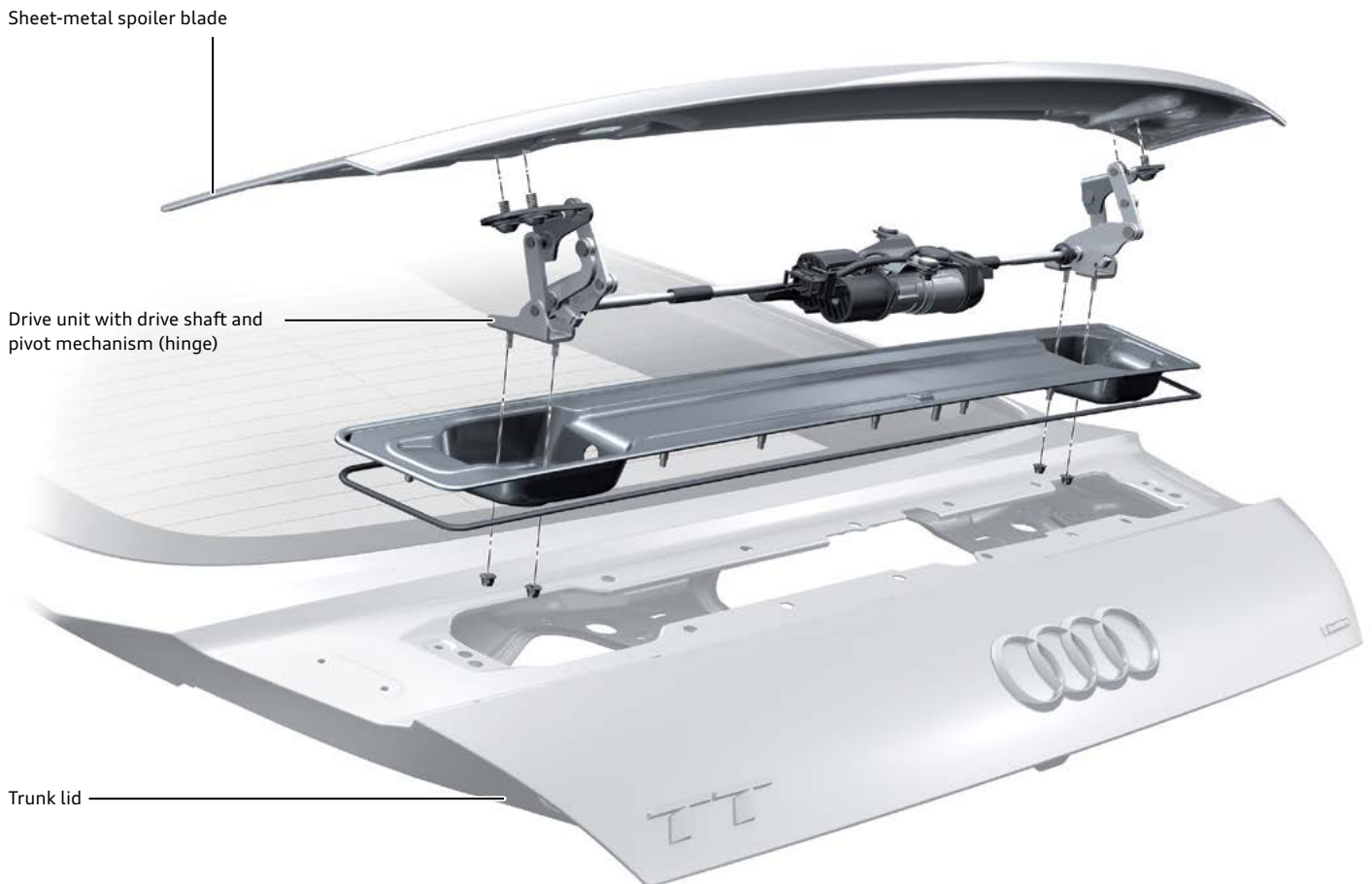
630_080

Rear spoiler

The Audi TT has an electrically retractable rear spoiler as standard. There is a choice of 2 operating modes for extending and retracting the rear spoiler.

Driving stability is increased significantly at high speeds when the rear spoiler is extended.

Operating mode	Function
Automatic mode	Automatic extension and retraction: The rear spoiler is automatically extended when a speed of approximately 75 mph (120 km/h) is exceeded and retracted again at about 50 mph (80 km/h).
Manual mode	Manual extension: The rear spoiler can be extended fully with a short touch of the rear spoiler button in the center console. Manual retraction: <ul style="list-style-type: none">> At a speed of up to about 12 mph (20 km/h), the rear spoiler can be retracted by holding the button down.> At a speed of between 12 mph (20 km/h) and 75 mph (120 km/h), the rear spoiler can be retracted fully by touching the button.



