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# Table of Contents

## F01 Introduction

Subject	Page
<b>The New 7-Series</b> .....	<b>3</b>
Introducing the F01/F02 .....	3
Dimensional Comparison, F02 vs F01 .....	4
New Options .....	6
<b>Body Overview</b> .....	<b>7</b>
Bodyshell (body-in-white) .....	7
Function .....	7
Coating process .....	11
Front End .....	14
Side Frame .....	15
Repair sections, side frame F01/F02 .....	15
Rear, F01/F02 .....	16
Doors .....	19
Interior Equipment .....	21
Seats .....	23
Belt System .....	29
Luggage Compartment .....	30
Rear Bumper .....	33
Slide/tilt Sunroof .....	34

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# Introduction

**Model: F01/F02**

**Production: From Start of Production**

# OBJECTIVES

After completion of this module you will be able to:

- Understand the changes to the 7-Series for 2009
- Understand dimensional changes as compared to the previous 7-Series
- Understand body construction and assembly techniques
- Understand the mix of body materials
- Understand interior changes

# The New 7-Series

## Introducing the F01/F02

In autumn 2008, the F01 will be in production in the Dingolfing plant. At the same time, the F02 (long-wheelbase version) will start coming off the assembly line.

The range will be represented by the 740i, 740iL and 750i and 750Li models. The F01/F02 is lower in height than the E65/ E66 and it has an improved rear passenger compartment (space for head/knees). The wheelbase too is considerably longer. Headroom and luggage-compartment capacity are more or less the same as in the E65.



**F01**



**F02**

## Dimensional Comparison, F02 vs F01

The following text describes the dimensional differences between the F01 and the longer wheelbase version, the F02:

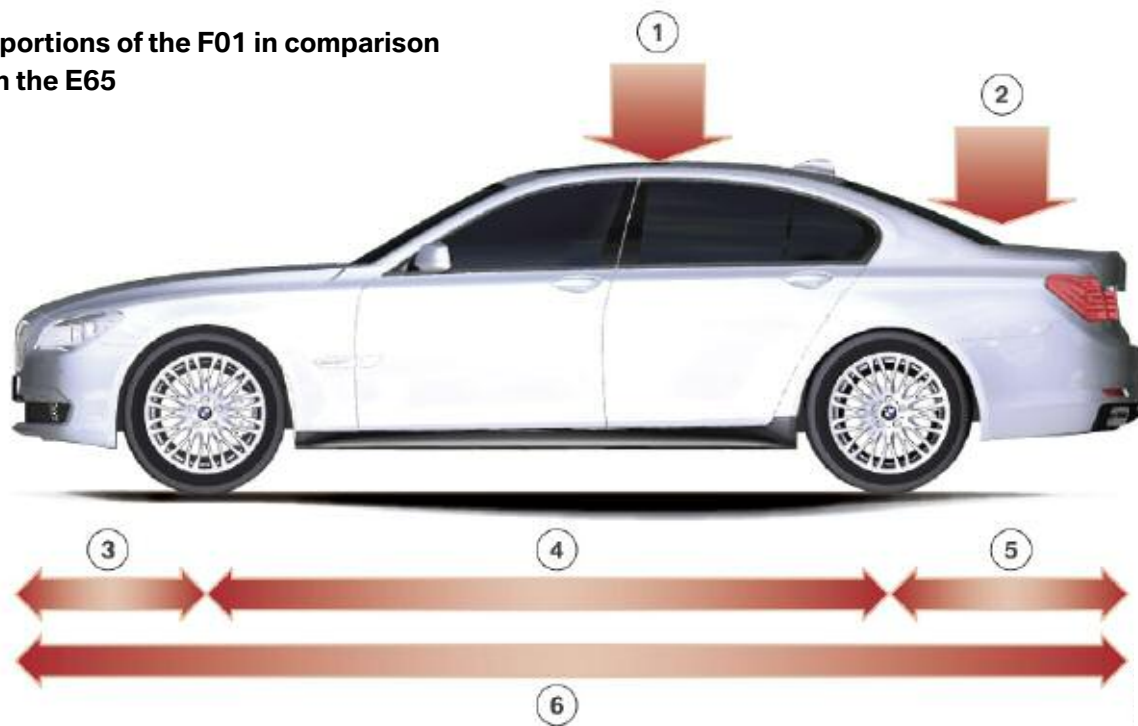
- Wheelbase longer by 140 mm
- F02 rear axle with pneumatic springs and self-levelling suspension as standard
- F02 has more rear-passenger orientation and a multifunction seat with improved comfort.

The F01/F02 is characterized by highly efficient petrol and diesel engines (more power in combination with lower fuel consumption).

The suspension damping is variable, with 3stage adjustment. The steering is an Integral Active Steering configuration with steerable rear axle.

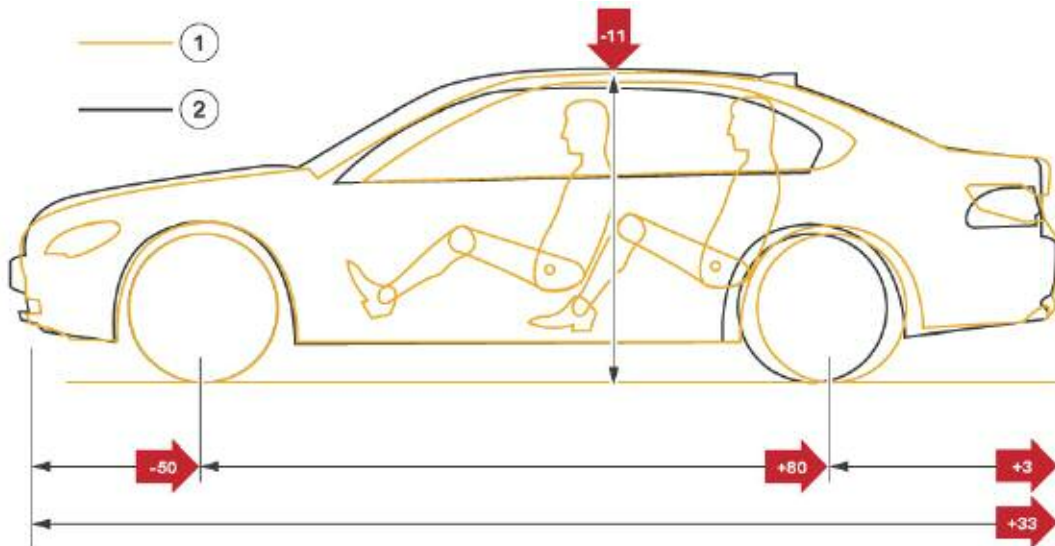
Drive assistance systems and a cockpit arrangement with driver orientation and a selector lever set in the center console are distinct from the E65.

### Proportions of the F01 in comparison with the E65



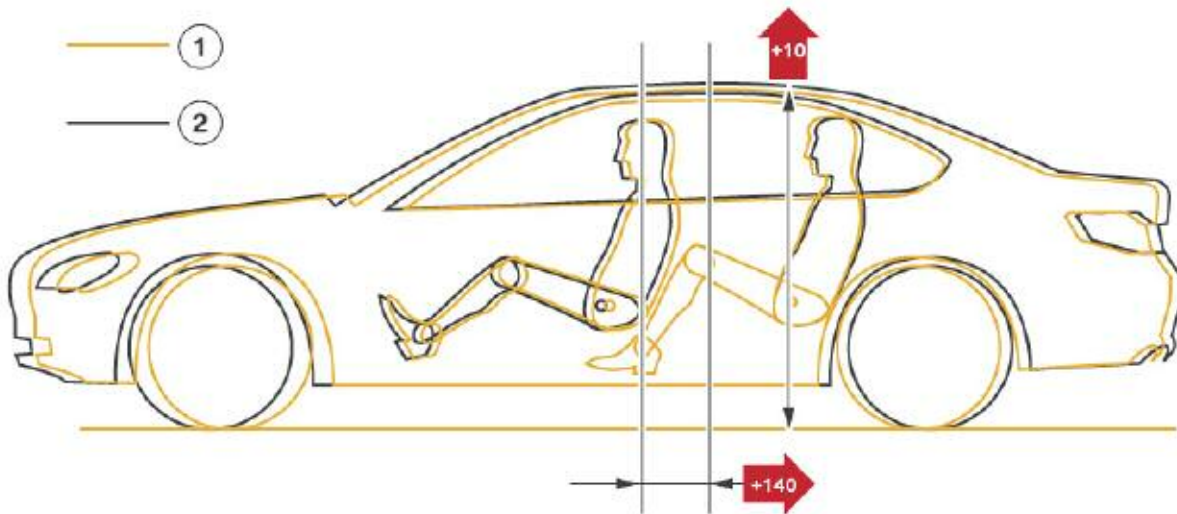
Index	Explanation	Index	Explanation
1	Lower	4	Longer wheelbase
2	Flatter	5	Longer
3	Shorter	6	Longer

