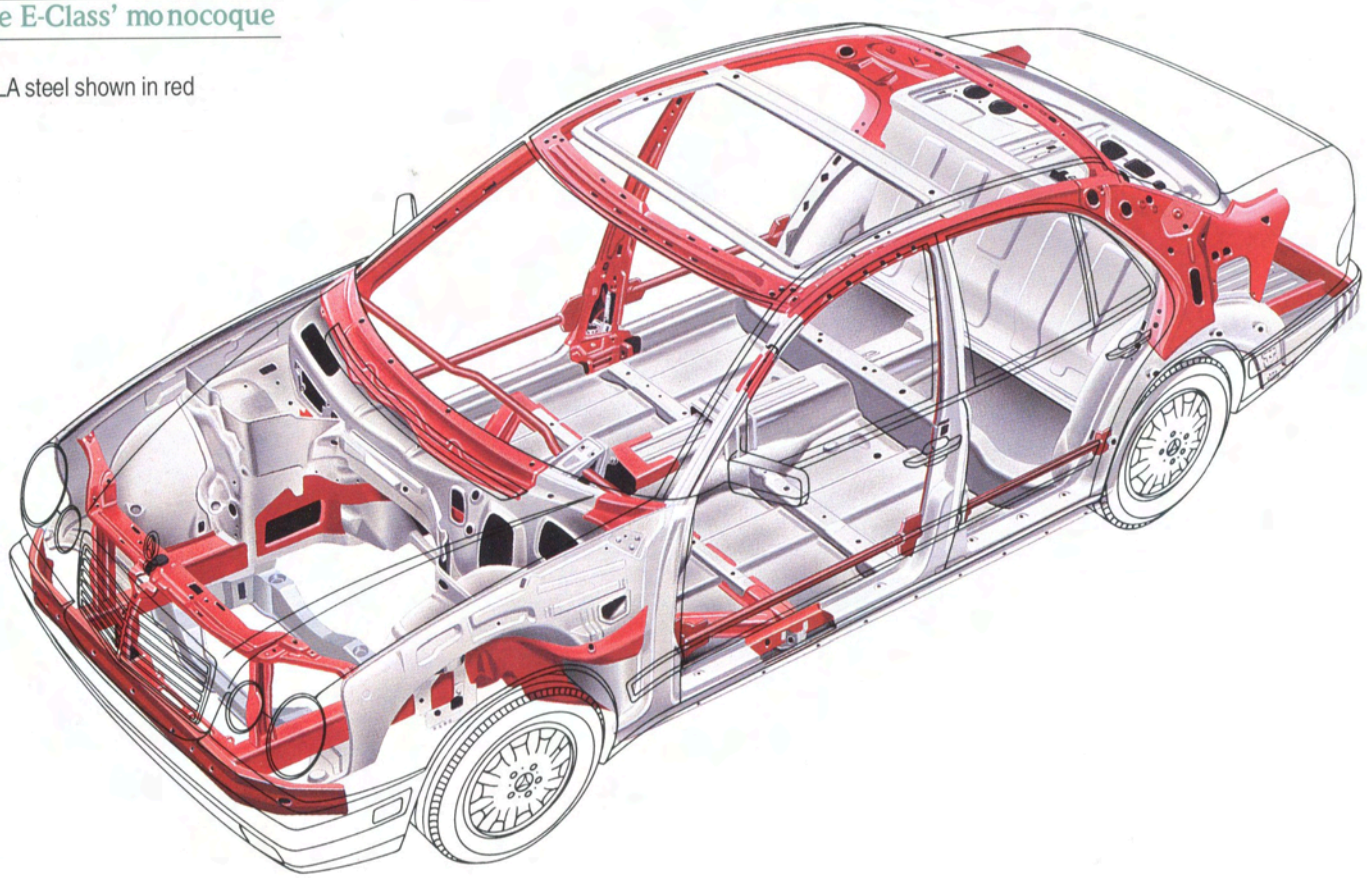
# The E-Class Body Structure

A rigid platform with these benefits:

- **A solid platform for the suspension, contributing to superb handling!**
- **Mercedes-Benz patented passenger safety frame and crumple zones — front and rear!**
- **An industry benchmark for durability and noise reduction!**

## The E-Class' monocoque

HSLA steel shown in red



### *Overview*

#### Monocoque Structure

The E-Class' monocoque (meaning "one shell") construction incorporates the body and frame in the same sheet metal. This technology provides one of the strongest steel automobile bodies for its weight.

