Body/equipment mounting directives Van

Sprinter – Model Designation 906

Issue date: 15.05.2009

Mercedes-Benz

Amendments since the 17.08.2007 edition

1.1 The aim of these directives

These directives provide body manufacturers with important technical information about the basic vehicle. This information must be observed for the production of attachments, bodies, equipment and modifications on vehicles manufactured by Mercedes-Benz.

Due to the large number of body manufacturers and body types, Daimler AG cannot take into account all the possible modifications to the vehicle, e.g. performance, stability, load distribution, centre of gravity and handling characteristics, that may result from the design of attachments, bodies, equipment or modifications. For this reason, Daimler AG can accept no liability claims from body manufacturers for accidents or injuries sustained as a result of such modifications to its vehicles, particularly when such modifications have a negative impact on the entire vehicle. Accordingly, Daimler AG will only assume liability as manufacturer within the scope of the design and production work which it has performed itself and as per the instructions it has issued itself. The body manufacturer will undertake to ensure that the attachments, bodies, equipment or modifications that it produces are not defective in themselves, nor are they capable of causing defects to or hazards on the entire vehicle. If this obligation is violated in any way, the body manufacturer will assume full product liability. Daimler AG uses the body / equipment mounting directives to instruct body manufacturers with regard to important aspects to be observed when mounting attachments and bodies.

These body / equipment mounting directives are primarily intended for the professional manufacturers of attachments, bodies, equipment or modifications for our vehicles. As a result, these body / equipment mounting directives assume that the body manufacturer has suitable background knowledge. If you intend to mount attachments, bodies and equipment on or carry out modifications on our vehicles, please be aware that certain types of work (e.g. welding work on load-bearing components) may only be carried out by qualified personnel. This will avoid the risk of injury and will attain the degree of quality required for the attachments, bodies, equipment and modifications.

These directives are divided into 10 interlinked sections to help you find the information you require more quickly:

For additional information, see subsection 2.4 "Product and vehicle information for body manufacturers" (▷ page 20).

The index in pdf format is linked to help you find the information you require quickly.

Make absolutely sure that you observe the threshold values selected in Section 4 "Technical threshold values for planning" (▷ page 44) as planning must be based on these values.

The sections entitled "Modifications to the basic vehicle" and "Construction of bodies" are the main source of technical information contained in these body / equipment mounting directives.

1.2 Symbols

The following symbols are used in these directives:

Risk of accident

A warning note draws your attention to possible risks of accident or injury to yourself and others.

Environmental note

An environmental note gives you tips on the protection of the environment.

Property damage

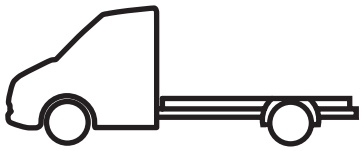
This note draws your attention to possible damage to your vehicle.

Additional information

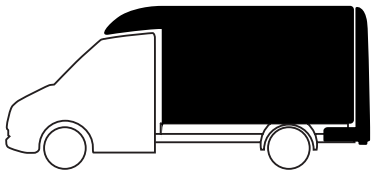
This note points out any additional information.

▷ page — This symbol indicates the page on which you will find further information on the subject.

▷▷ — This continuation symbol indicates an interrupted sequence of actions that will be continued on the next page.



This symbol is used for information relating to the delivered basic vehicle (chassis, panel van and passenger van).



Under this symbol, you will find information relating to the conversion or the mounting or attachment of the body by the body manufacturer.

1.3 Vehicle safety

⚠ Risk of accident

Before installing non-MB bodies or attaching, mounting, installing or modifying assemblies, please read the relevant section of the detailed operating instructions concerning installation work. You can otherwise fail to recognise dangers, which could result in injury to yourself or others.

Notes on vehicle safety

We recommend that you use the parts, assemblies, conversion parts and accessories that have been tested and found suitable by Mercedes-Benz for the type of vehicle concerned.

If parts, assemblies, conversion parts or accessories are used that have not been recommended, have the safety of the vehicle verified without delay.

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Make absolutely sure that you comply with national registration regulations as attachments, bodies, equipment on or modifications to the vehicle will change the vehicle type approved and may invalidate the general operating permit. This applies in particular to:

- modifications which change the vehicle type approved in the general operating permit
- modifications which could endanger road users, or
- modifications which adversely affect exhaust emissions or noise levels

1.4 Operating safety

⚠ Risk of accident

Work incorrectly carried out on equipment and its software can prevent this equipment from working. Since the electronic systems are networked, this can also affect systems that have not been modified. Malfunctions in the electronic systems can seriously jeopardise the operating safety of the vehicle.
Have work on or modifications to electronic components carried out at a qualified specialist workshop which has the necessary expertise and tools to carry out the work required.
Mercedes-Benz recommends that you use a Mercedes-Benz Service Centre for this purpose.
In particular, work relevant to safety or on safety-related systems must be carried out at a qualified specialist workshop.
Some of the safety systems only function when the engine is running. For this reason, do not switch off the engine when the vehicle is in motion.