The illustrations below, compare the F01 with the E65 (facelift) as well as the F01 and F02:



**Dimensions of the F01 in comparison with the E65 facelift (in mm)**

Index	Explanation	Index	Explanation
1	E65 facelift (LCI)	2	F01



**Dimensions of the F01 in comparison with the F02 (in mm)**

Index	Explanation	Index	Explanation
1	F01	2	F02

As the graphic indicates, in comparison with the F01 from the B-pillar back the rear-seat passengers of the F02 have 140 mm more length and 10 mm more height at their disposal.

## New Options

There are several new systems and functions available for the F01. The items listed below were not available on the previous 7-Series (E65):

- Head-Up Display
- Massage function for comfort seats in the rear
- Sideview and rear view cameras
- 4-zone air conditioning
- Instrument panel finished in leather
- Ceramic secondary controls
- Lane Departure Warning
- Active Blind Spot Detection (a.k.a. Lane Change Warning)
- Night Vision with person recognition
- Integral Active Steering
- ACC with Stop&Go function.



# Body Overview

## Bodyshell (body-in-white)

As with other models, the use of lightweight materials was a major requirement in the F01/ F02 design brief. This was achieved by the intelligent use of high-strength multiphase steels and very-high-strength hot-formed steels (strength of the body structure has again been increased over that of the predecessor model).

The lightweight materials contribute significantly to the overall reduction in gross vehicle weight and in combination with the rigidity of the bodywork skeleton they also contribute significantly to the car's drive dynamics.

### Highlights:

- Cast-aluminum spring mounts and aluminum roof (4 % of the body skeleton weight)
- High proportion of multiphase steels (18 % of the body skeleton weight)
- High proportion of hot-formed steels (16 % of the body skeleton weight)

### Function

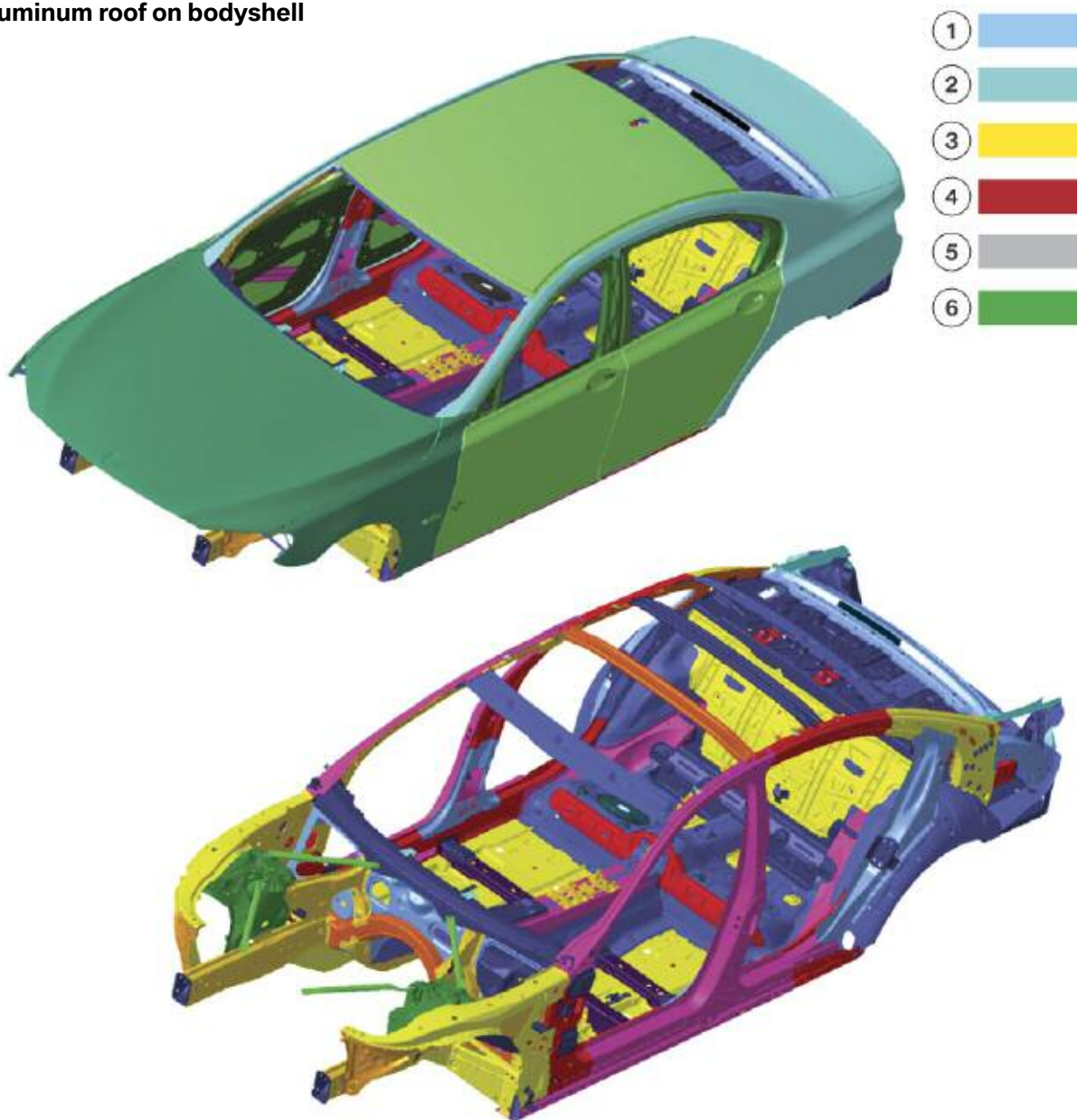
The cast-aluminum spring mounts strengthen the front section and improve drive dynamics. Lightweight construction with aluminum in the front section contributes to uniform axle load distribution.

The aluminum roof lowers the center of gravity of the vehicle as a whole, thus contributing positively to drive dynamics.

The increased-strength multiphase steels and very-high-strength hot-formed steels combine low weight with maximum strength for the safety passenger cell, thus contributing very significantly to passive safety.

Interested readers will find a wealth of background information on nomenclature and abbreviations in the Product Information entitled "Basics of High-Strength Steels".