630_081

Design

The operating module is bolted to the rear trunk lid. The spoiler blade is mounted to the operating module. The operating module consists of the drive unit, drive shaft and pivot mechanism (hinge) and the self-adjusters.



Note

The spoiler mechanism components cannot be repaired/replaced individually. In the event of damage, the operating module must be replaced as a unit. The spoiler blade, however, can be replaced if damaged.

2016 TT Roadster

(All Parts in Illustration are Restricted)

The bodyshell of the TT Roadster is based on the modular transverse matrix (MQB). Ultra high strength components made from hot-stamped steel reinforce the front end and the occupant cell floor. Aluminum is used in the cell as well as in all outer skin parts and attachments in the form of three typical semi-finished products - die-cast nodal elements, extruded profiles and sheet metal. In total, 50% cold formed steel and 11% hot formed steel are used in the new TT Roadster.

The 37% share of aluminum is distributed as follows:

- > 21% sheet aluminum.
- > 8% die-cast aluminum.
- > 8% aluminum profile.








Altogether, the body of the Audi TT Roadster including attachments weighs 741lbs (336kg). The crash safety performance of the TT Roadster is formidable due to the intelligent hybrid construction concept.

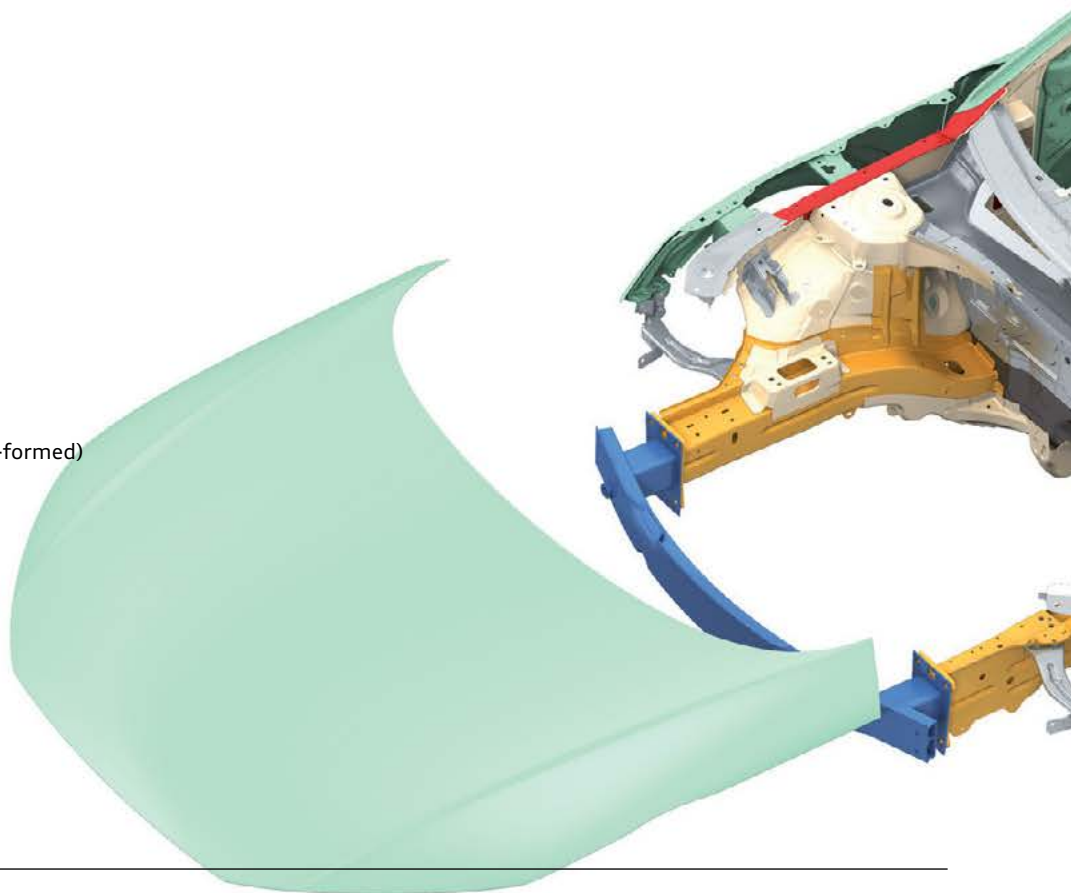
Outer skin

The entire outer skin of the Audi TT Roadster is made of aluminum. This includes:

- > Front fenders.
- > Side panels.
- > Hood attachments.
- > Doors.
- > Trunk lid.

Key:

	Sheet aluminum
	Die-cast aluminum
	Aluminum section
	Ultra-high strength steel (hot-formed)
	Advanced high strength steel
	High strength steel
	Low strength steel



No Pulling on Side or Rear



Note

Specialized structural parts are required to properly repair the Audi vehicles in this section; these parts may only be available to "Ultra" Audi Authorized Collision Repair Facilities.