2.1 Vehicle and model designation

These body / equipment mounting directives apply to the following vehicle types:

Version	Wheelbase	Model series by permissible gross vehicle weight		
	[mm]	3,000 kg	3,500 kg	4,600 kg / 5,000 kg
Panel van	3,250	906.611	906.631	–
	3,665	906.613	906.633	906.653
	4,325	–	906.635	906.655
	4,325[1]	–	906.637	906.657
Passenger van	3,250	906.711	906.731	–
	3,665	906.713	906.733	–
	4,325	–	906.735	–
Platform truck	3,250	906.111	906.131	–
	3,665	906.113	906.133	906.153
	4,325	–	906.135	906.155
Platform truck with crewcab	3,250	906.211	906.231	–
	3,665	906.213	906.233	906.253
	4,325	–	906.235	906.255

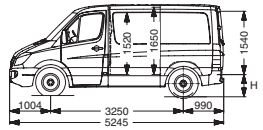
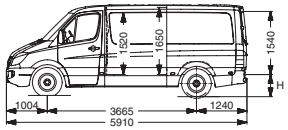
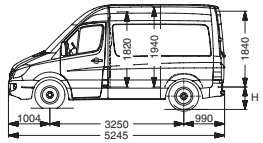
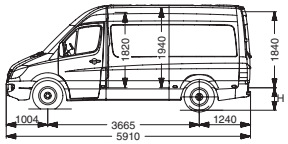
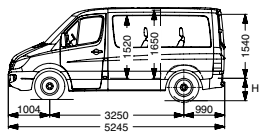
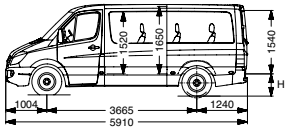
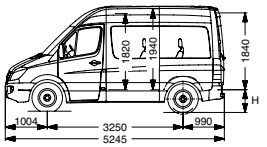
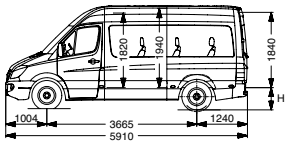
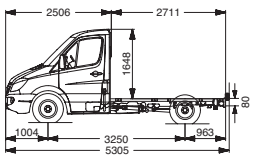
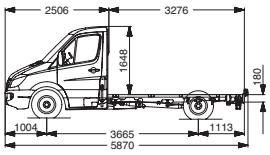
[1] Version with extended overhang

2.1 Vehicle and model designation

Engine code	Engine	Output	Model designation by permissible gross vehicle weight			
		[kW / bhp]	3,000 kg	3,500 kg	4,600 kg	5,000 kg
MC1	OM646 DE 22 LA	65 / 88	209 CDI	309 CDI	–	509 CDI
MC2	OM646 DE 22 LA	80 / 109	211 CDI	311 CDI	411 CDI	511 CDI
MC3	OM646 DE 22 LA	110 / 150	215 CDI	315 CDI	415 CDI	515 CDI
MC4	OM642 DE 30 LA	135 / 184	218 CDI	318 CDI	418 CDI	518 CDI
MC6	M271 E 18	115 / 156	216	316	416	516
MC9	M272 E35	190 / 258	224	324	424	524
MG1	OM651 DE 22 LA	70 / 95	210 CDI	310 CDI		510 CDI
MG2	OM651 DE 22 LA	95 / 129	213 CDI	313 CDI	413 CDI	513 CDI
MG3	OM651 DE 22 LA	120 / 163	216 CDI	316 CDI	416 CDI	516 CDI
MG5	OM642 DE 30 LA	140 / 190	219 CDI	319 CDI	419 CDI	519 CDI
MR2	OM646 DE 22 LA	95 / 129	213 CDI	313 CDI	413 CDI	513 CDI

Body code	Roof version
D 03	High roof
D 05	Super-high roof

2.2 Model overview

3.0 t	
906.611 MC1 / MC2 / MC3 / MC4 / MG1 / MG2 / MG3 	**906.613** MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3 
906.611 MC1 / MC2 / MC3 / MC4 / MG1 / MG2 / MG3 	**906.613** MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3 
906.711 MC1 / MC2 / MC3 / MC4 / MG1 / MG2 / MG3 	**906.713** MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3 
906.711 MC1 / MC2 / MC3 / MC4 / MG1 / MG2 / MG3 	**906.713** MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3 
906.111 MC1 / MC2 / MC3 / MC4 / MG1 / MG2 / MG3 	**906.113** MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3 

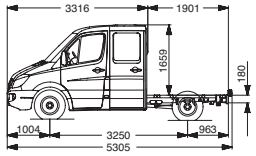
For the dimension "H", see "Tender drawings" in the body manufacturer portal (▷ page 20).