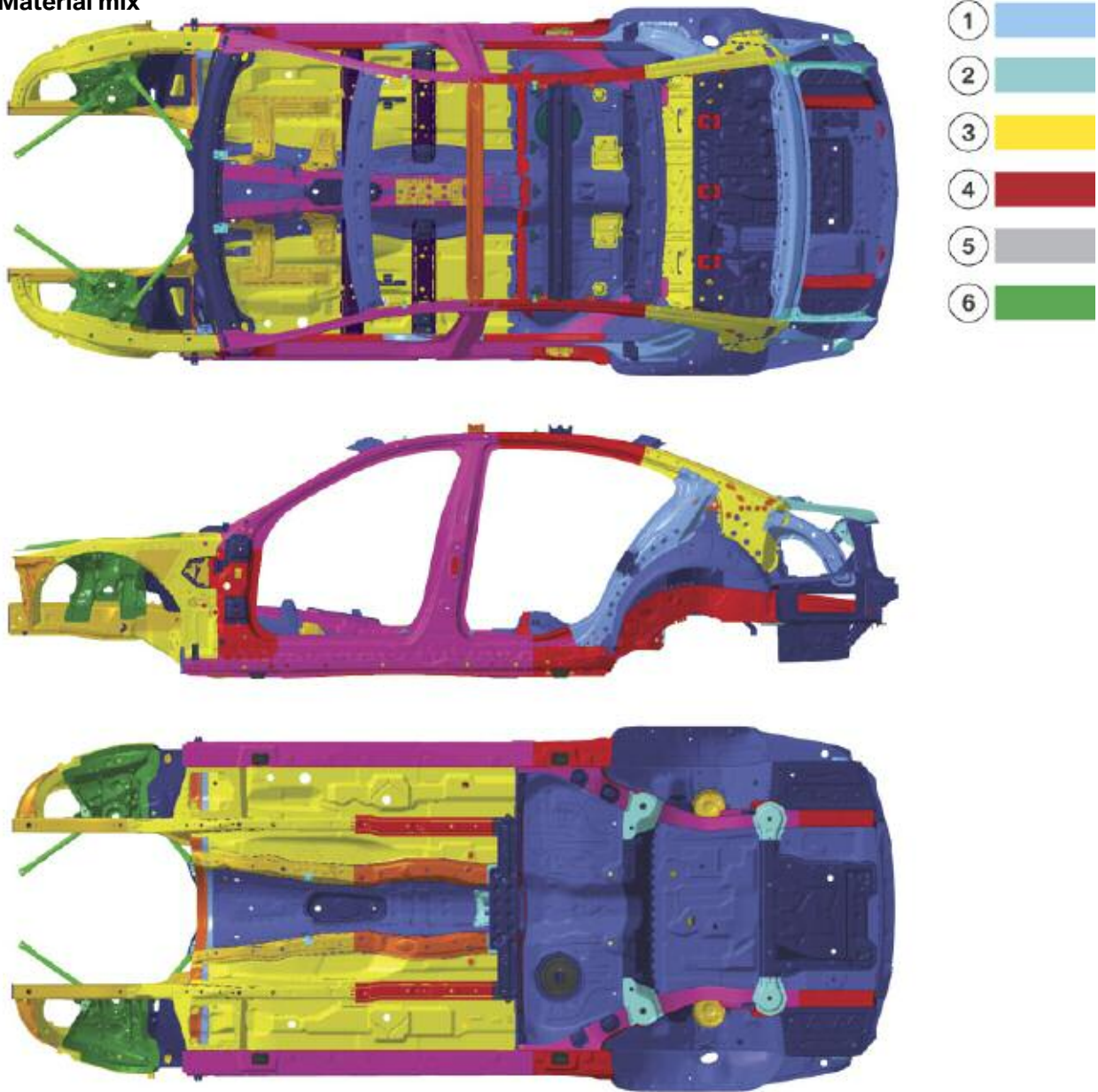
## Aluminum roof on bodyshell



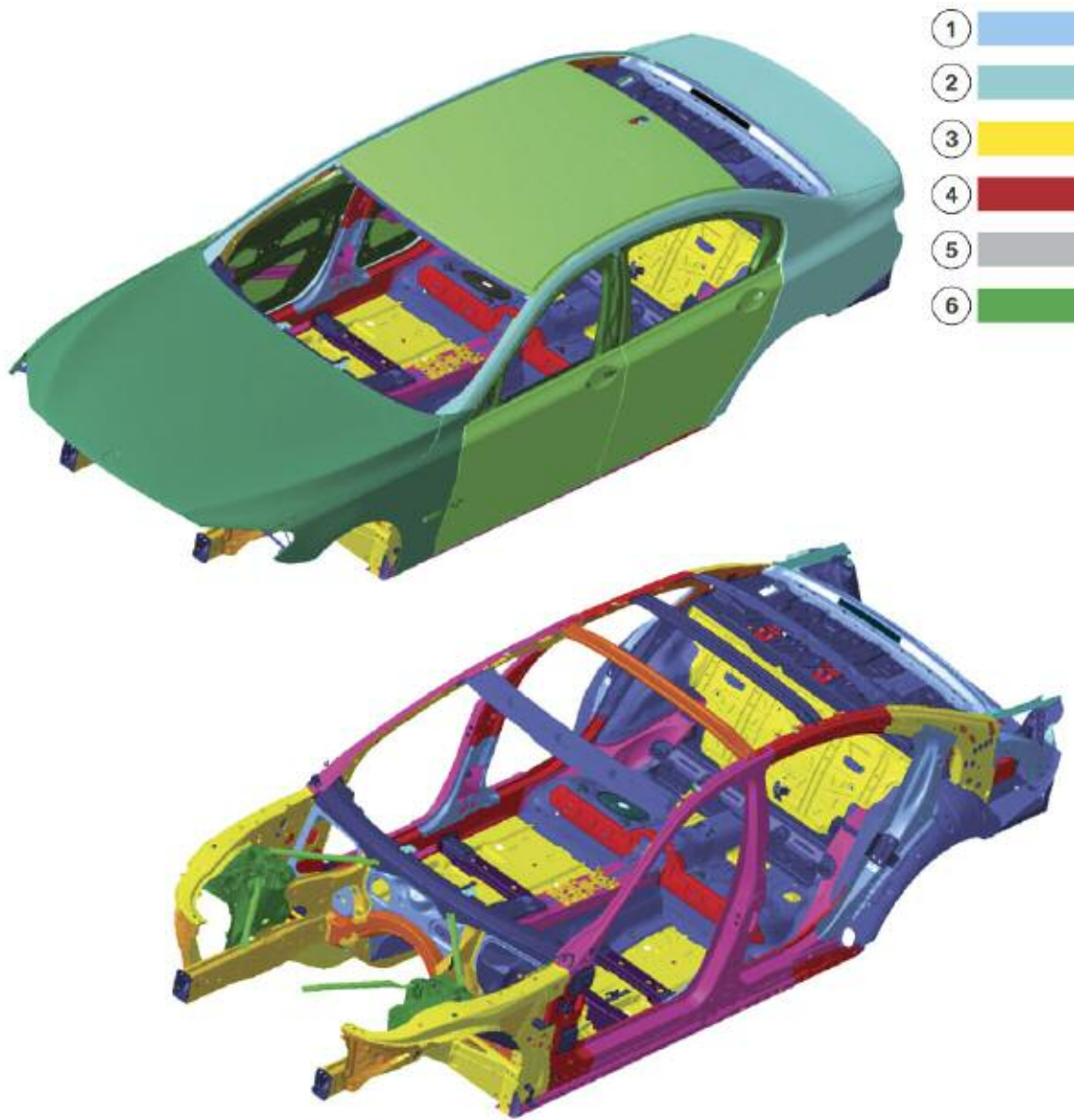
Index	Explanation	Index	Explanation
1	HC180BD, HC220BD, HC220YD, HC260BD, HC260LAD, HC260X, HX260BD	4	HC400T, HC420LAD, HC450X, HC600C, HD680C, HC900WD, HC950W, Docol 1200
2	DX54D	5	Others
3	HC300BD, HC300LAD, HC300X, HC340LAD, HC340X, HC380LAD	6	Aluminum



## Material mix



Index	Explanation	Index	Explanation
1	HC180BD, HC220BD, HC220YD, HC260BD, HC260LAD, HC260X, HX260BD	4	HC400T, HC420LAD, HC450X, HC600C, HD680C, HC900WD, HC950W, Docol 1200
2	DX54D	5	Others
3	HC300BD, HC300LAD, HC300X, HC340LAD, HC340X, HC380LAD	6	Aluminum



Index	Explanation	Index	Explanation
1	HC180BD, HC220BD, HC220YD, HC260BD, HC260LAD, HC260X	4	HC400T, HC420LAD, HC450X, HC600C, HD680C, HC900WD, HC950W, Docol 1200
2	DX54D	5	Others
3	HC300BD, HC300LAD, HC300X, HC340LAD, HC340X, HC380LAD	6	Aluminum

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In order to optimize anti-corrosion protection, the bodywork of the F01/F02 is constructed primarily from fully galvanized sheet, special-steel sheet and aluminum sheet. Welding, adhesive bonding and riveting are the connection techniques used.

Where sheets are doubled up the design is such as to minimize the contact surfaces. This helps prevent bondline corrosion.

All other anti-corrosion protection and sealing measures depend on the extent to which the doubled sheets are exposed to moisture/ water.