Audi trained repair technicians use factory-approved procedures for safer repairs.

Consult Repair Information if damage to any components attached to castings designated in red. Red component needs to be crack tested.

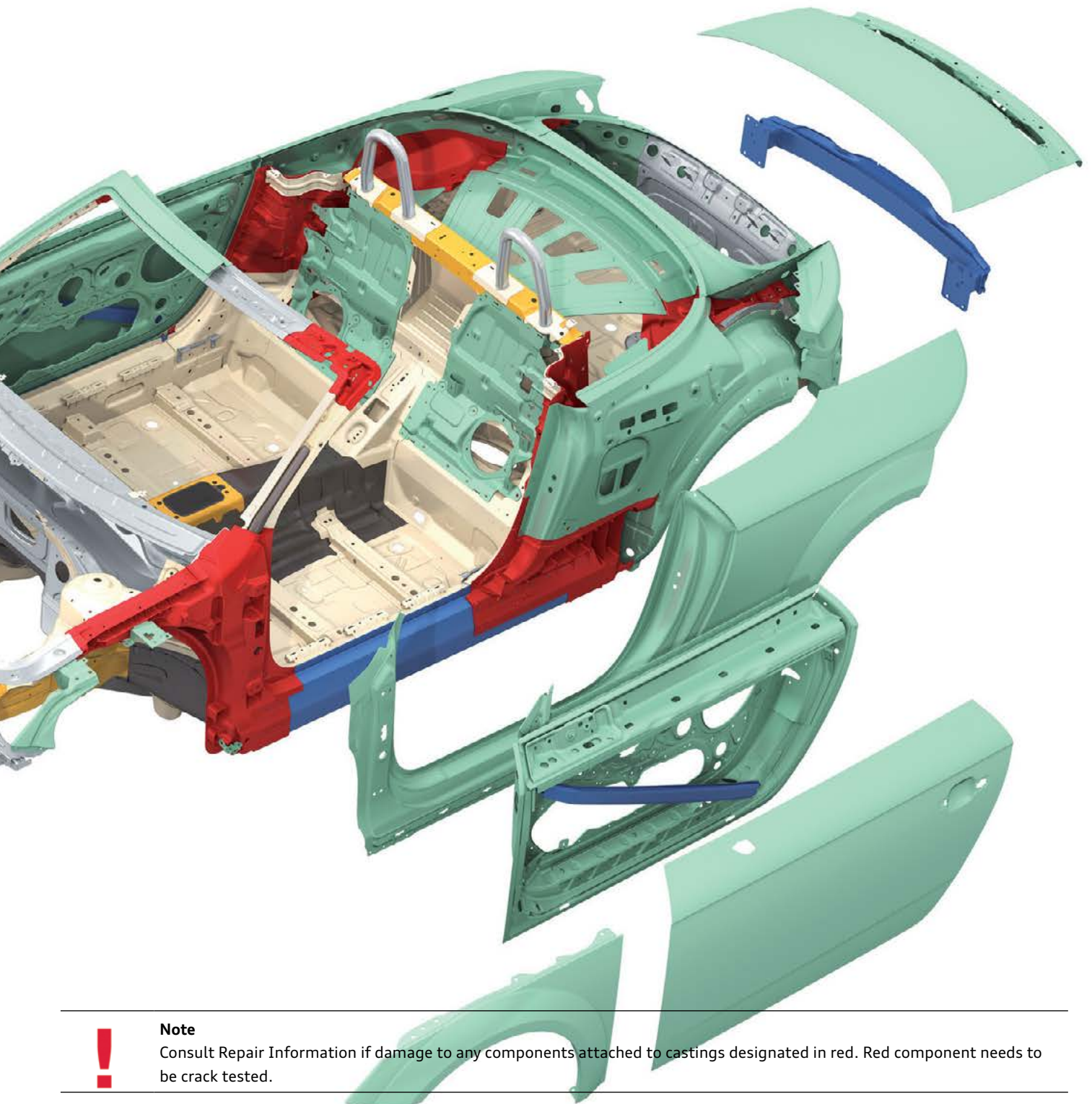
Design

The occupant cell of the Audi TT Roadster weighs 119.04 lb (54 kg). It is an aluminum lattice structure where 10 castings form the nodal points of the bodyshell.

There are large nodal elements at the A-pillars that connect the sill, window cross member and the upper longitudinal section in the front end.

The following components are made of die-cast aluminum:

- › A-pillar.
- › Top front roof frame nodal element.
- › Inner B-pillar.
- › Inner B-pillar connecting part.
- › Rear roof frame nodal element.