#### High-strength/Low-alloy (HSLA) Steel

HSLA steel (shown in red) is an alloy that is up to three times stronger than lower-carbon steel of the same dimension. HSLA steel is used in parts of the monocoque that are critical for strength and rigidity (20.0 percent of the overall E-Class structure). A rigid body supports the chassis systems and helps protect the passenger cabin.

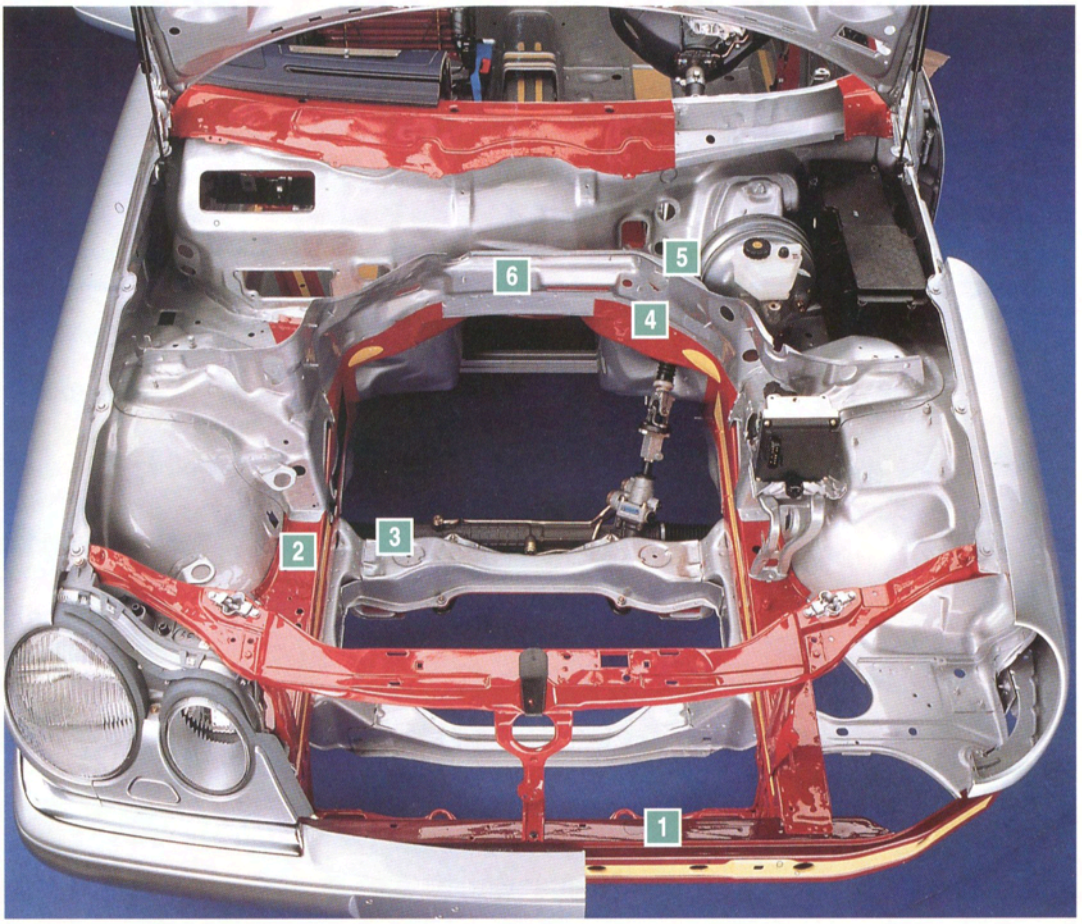
#### Multiple-step Sheet-metal Fabrication

A large proportion of the sheet metal is rolled or stamped in multiple steps to maintain strength and integrity over the entire surface.

Bends and arcs in the body have a wide radius wherever possible. Full, wide curves reduce cutting and crimping that could weaken the steel and make it more susceptible to rust and corrosion.