In particularly critical areas, expanding foam parts are used to seal the body cavities against the ingress of water. All doubled sheets in wet zones are double-sealed and, if necessary, they are also treated with wax as an extra sealant.

Doubled sheets in dry zones (above the waistline) are sealed not against corrosion as such, but if necessary to avoid the ingress of dust.

Corrosion-critical material pairing is avoided. The combinations of material substrates and joining technique were chosen with meticulous care in order to avoid corrosion risks.

### ■ Coating process

In the painting process the bodyshell is dipped and:

- Alkaline-cleaned
- Phosphated (roughening of the surface so the coating forms a good key) and
- Cathodic-dip coated (anticorrosion coating that coats the insides of all body cavities).

The organic paint coat is then baked on.

In follow-up processes the body is sealed with PVC and protected by filler and topcoat paints on the outer skin.

Critical parts of the body of the F01/F02 are specially treated with cavity sealant.

The objectives are:

- 3 years without any visible corrosion whatsoever
- 12 years without rust penetration
- High level of seal efficiency against increase of water and dust.

The design implements the following measures aimed at controlling acoustic effects and vibrations in the F01/F02 bodyshell:

- Narrow engine-mount base to reduce structure-borne sound transmission to the front of the car
- Longer rear-axle mount base; solution of the trade-off between liveliness of response on the one hand and acoustics on the other

- Rolling acoustics with runflat tires on a par with those of non-runflats
- Optimized vehicle insulation, even though the roof is aluminum
- Double bulkhead panel with need-oriented acoustic insulation
- High static and dynamic body stiffnesses; homogeneous flex line
- Outstanding idling comfort
- Acoustically insulating glass available as an optional extra
- V8 and larger engines: hydraulically damped gearbox mounts: solution of trade-off between shake vs. acoustics.



**Separating the roof from the bodyshell**

The aluminum roof is one of the engineering highlights of the F01/F02 bodyshell.

- Aluminum roof on steel body in series production
- Weight saving (8.4 kg for the slide/tilt sunroof version)
- Lowers the car's center of gravity > drive dynamics, CO<sub>2</sub>
- Adhesive-bonded aluminum roof; this also means optimum anti-corrosion protection in mixed-material construct
- Top part of frame riveted (slide/tilt sunroof version)
- Patented shaping to compensate for thermal expansion and contraction
- Use of a newly developed adhesive generation ("expansion/contraction vs. strength", shear modulus over temperature, long-term strength)
- Spacer nubs integrated into roof ensure correct gap for the adhesive
- Assurance of a roof-rack concept (100 kg load-bearing capacity).

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The aluminum roof can be separated from the bodyshell by heating the adhesive and inserting wooden wedges to open a gap between the aluminum roof and the bodyshell.

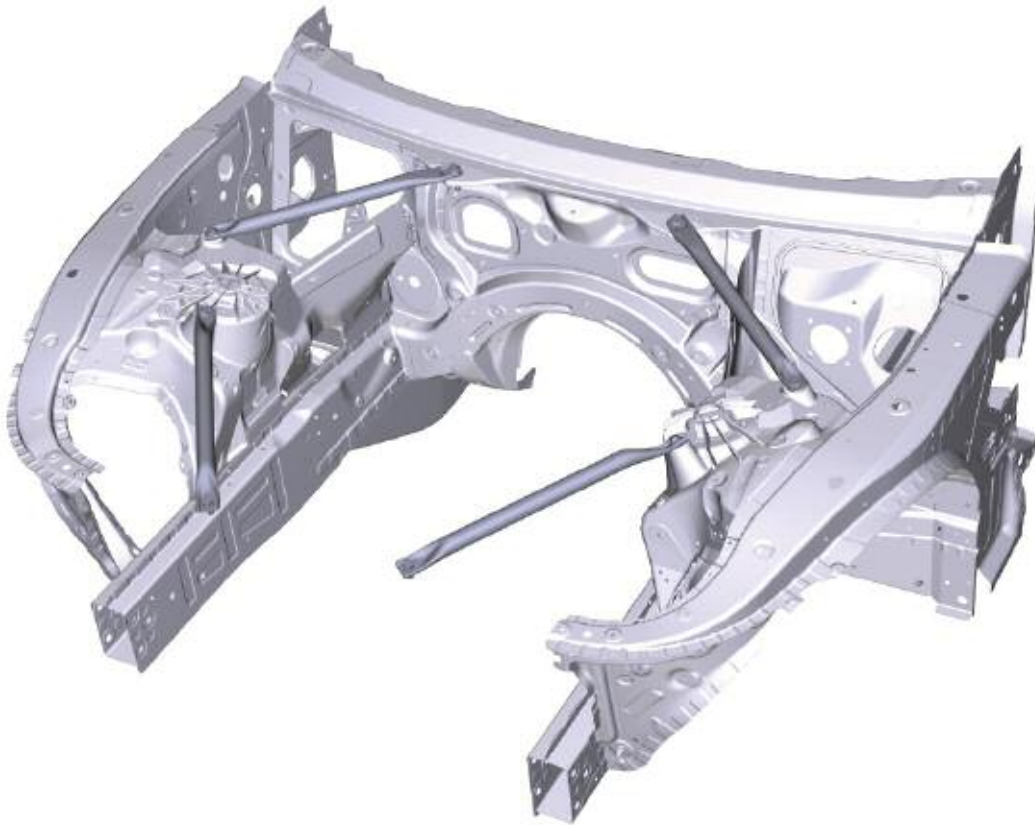


**Separating roof from bodyshell**

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## Front End

The F01/F02 share the same front end of the bodyshell.



The engine supports are shorter than those of the E65. Consequently, there is no repair section for the engine bearers for the F01/F02.

The wheel housing is similar in design to that of the E70 (cast-aluminum spring mount). In most instances in which the wheel housing requires repair, engine and gearbox can remain installed in the car.

There are repair sections for the top support.

The front side panel is a bolt-on aluminum panel. There are spacers between the side panel and the bodyshell.



**Section through top support**

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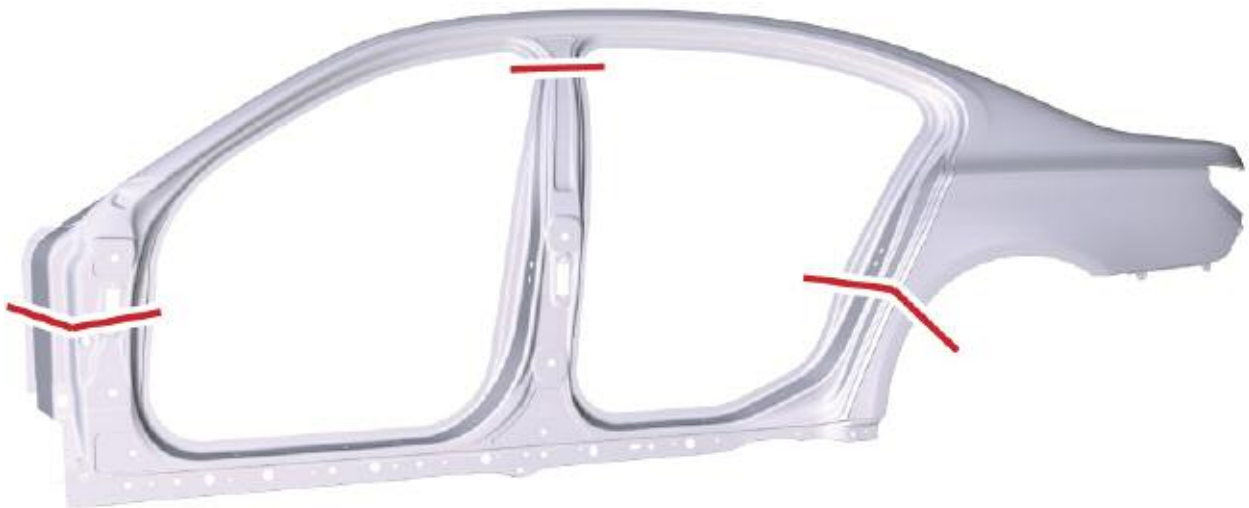
## Side Frame



As in the predecessor model, the B pillar of the side frame is made of very-high-strength steel. A new feature is that the sill is made of the same material as the B pillar.