Note

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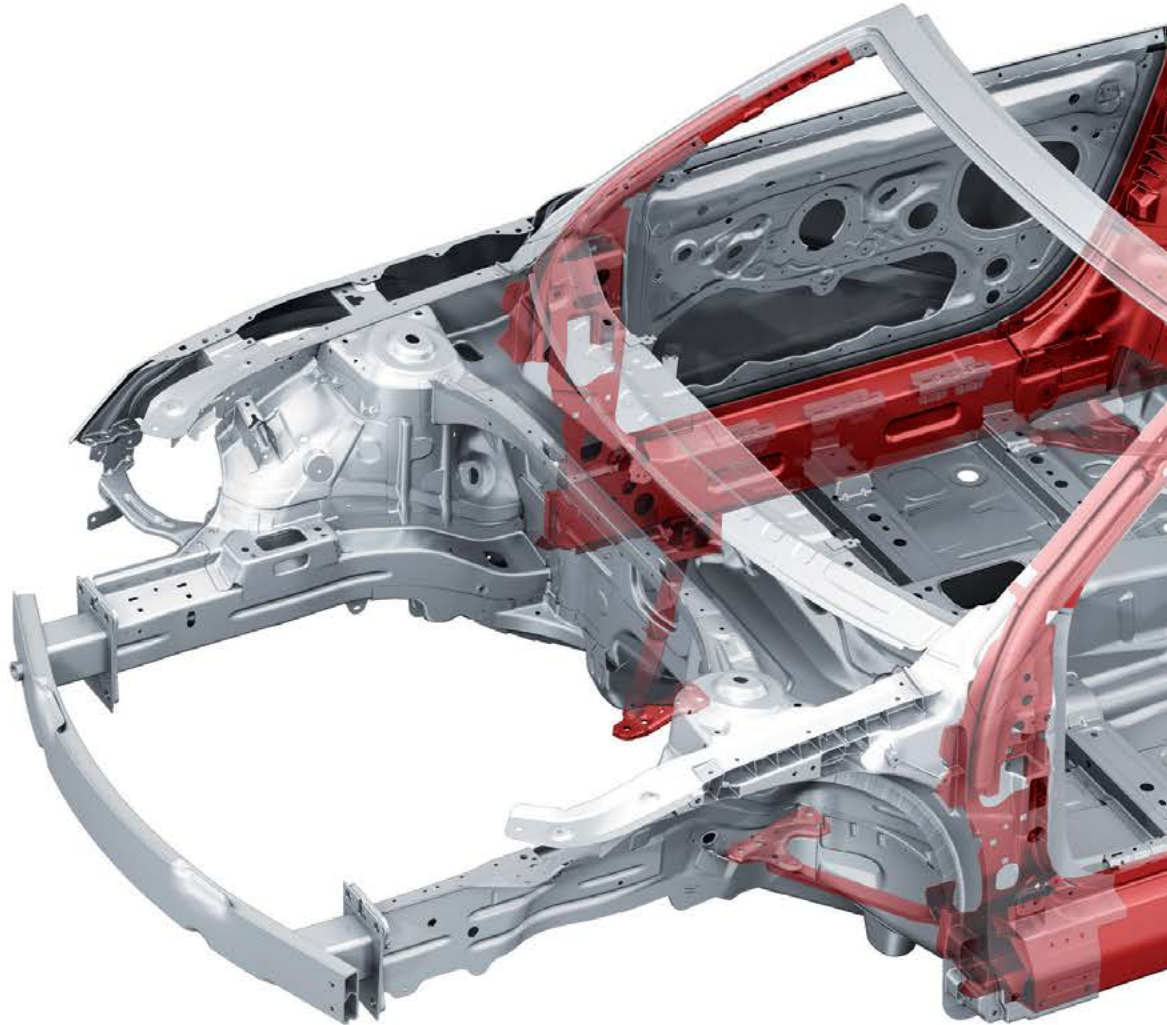
Consult Repair Information for Pulling

Body reinforcements

A-pillar

Compared with the Coupe, the body of the TT Roadster has been modified in key areas. To provide additional stiffening, an inner panel made of high strength steel and a reinforcing tube are concealed behind the die-cast aluminum A-pillars.

The reinforcing tube is made from ultra high strength hot stamped steel. These components offer the occupants a high level of safety in the event of a rollover.