#### Crumple Zones

The front and rear sections are designed to crumple or deform in a programmed fashion during an impact. Crumpling helps to dissipate as much impact force as possible before reaching the passenger cabin.




## *Front Structure*

**1**

### Transverse Member

Behind the bumper, a transverse member ties together the two longitudinal members. The transverse member is made of high-strength steel and is bolted and strongly welded to the longitudinal members. The member is designed to channel impact energy to the side opposite a frontal, offset collision so that both sides are involved in absorbing some impact energy.

**2**

### Longitudinal Members

Running from the bumper to the passenger cabin, these frame rails are made of HSLA steel. The two members increase in height and cross section from the bumper to the cabin. This design helps them to deform at a programmed, uniform rate, absorbing some impact forces before they reach the cabin.

**3**

### Subframe

The front subframe serves a number of purposes. Besides being the mounting point for engine and chassis components, it is a structural member.

The subframe is made of rigid high-strength steel, and its front crossmember acts as an additional transverse member connecting the two longitudinal members. The rear crossmember's mounts are designed to break away from the longitudinal members in an impact, allowing the longitudinal members to deform along a greater portion of their length. By breaking away, the subframe carries the engine and chassis components that are mounted to it backward and potentially under the passenger cabin.

In addition to reducing noise and road vibration, the subframe increases chassis rigidity, adding to body strength and durability.

**4**

### Three-prong Forked Members

As the longitudinal members approach the cabin, they divide into three prongs, leading to the transmission tunnel, the rocker panels, and the A-pillars. The prongs' purpose is to channel some impact energy around the passenger cabin instead of into it, helping to protect the occupants and reduce injury.

**5**

### Double Bulkhead

Two bulkheads separate the engine compartment from the passenger cabin. Their benefits are: (A) They protect the electrical and brake components housed between them from dust and engine heat. (B) They add an additional barrier to engine noise and heat, helping to prevent them from entering the passenger cabin. (C) They add strength to the body.

**6**

### Bulkhead Crossmember

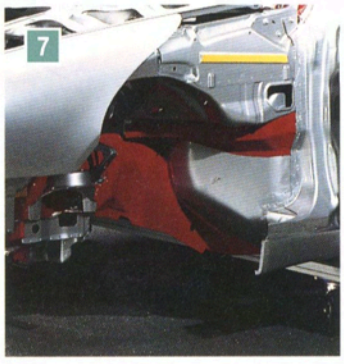
An HSLA-steel crossmember at the forward bulkhead connects the inner forks of the three-prong forked members. This transverse link increases body strength and transverse rigidity.