### ■ Repair sections, side frame F01/F02

The following sections have been defined for parts-replacement repairs of the side frame:

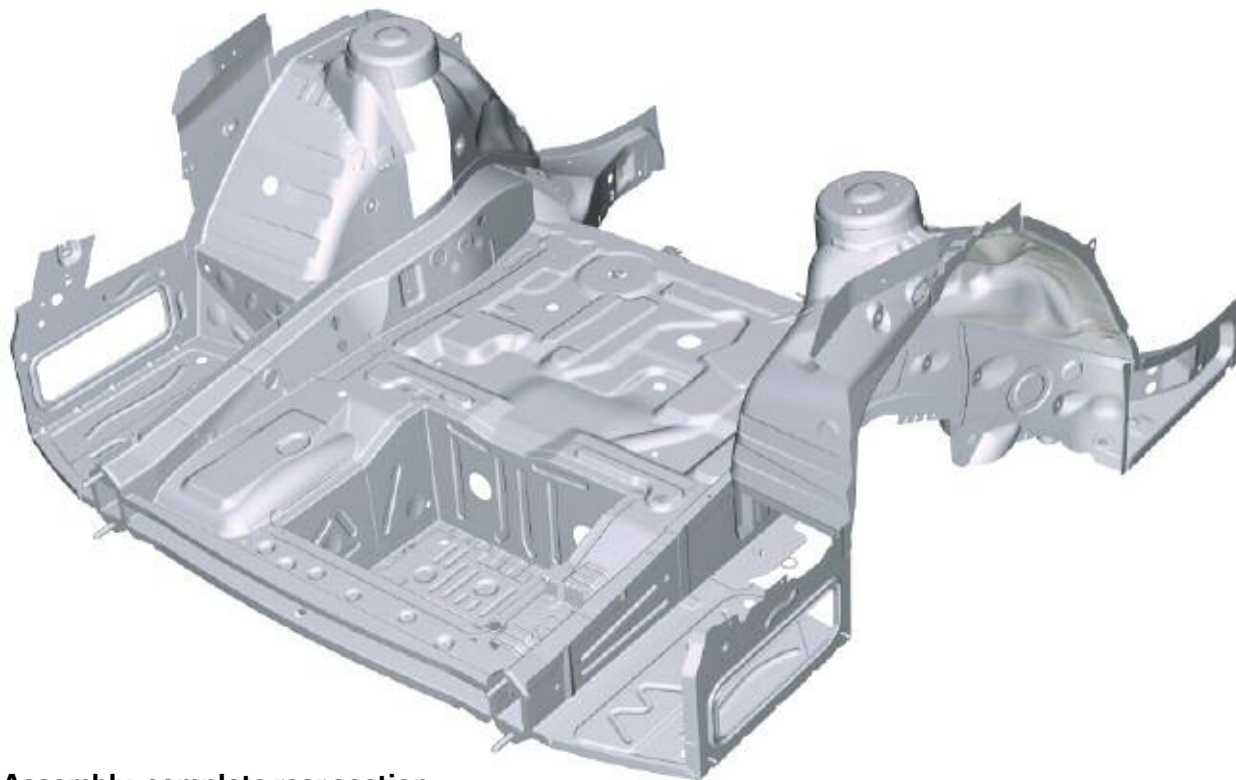


### Repair sections, side frame F01/F02

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## Rear, F01/F02

The rear of the F01/F02 is a conventional structure. With regard to repair procedures, there are no major innovations as compared to the E65/E66.



**Assembly, complete rear section**



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## Front end

The front end of the F01/F02 can be completely separated from the rest of the car. It consists of the front bumper, the lights and numerous sensors and the diverse cover panels.



### Attachment of front end

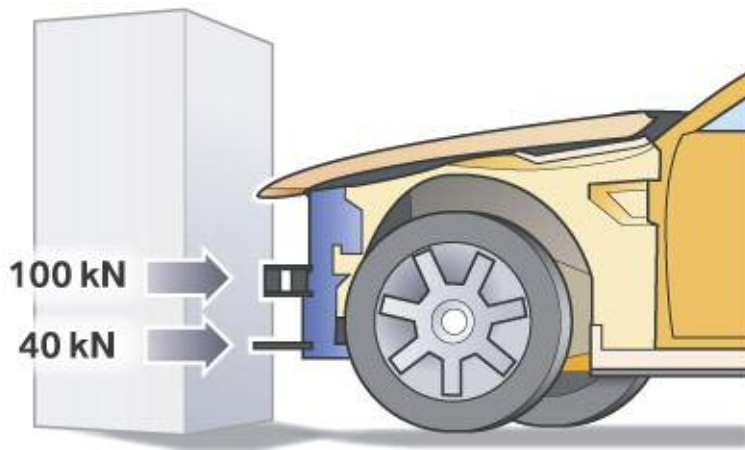
The front end is attached by means of the engine carrier and the front axle. This is new. Removing the front end entails releasing the threaded fasteners at the engine carrier.

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The threaded fasteners of the front-axle mounts also have to be undone.

The threaded fasteners of the radiator bracket also have to be undone (do not open the cooling circuit). The final steps are to release the support of the lock and remove the wheel-arch panels.

The advantage of having the front end attached by means of the engine carrier and the front axle is that in the event of a collision, there is a second load path to dissipate the collision forces.



This makes for better results in the statutory crash tests and advantages in terms of pedestrian protection and the high-speed crash requirements.

Another interesting point is the material mix in the threaded-fastener concept of this mounting system. The engine carrier is made of increased-strength steel, while the bumper mounts and the front-axle anchorages are aluminum.

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## Doors

The F01/F02 has aluminum doors with sheet-metal shell window frames. The advantages of this configuration are as follows:

- Improved visibility to the outside and upward
- Window frames look lighter and slimmer when the doors are closed
- When the doors are open, the window frames look solid with a high-quality appeal
- More light can make its way into the passenger compartment
- Interior impression with improved feeling of space.



### Front door

The doors are made of large, sheet-metal shells to transmit force. The corpus of the door is characterized by high rigidity and component quality, ensured by the closest possible tolerances. Numerous advantages derive from this make-up:

- Compliance with the highest requirements for rigidity at the window frames, because the frame is a single section made of only two sheet-metal parts with minimum dimensions and good manufacturability
- Implementation of the premium design/ form language in the exterior by realization of extreme deep-draw dimensions and a new component separation (hinge reinforcement and door inside panel)
- Maximum geometrical stability of the individual parts with one-piece door inside panel (window frame and door corpus)
- Lowest possible number of components for the door structure
- Laser welding and structural adhesive bonding as the joining technologies of the door structure.

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## Rear door



BMW has often used aluminum door structures in the past, for example for the Z8. Until now, however, aluminum doors were manufactured only for models produced in relatively small numbers of units.

The development objective for the F01/F02 door structure, therefore, was to implement a concept for an aluminum door that can be manufactured in larger numbers at acceptable costs.

However, aluminum is not as easy to shape as steel, so aluminum sheet shell parts are much more difficult to manufacture than counterpart steel components, particularly when the deep-drawing depths are considerable.

Despite these difficulties, the development of a new structure concept with large shells to transmit force sufficed to improve the manufacturability of the components, without necessitating a departure from the proven sheet-metal shell structure. A new cross-section at the window frame achieves high rigidity and good manufacturability; there are only 2 parts and dimensions are minimized. In this way, the intensive form language typical of BMW's exterior lines is carried over into the material aluminum, bringing dimensional minimization to the visually sensitive area of the window frames and utilizing high deep-draw depths to preclude the possibility of taking up more space.

As regards the interior parts of the doors, it is noticeable that unlike the E65, there are no airbags in the door trim. Again at variance with the E65, the outside mirrors can be removed without the necessity of removing the door trim.

The sound-deadening mats and the fasteners for the wiring harness in the door are also of new design. The installation and removal of the exterior door handle are slightly more difficult than is the case with the E65.

Window lifts and locks are similar to those of the E65. A new roller sunblind is a feature of the rear door. The mounting elements are of modified design.

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## Interior Equipment

The interior of the F01/F02 has evolved again beyond that of the E65/E66. There is more knee-room for the rear-seat passengers. The same also applies to headroom in the rear. By the same token, the steering column adjusts over a longer range than in the predecessor model.