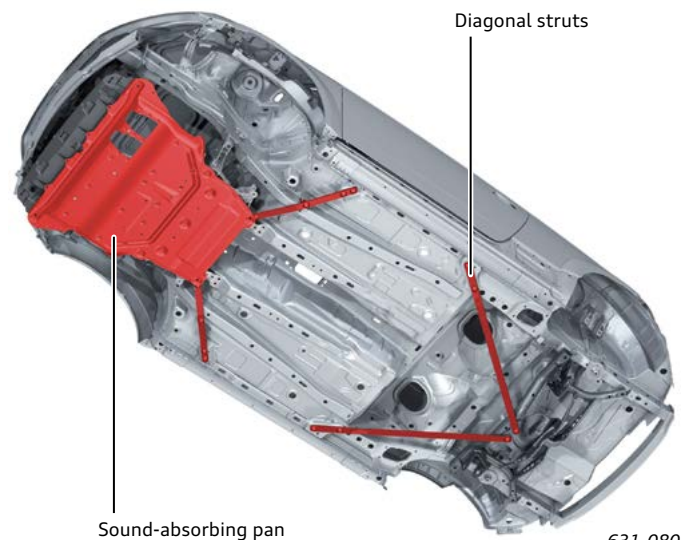


Diagonal struts

Additional V-shaped steel struts reinforce the front and rear axle carriers and connect them to the bodyshell. These supporting measures provide a high level of vehicle rigidity and help reduce the transfer of vibration to the passenger compartment.

Sound-absorbing pan

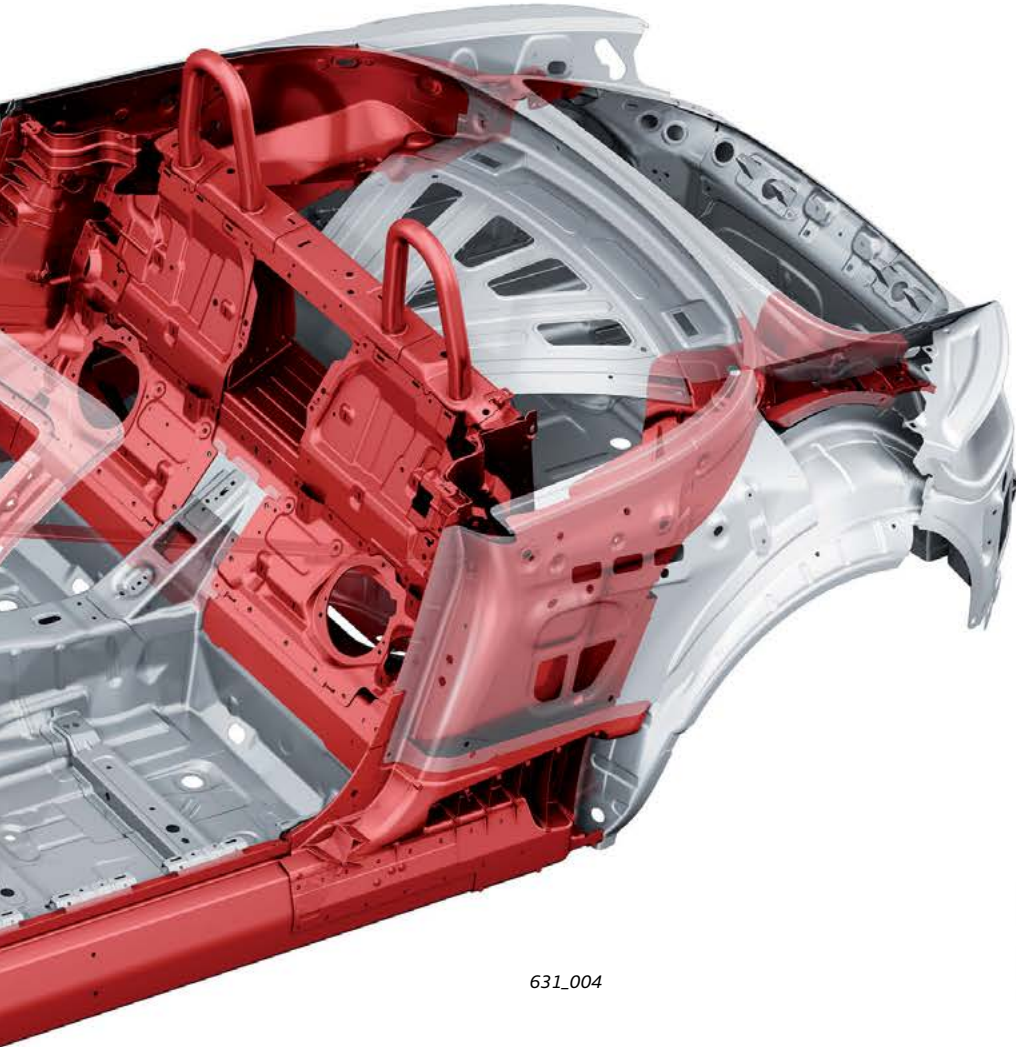
The Audi TT Roadster has an aluminum sound-absorbing pan, which not only reinforces the front end structure, but also provides added sound insulation.