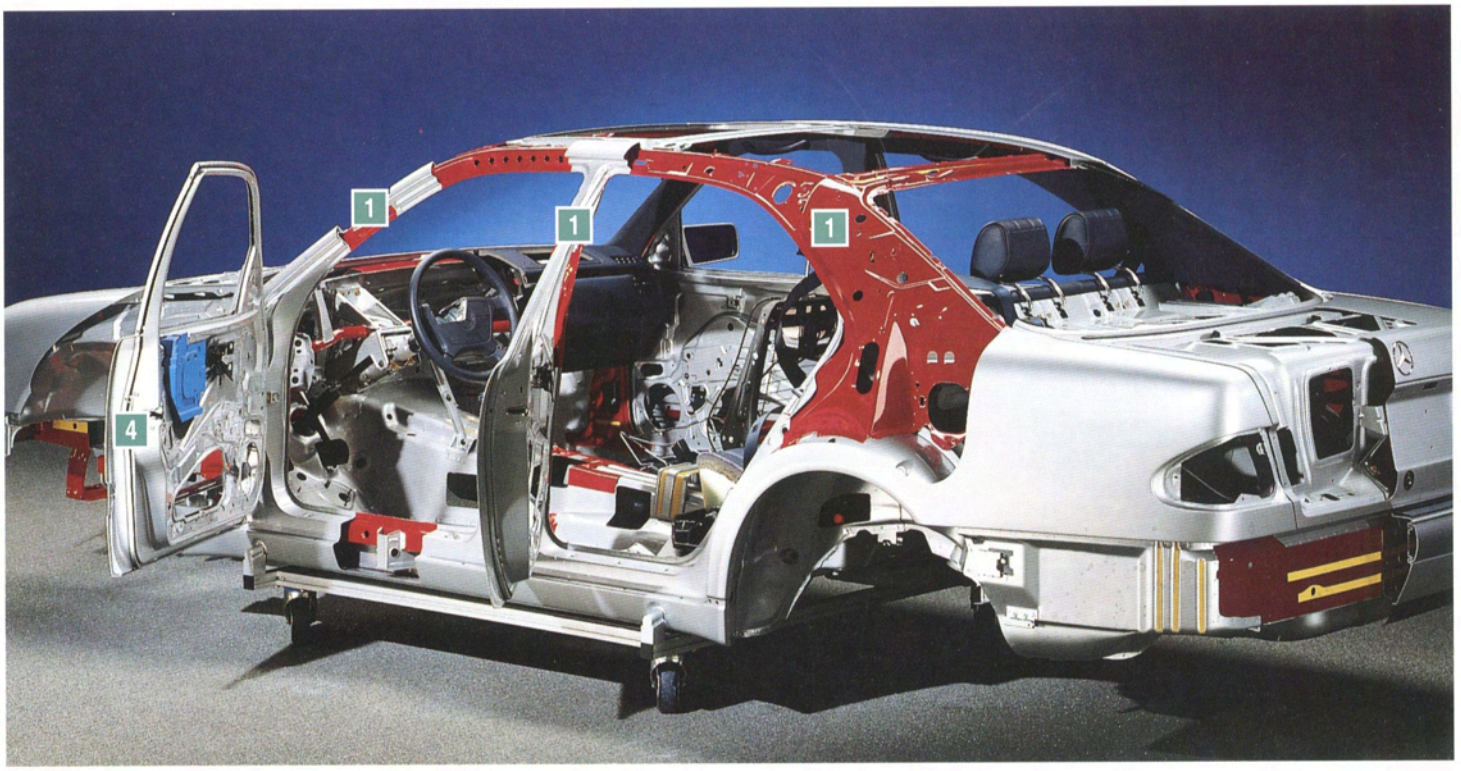
In certain full-frontal impacts, the front bulkhead crossmember will deform to help absorb some impact forces.

**7**

### Wheel Housings

Reinforced areas over the front wheels afford greater protection in impacts with objects that hit the car above the front bumper, helping to reduce intrusion into the passenger cabin.






## *Cabin Structure*

### Safety Frame

A rigid steel frame surrounds the E-Class' passenger cabin, helping to protect occupants in an impact. Body pillars, crossmembers, and longitudinal members form a safety frame around the cabin in the floor, around the doors, and in the roof. HSLA steel (shown in red) makes up a large part of the safety frame.

**1**

### Sandwich Body Pillars

The A-, B-, and C-pillars each consist of three pieces of steel sandwiched together (one of them HSLA steel). Crossmembers tie together the A- and B-pillars, and an HSLA-steel longitudinal roof member extends from the A-pillar to the C-pillar. This construction provides not only strength and rigidity for a quality feel, but affords increased protection for the occupants from various types of impacts.

The B-pillars extend into the HSLA-steel rocker panels for added strength, benefiting safety. (Some competitors weld the bottoms of the B-pillars to the tops of the rocker panels.)

**2**

### Floor Crossmembers

The rocker panels are connected by three HSLA-steel crossmembers, which make the floor pan stronger and increase body rigidity. The transmission tunnel has three braces that help the tunnel to resist collapsing in a side impact. (Compression would reduce interior occupant space.)