**Interior equipment, F01/F02**

The following are available for stowage inside the passenger compartment:

- Oddments tray with hinged lid on the left beside the steering column
- Folding-lid compartment in center console with mobile-phone adapter
- Large glove box
- DVD changer in directly accessible compartment with lid
- Large pockets in the doors.

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The driver assistance systems available are:

- Head-up display
- Night Vision II
- ACC
- Lane-departure Warning and Active Blind Spot Detection

An improved multimedia interface offers even more convenience and additional freely programmable buttons.

The F01/F02 offers perceptible driver orientation, for example gear-selector switch, actuating switch for the electromechanical parking brake and drive-dynamics switch in the center console.

The passenger compartment also features multimedia functions such as USB, hard-disc drive and multimedia changer (including DVD). A slimmer instrument panel without emphatic double dome over the instruments expresses the higher tone. Similarly, there is no slot for the ignition key (I.D. transmitter) Passive Go is now standard.

## Seats

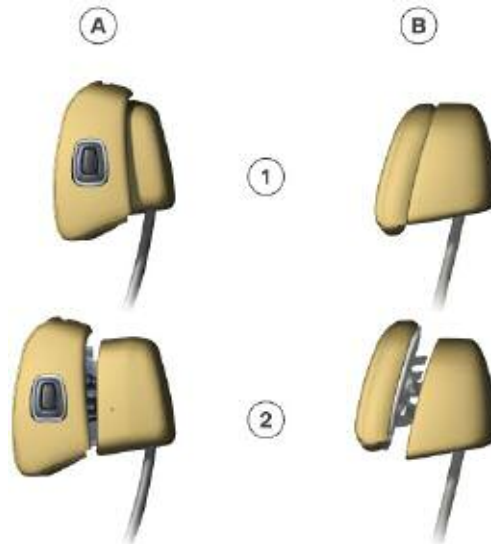
The front seating on the F01 consists of the multifunction seats. This seat features a side airbag integrated into the seat backrest.

If the Rear Seat Entertainment option is installed the backrest head of each front seat has a rear-facing monitor set in the rear. Ambience lights for the rear compartment are also set in the back panel of each front seat.

The seat-adjustment switches have been relocated and are now back on the seats themselves, whereas the seat function switches are again set in the door trim.

The front seat features crash-active headrests. There is also a choice between basic and high versions for the rear seats.

### Crash-active headrest, basic seat/multifunction seat



Index	Explanation	Index	Explanation
1	Comfort precision advance	A	Basic seat
2	Crash advance	B	Multifunction seat

The “Comfort seat, rear” is available as part of the “Luxury Rear Seating” package only in the F02. The comfort seat is a two-seat configuration for more passenger comfort . Between the seats there is a small console with a storage compartment and lid.

The center armrest has a recess cover. The cover moves into position to cover the recess when the armrest is extended. There is also a cupholder integrated into the center armrest.

**Complete seat system, rear comfort seats** The rear luxury seating package includes the



Index	Explanation	Index	Explanation
1	Console with storage compartment	3	Center arm rest with recess cover
2	Cupholder		

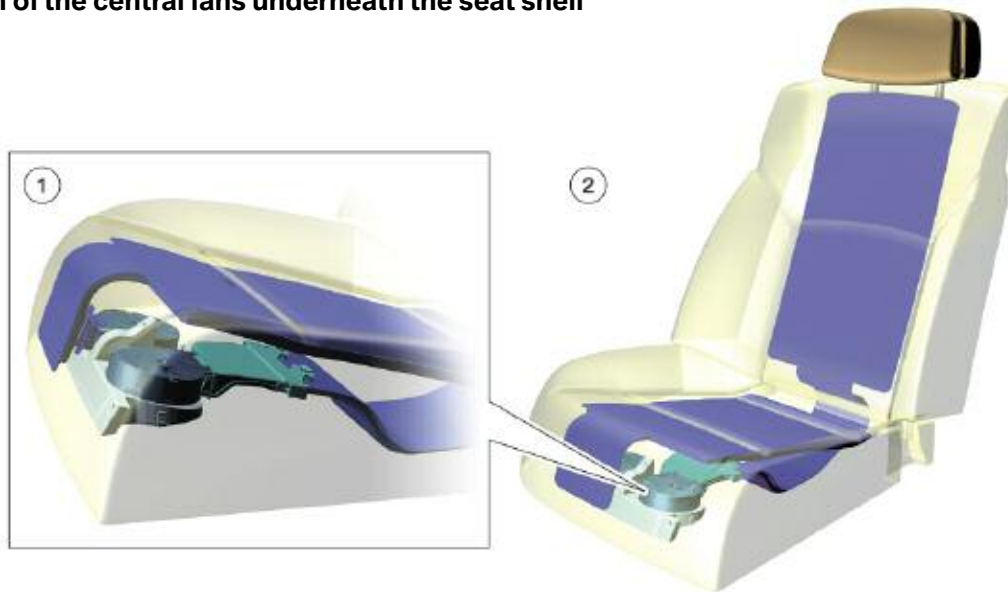
rear seat ventilation system which directs air to different parts of the seat. This is accomplished by air mats perforated at defined points to direct the air to the seat occupant’s body.

The cooled air is drawn in from the passenger compartment at the bottom of the B pillar. This new concept has a significantly better cooling effect than the configuration in the E65, especially in hot climates.

The diverse individual fans in the acclimatized seat of the E65 are replaced by two central fans per seat. These fans draw in air cooled air from the passenger compartment through the shared box.



## Location of the central fans underneath the seat shell



Index	Explanation	Index	Explanation
1	Location of the two central fans underneath the seat shell	2	Ventilation mats for seat cushion and backrest

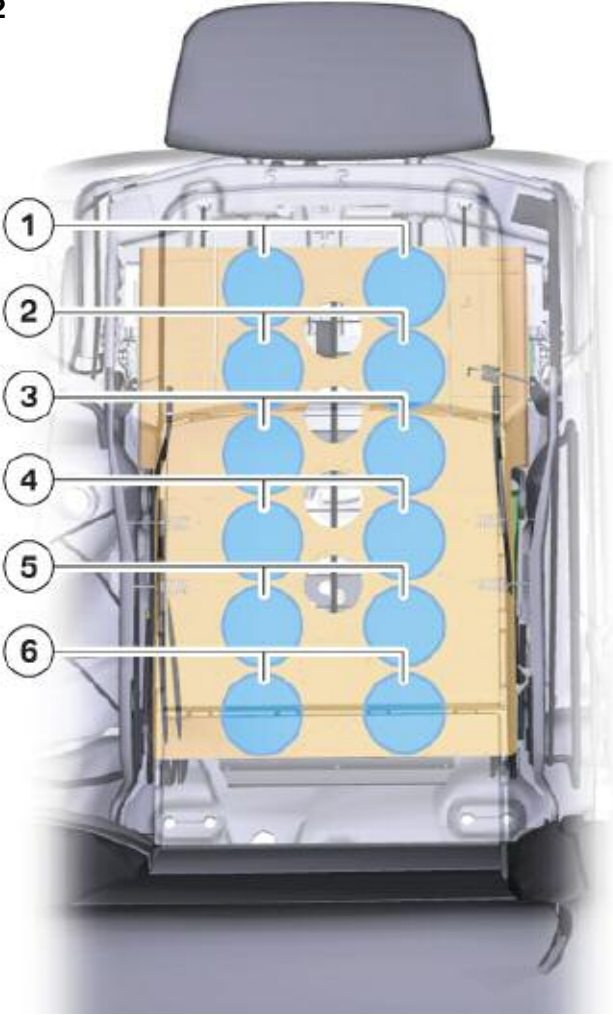
The fans blow air toward the seat occupants. Fan speed varies as a function of the seat's surface temperature.

The rear massage seat is a new optional extra. 12 inflatable massage pads relax the musculature of the seat occupant's back with a wavelike downward massaging action. The rotary mobilization function is produced by 6 pads. These pads are set in the outer-shoulder area and in the middle of the thorax and in the lower lumbar region.

To achieve segment rotation, the left shoulder pad is inflated with the right lumbar pad and the left thorax pad. This changes periodically with the opposite set of pads.