Rear bulkhead

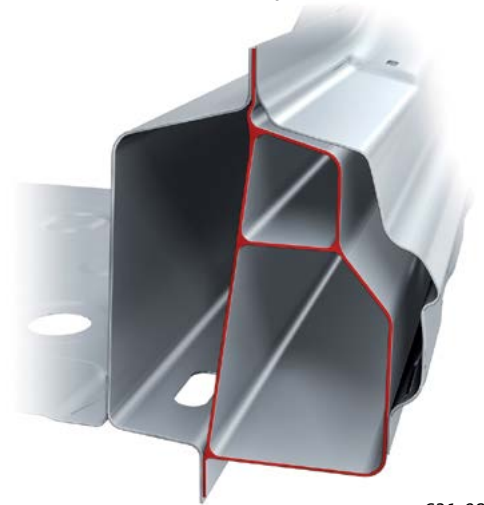
In the Audi TT Roadster, a solid bulkhead made of two box profiles separates the occupant cell from the luggage compartment and replaces the bottom cross member found on the Coupe. The top section of the bulkhead houses the steel rollover bars, a well-known and classic design feature of the Roadster.

Mounting plates seal the openings in the rear bulkhead, which features through-loading as standard.



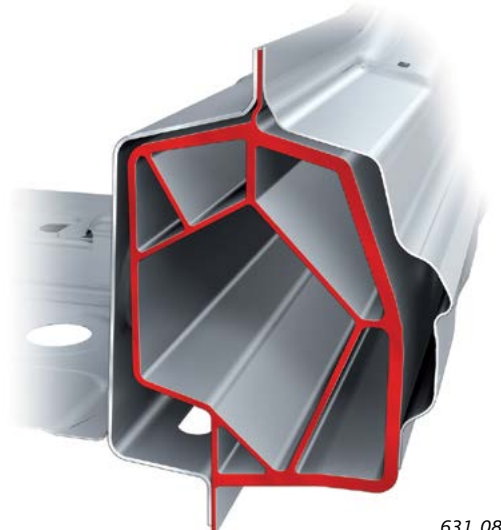
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Door sills of the Audi TT Coupe



631_081

Door sills of the Audi TT Roadster



631_082

Door sill

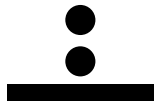
The door sills made from extruded aluminum profiles give extra strength.

Due to the absence of a roof structure, it is necessary for the door sills of the TT Roadster to be thicker and be integrated into the structure by means of die-cast nodes in the B-pillar. The modified interior geometry provides much higher strength.

Audi Collision Repair Symbols



Straight-line spot weld seam (single row) RP=spot weld



Straight-line spot weld seam (double row)



Straight-line spot weld seam (double row, staggered)



Gas-shielded arc plug weld seam
SG=gas -shielded welding



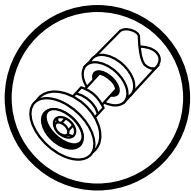
Gas-shielded arc stitch weld seam



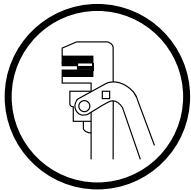
Gas-shielded arc continuous weld seam



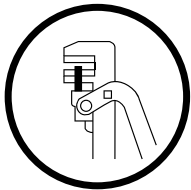
Gas-shielded arc continuous weld seam (intermittent)



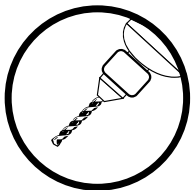
Panel cutting or weld grinding



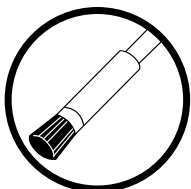
Flange panel edge for lap joint



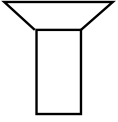
Punch plug weld holes



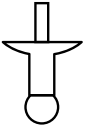
Drill plug weld holes or remove spot welds



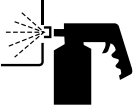
Rotary wire brush - removing coating with limited access