**3**

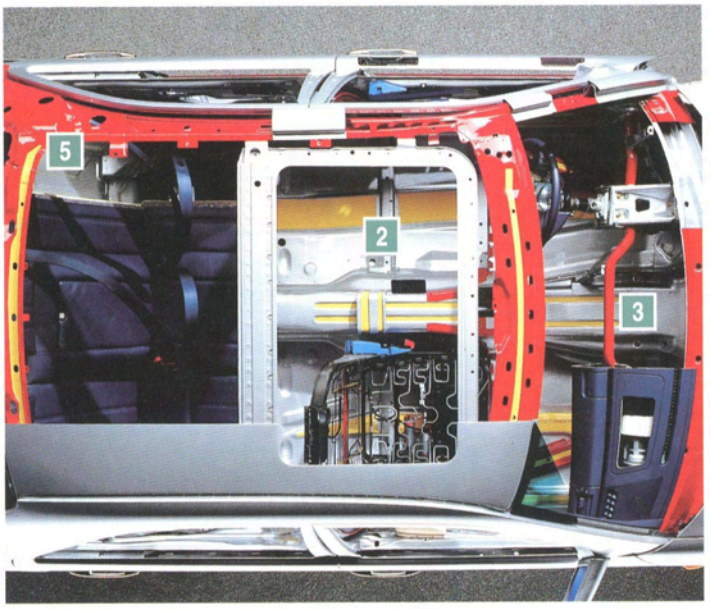
### Cowl Crossmember

A tubular, high-grade, HSLA-steel cowl crossmember ties together the A-pillars. It helps to resist crushing in a side impact that strikes the cowl area. This crossmember also assists in holding back the steering column, climate-control unit, and other components that are housed behind the dashboard, helping to prevent intrusion in frontal impacts.

**4**

### Doors and Hinges

A steel beam inside each door presents a barrier to side-impact forces, helping to reduce intrusion. Strong hinges attach the doors to the A-and B-pillars. The hinges and the wedge design of the door latches help to allow the doors to be opened after an impact.



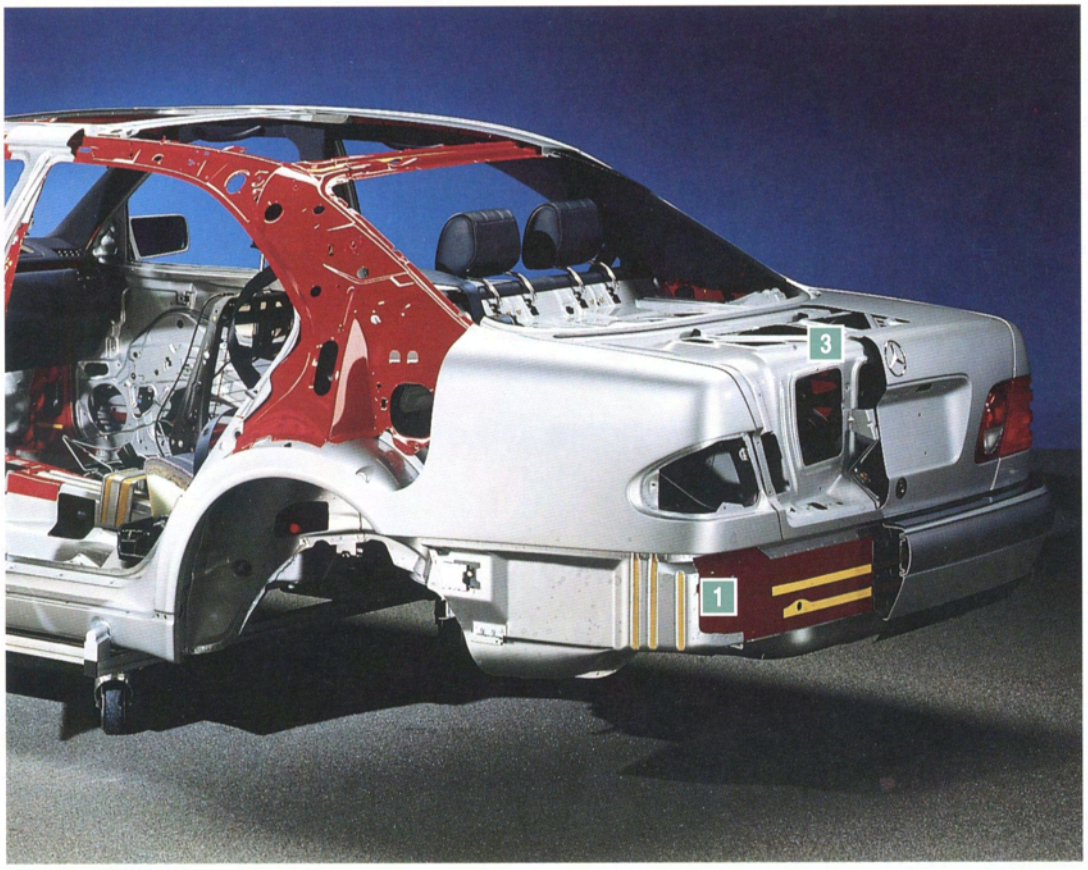

**5**

### Rear Bulkhead

A steel bulkhead separates the passenger cabin from the trunk. Besides protecting occupants in the cabin from trunk contents, it also improves overall structural rigidity to resist body flexing.