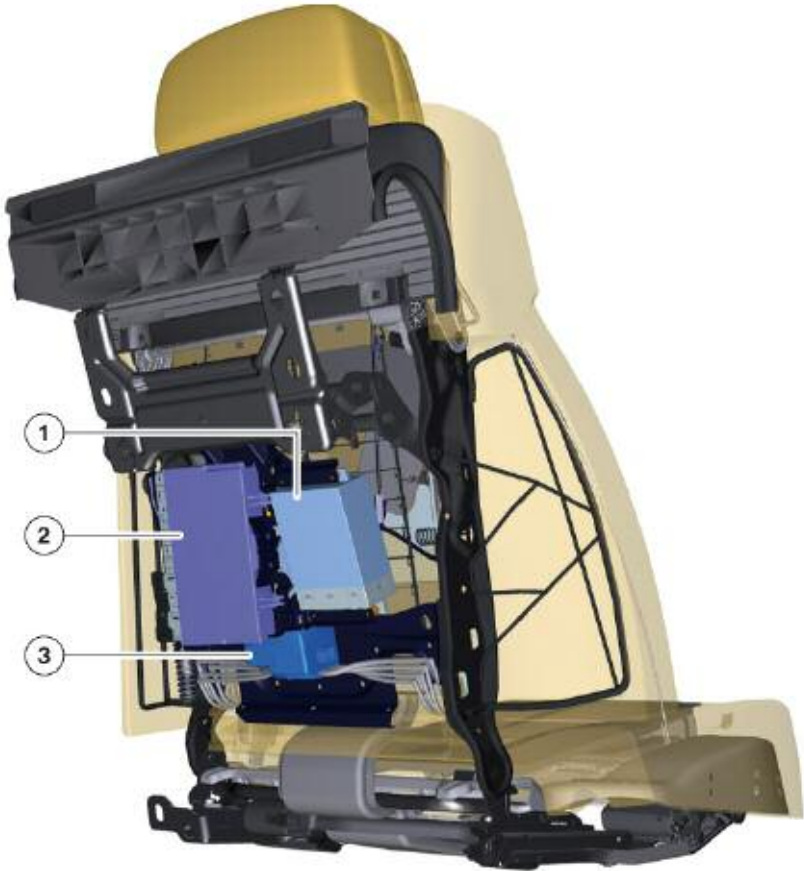
A complete massage cycle takes 64 seconds, then the process starts again at the beginning.

**Massage seat, F01/F02**



Index	Explanation
1-6	Massage pad

**Pressure distribution module, F01/F02**



Index	Explanation	Index	Explanation
1	Lumbar pump	3	Pressure distribution module, massage pads/lumbar support
2	Seat module		

Electric backrest tilt and seat-length adjustment and backrest-head and headrest lifter round off the technical features of these seat versions for the rear passengers.

Even the rear-seat passengers of the F01/F02 can enjoy the comfort of the lumbar-support adjustment option.



Comfort seat, rear

Index	Explanation	Index	Explanation
1	Memory buttons	2	Button for seat adjustment functions

The impression of space in the rear of the F02 is improved considerably by comparison with the E66, on account of the multifunction seat and the rear air-conditioning system.

By the same token, the ambience enjoyed by the rear-seat passengers reflects the most exacting standards. This starts with the vanity mirror in the headliner, continues through the controls for the rear-seat air-conditioning system through to the 9" screens and DVD drives that are standard with the Rear Seat Entertainment optional extra.

These screens are set in the backrests of the front seats.

The Controller and numerous other secondary controls are set in the rear center armrest. In conjunction with the ambience lights package, these features combine to give a higher feeling of sumptuous luxury even than the E65.

## Belt System

The F01/F02 has electric belt reels (EMA) for the driver's and front passenger's seat belts. In this arrangement the B pillar accommodates an electric motor with control unit. This is an automatic belt reel with a motor/gear unit.

### Seat belt with electric reel



Index	Explanation	Index	Explanation
1	EMA control unit	3	Automatic reel
2	Electric motor	4	EMA gear unit

The EMA offers two functions:

- Comfort function Belt slack is taken up when the seat occupant buckles the belt: the electric motor reels in the slack to tighten the belt
- Pre-crash function In a hazard situation the occupant is brought to the crash position at which the restraint systems can operate at maximum efficiency. This function is reversible.

## Luggage Compartment

At 500 liters, luggage-compartment capacity is the same as that of the E65.

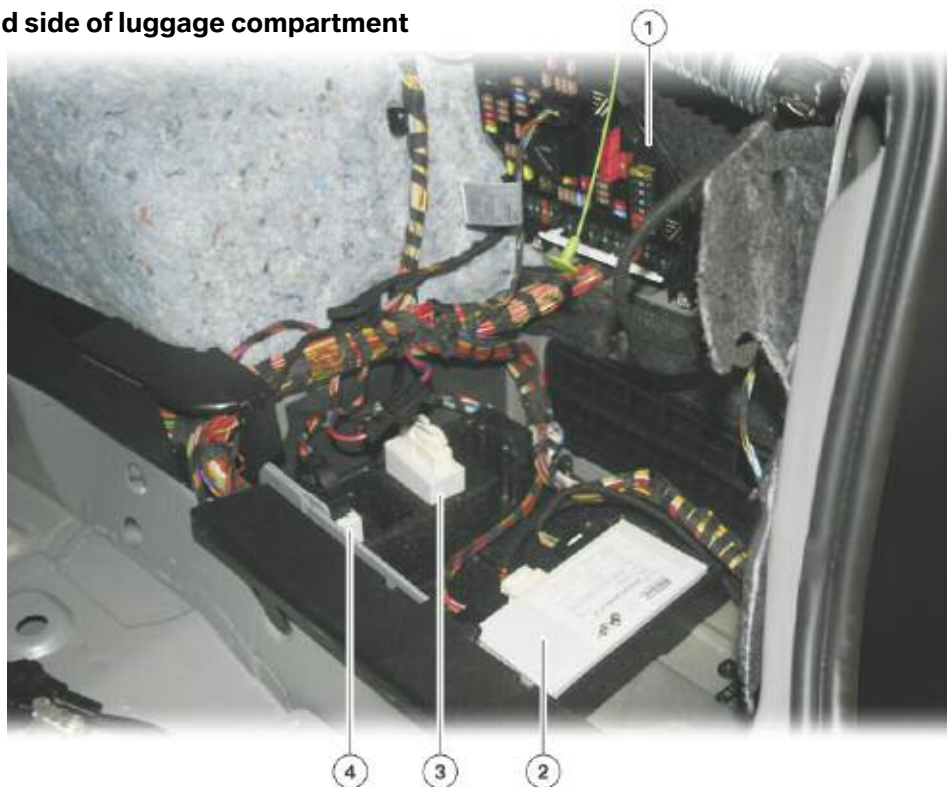
The following luggage-compartment versions are available:

- Luggage compartment with rear-compartment air conditioning and cool box
- Luggage compartment with cool box
- Luggage compartment with rear-compartment air conditioning
- Luggage compartment without rear-compartment air conditioning/and without cool box. In this configuration the capacity of the luggage compartment has a capacity of 500 liters.

It will accommodate 1 medium-sized and 2 small cases and a cosmetic case. Alternatively, 4 golf bags or 2 pairs of skis or 1 snowboard can be transported.

The are compartments with storage trays underneath and a height-adjustable net offer practical possibilities for stowage. The toolkit and warning triangle are now again stowed in the luggage compartment lid.

### Right-hand side of luggage compartment



Index	Explanation	Index	Explanation
1	Power distribution box, rear	3	Not for US market
2	HKL control module	4	Not for US market

The power distribution box, the control unit for the luggage compartment lid lift (HKL) and the rear-axle pneumatic springs (EHC) are also on the right-hand side of the luggage compartment.

**Left-hand side of luggage compartment**



Index	Explanation	Index	Explanation
1	Not for US market	4	HiFi Amplifier
2	Telematics Control Unit	5	Sideview control module (TR SVC)
3	Fan		

The HiFi amplifier, the sideview control unit as well as the changeover valve for the exhaust-flow control are located on the left hand side along with the M-ULF High, TCU and Combox .