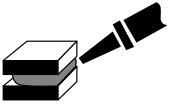
Solid rivet with countersunk head



Pop rivet with countersunk head



Apply cavity sealant



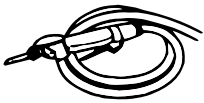
Apply adhesives



Apply seam sealer



Spot weld remover

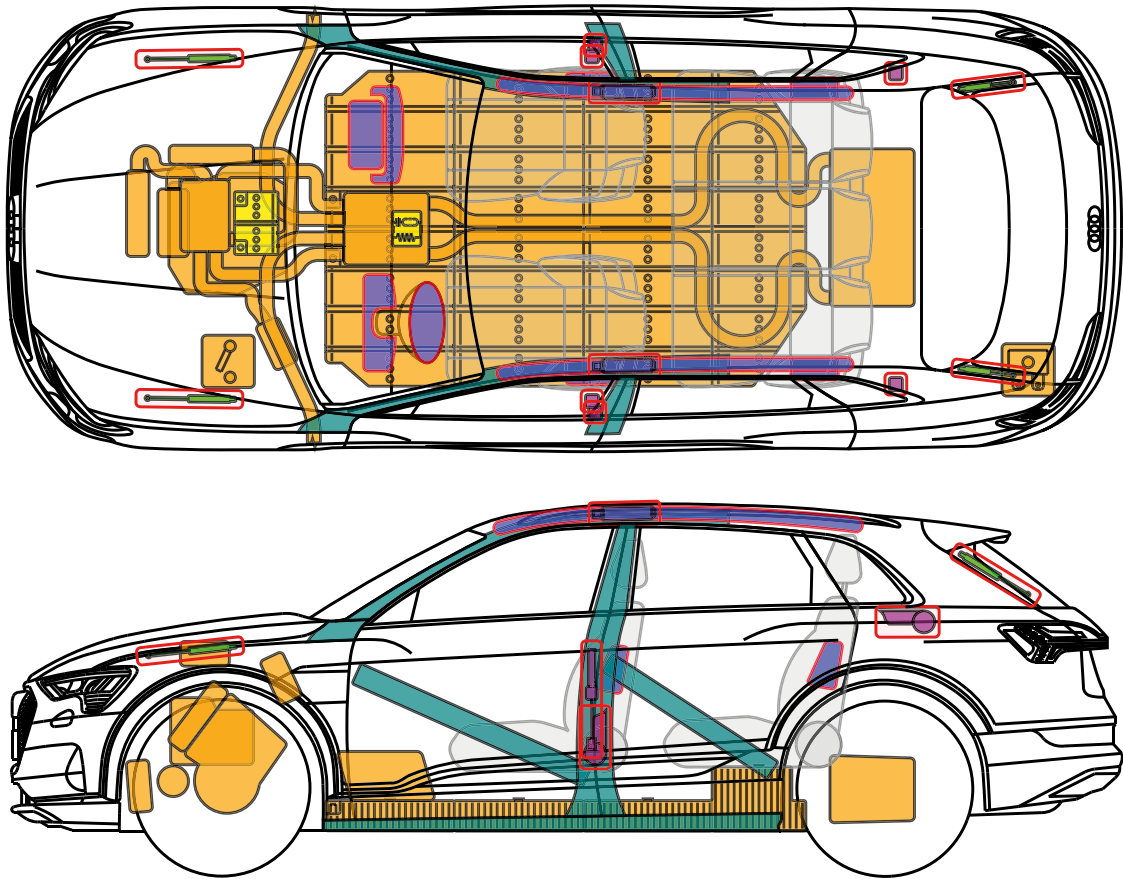


Body repair saw

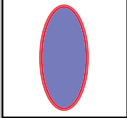



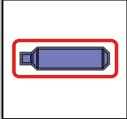
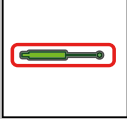




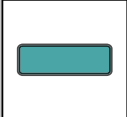
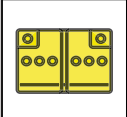



Riveting Tool

e-tron First Responders Guide



Legend

	Airbag		Automatic roll bar		Fuel tank		High voltage emergency disconnect
	Stored gas inflator		Cylinder		High voltage battery		
	Seatbelt pretensioner		SRS control unit		High voltage cable/component		
	Reinforcement		12 V Battery		Fusebox		

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Note

All 48v Hybrid models and e-tron High Voltage Batteries, must be de-energized by dealer high voltage technician or expert. All models, consult repair procedures in erWIN/ELSA for 12v battery disconnect procedure which requires VAS diagnostic tool and software.

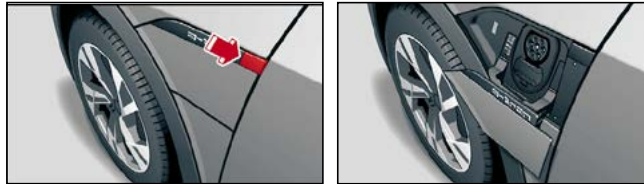
Characteristic features

The Audi e-tron can be identified by the characteristic body design (only electric drive variant), the charging socket and the e-tron logo.



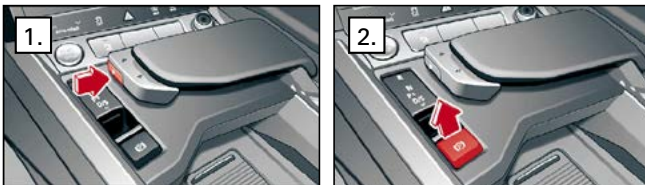
e-tron

The e-tron logo at the rear and side can optionally be deselected



Vehicle immobilization

1. Push "P"-Button on gear lever
2. Apply parking brake



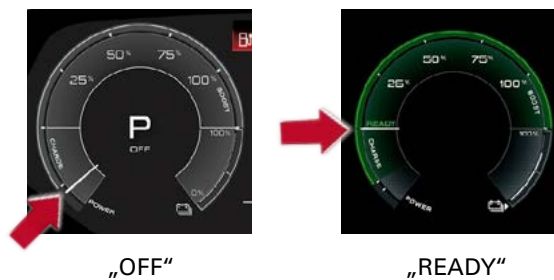
Switch off ignition

Press START-STOP button without depressing brake pedal



Warning: When pressing the START-ENGINE-STOP button and depressing the brake pedal at the same time, the engine will start!