### Bonded Front and Rear Windshields

The E-Class' fixed glass is held in place by a quick-drying adhesive that bonds the glass solidly to the body. The strong bonding makes the glass a part of the body structure, adding to its rigidity and safety.




## Rear Structure

**1**

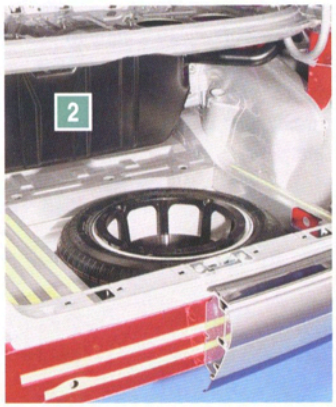
### Transverse Member

As in the front, a high-strength steel transverse member ties together the longitudinal members. In an offset collision, the transverse member helps channel some impact energy to the opposite side, for improved safety.

**2**

### Fuel Tank

One of the safest locations for the fuel tank is over the rear axle, an area protected from rear impacts by the rear body structure and the rear part of the chassis. The E-Class sedan's fuel tank is located there. The Wagon's fuel tank is located under the floor pan.




**3**

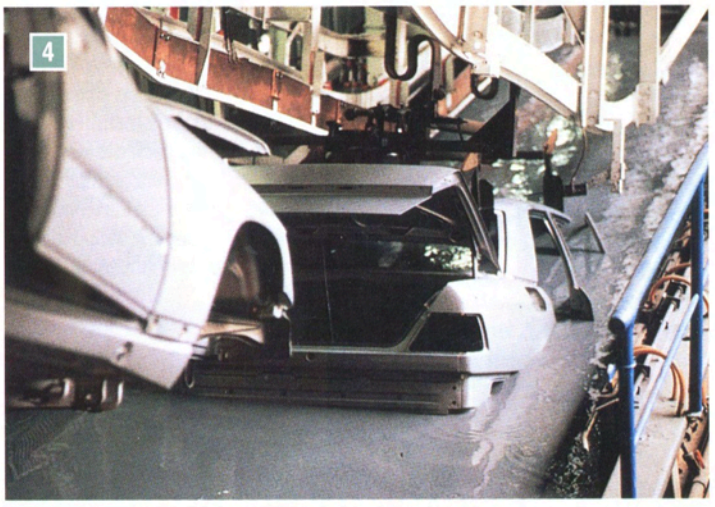
### Decklid Construction

Part of the decklid is preassembled using a "clinching" process. Clinching joins the two parts of the decklid through a pressurized indentation of the metal. The joining is done without damage to the decklid's corrosion protection and without heat distortion, adding to the decklid's quality construction.

Clinching allows the use of two different metals that cannot be welded together — steel for the outer shell and framing made of aluminum fittings and brackets.

### Reinforced Structure (E320 Wagon)

Structural enhancements by crossmembers in the Wagon's roof and passenger-cabin/cargo-area floor as well as a steel frame surrounding the tailgate opening help to ensure rigidity and integrity even when fully loaded with seven passengers and/or cargo.




## Corrosion Protection

**4**

### Galvanization

Much of E-Class' body is electrogalvanized, coating 48.0 percent of the body with zinc. Zinc covers the steel uniformly, making it resistant to corrosion. Zinc protects steel by "sacrificing" itself when the steel is scratched, rather than allowing the steel to corrode or rust. The benefit of galvanizing is increased body durability, ensuring long-lasting strength.

### Rust Inhibitors

Seams and crimped body parts most subject to corrosive influences are sealed with polyvinyl chloride (PVC) to help prevent corrosion. The wheel arches, underside of the floor, and A-pillars receive particular attention. The critical attachment points of the A-pillars and the body are sealed by hand, affording long life and strength.