## Middle of luggage compartment



Index	Explanation	Index	Explanation
1	Power distributor, battery	3	EKP module
2	Battery 90Ah		

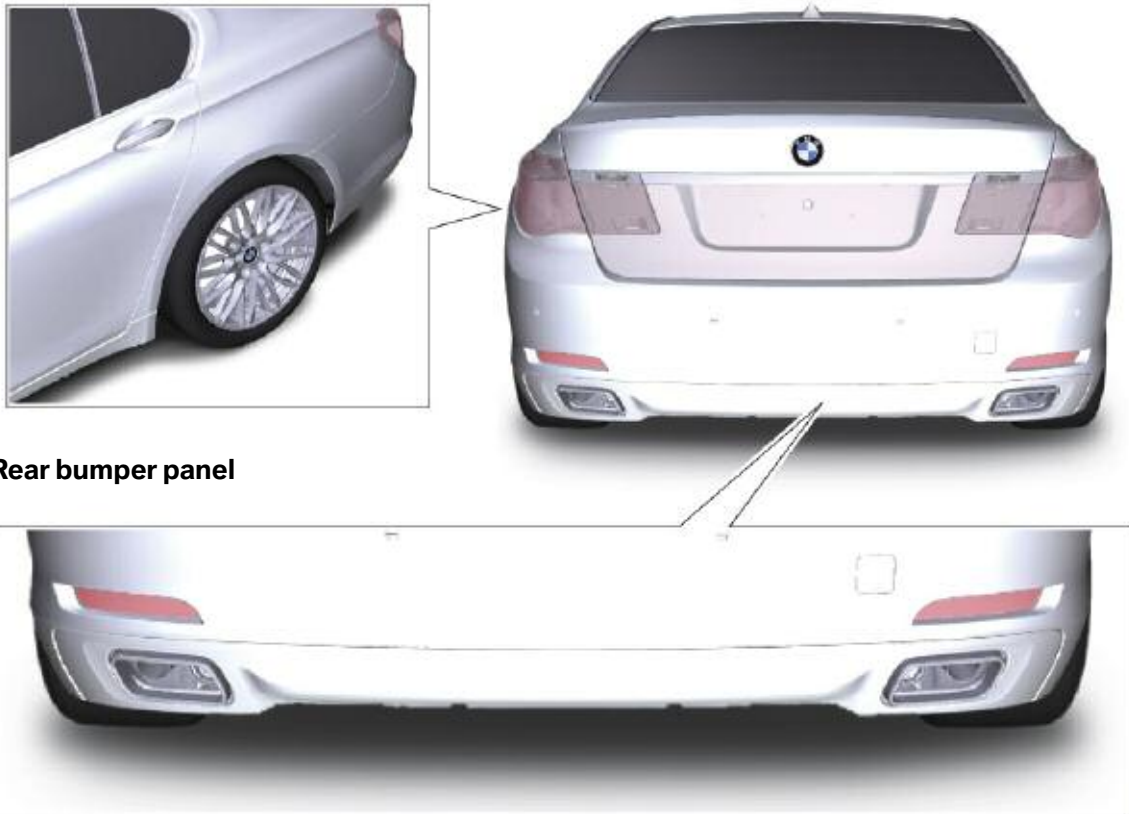
The battery, the EKP and HSR control units (HSR, rear axle angle control) are all in the and the luggage-compartment. This is also where the cut-off relay for the electric fans and the luggage compartment antennas for the Passive Go system are located.



## Rear Bumper

The bumper panel of the rear bumper is a no-gap fit to the side frame. The reflectors are integrated into the bumper panel. The bottom part of the panel is also finished in the body color. Chrome-plated stainless steel end-silencer covers are integrated into the bottom part of the bumper panel.

Model differentiation is carried through by various details for the 8-cylinder and the future 12-cylinder power plants. An extra chrome finisher for the 12-cylinder emphasizes the top-of-the-line engine.



**Rear bumper panel**

The bumper panel's overhang past the luggage compartment lid is minimal in combination with the finisher panel for the luggage compartment lid. There is a seamless transition between rear-light unit and bumper panel.

The bumper carrier (with the shock absorber) is bolted to the bodyshell structure. It can absorb low-speed impacts without damage to the bodywork (at least 2.5 mph).

The bumper system is a consumer-protection-complaint design that prevents damage to the car's body structure. Deformation elements specifically designed for the purpose make for low repair costs.

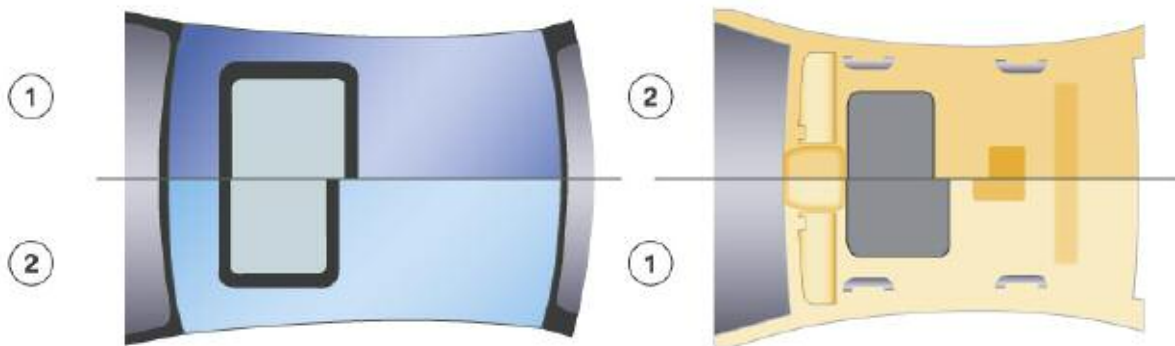
## Slide/tilt Sunroof

The F01/F02 has an evolved sliding sunroof system, known as the contour roof. The contour roof has a larger area of glass than a conventional sliding sunroof system, so it contributes positively to the interior effect and to the feeling of space inside the car.

The headliner panel is electrically operated, and since this means that there is no grip in the panel the impression of interior space is even further enhanced, because the sliding headliner panel now integrates into the interior design of the headliner as a homogeneous surface, underscoring the premium luxury effect.

When we turn our attention to the exterior we see that the design integration of the glass into the car's skin is effected by the contour curvature of the glass sunroof. At its leading edge, it is oriented in parallel with the leading edge of the roof at the transition to the windscreen, contributing to the harmonic appearance of the car as a whole.

In order to maintain a pleasant level of background noise with the glass sunroof fully open, the contour roof features a speed-dependent combination slipstream deflector.



Index	Explanation	Index	Explanation
1	Contour roof	2	Standard, slide/tilt sunroof

The contour roof features an inside-mount slide/tilt sunroof. Glass panel, sliding headliner panel and combination slipstream deflector are all-electric and are operated by a switch set in the roof-functions overhead console (FZD), in line with BMW's usual control and operation logic for the sliding sunroof:

- To open the roof -> Push the switch to the rear
- To close the roof -> Push the switch forward
- Set roof to vent position -> Push the switch up.

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The operation and control logic for opening the sliding headliner panel is analogous to that familiar from the BMW panorama-roof configurations. The direction in which the control is moved corresponds to the direction in which the component is to be moved, so this logic is easy for customers to grasp.

To exclude the risk of possible injury, the entire range of movement of the glass roof panel and the sliding headliner panel has a trap release function with a special electronic controller in accordance with international legal requirements.

When the glass sunroof panel and the sliding sunroof panel are both fully closed, the material of which the sliding sunroof panel is made keeps the background noise level on a par with that of a car with normal roof.

The combination slipstream deflector can move to either of 2 possible positions, depending on the speed of the car, positively influencing the aero-acoustics of the car when the glass sunroof panel is fully open. This effectively reduces the annoying low-frequency “blattering” that can occur in the speed range around 70 km/h (43 mph), as well as the high-frequency whine that is typical at speeds around 120 km/h (75 mph).

### **Dimensions**

- Glass panel length: 601 mm
- Glass panel width: 919 mm

### **Aperture size**

- Glass panel fully open: 390 mm

### **Glass panel in vent position**

- Vent gap of glass panel: 19 mm
- Vent gap of sliding sunroof panel: 80 mm

The contour roof is moved by 2 electric Glass panel in vent position motors.