The electric motor is silent.
The display on the left of the instrument cluster (power metre) indicates if the drive system is switched off („OFF“) or ready to drive („READY“).



„OFF“


„READY“



Note

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Deactivation of High Voltage System

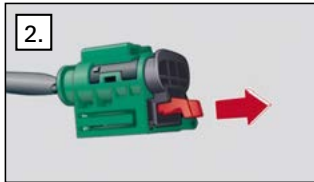
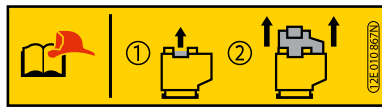
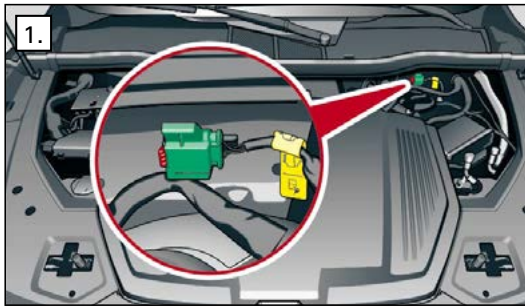
 **The High Voltage System is automatically deactivated during accidents in which the airbag(s) deployed.**

For all other cases, deactivate the High Voltage System as follows

Alternative 1 – Emergency disconnect in the vehicle front end accessible,

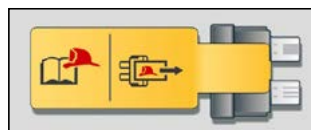
open the motor compartment hood

1. Locate the emergency disconnect ➔ on the left side next to the plenum panel
2. Pull out red flap from emergency disconnect
3. Pull out black plug while pressing the red tab



Alternative 2- Emergency disconnect fuse in trunk

1. Remove the cargo floor
2. Remove fuse box cover
3. Identify emergency fuse disconnection tab and pull out the tab



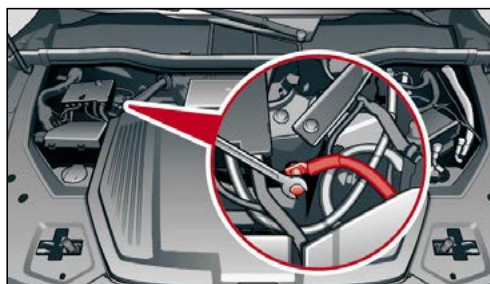
Note

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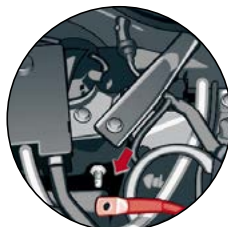
Disconnect 12 V battery

The 12 V battery is located in the vehicle front end under a cover, next to the plenum panel.

The 12 V negative battery cable is connected to the chassis suspension strut, see picture 1.
Unscrew the negative battery cable from the chassis suspension strut, see picture 2.



picture 1

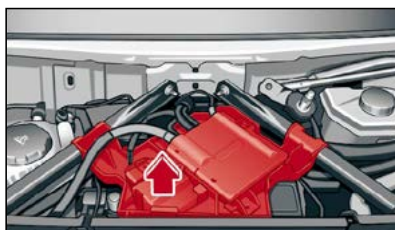


picture 2

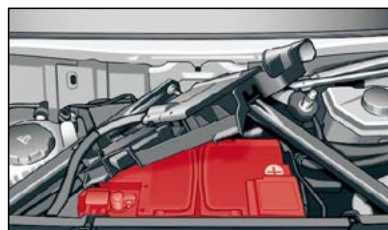
The 12 V battery can be accessed when the cover and control boxes located on the top of the battery are removed, see picture 3-5.



picture 3



picture 4



picture 5

Disconnect charging cable

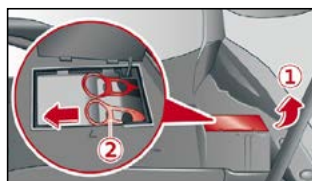
Vehicle connected to charging station:

1. Unlock vehicle via remote control
2. Push button charging socket and disconnect the charging connector



Releasing the charging connector manually in case of failure:
open the bonnet

1. Open the cover in the motor compartment on the appropriate side for the connection affected
2. Release the yellow ring from its holder and pull the ring carefully
3. Disconnect the charging connector



If needed, refer to additional steps in this rescue sheet



Note

All 48v Hybrid models and e-tron High Voltage Batteries, must be de-energized by dealer high voltage technician or expert.
All models, consult repair procedures in erWIN/ELSA for 12v battery disconnect procedure which requires VAS diagnostic tool and software.

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