Explanations of model series and engine codes are contained in the table (▷ page 11).

3.0 t

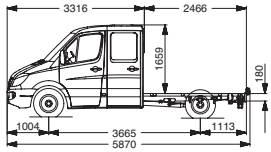
906.211

MC1 / MC2 / MC3 / MC4 / MG1 / MG2 / MG3



906.213

MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3



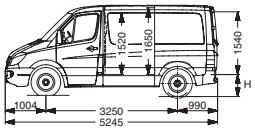
For the dimension "H", see "Tender drawings" in the body manufacturer portal (▷ page 20).

Explanations of model series and engine codes are contained in the table (▷ page 11).

3.5 t

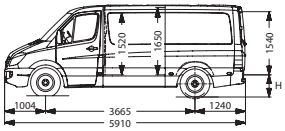
906.631

MC1 / MC2 / MC3 / MC4 / MG1 / MG2 / MG3 / MR2



906.633

MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3



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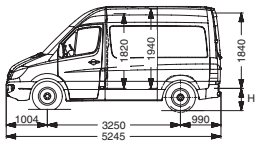
MC1 / MC2 / MC3 / MC4 / MG1 / MG2 / MG3 / MR2



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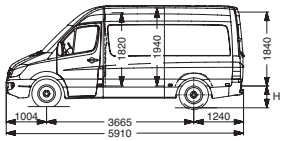
MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3



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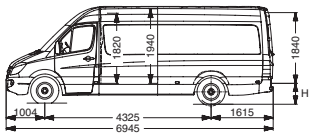
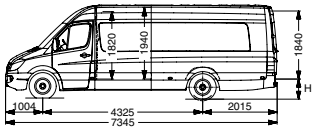
MC1 / MC2 / MC3 / MC4 / MG1 / MG2 / MG3



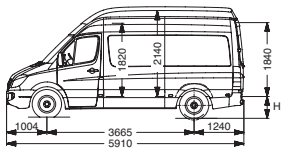
906.637

MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3



906.633

MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3



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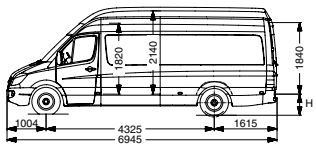
MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3



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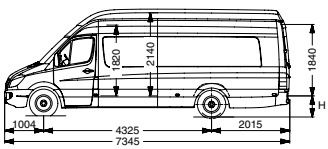
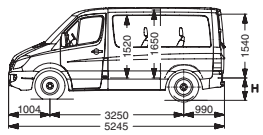
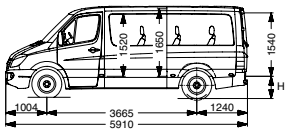
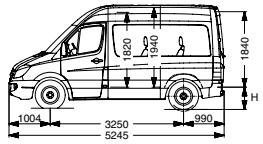
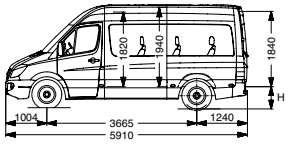
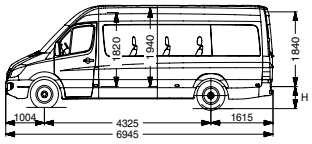
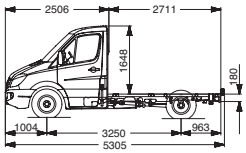
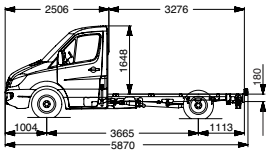
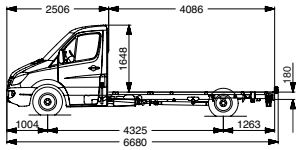
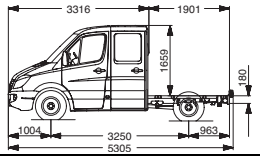
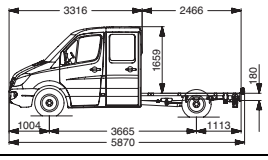
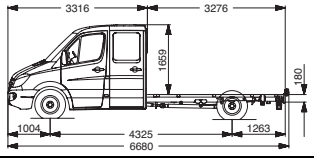
MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3



For the dimension "H", see "Tender drawings" in the body manufacturer portal (▷ page 20).

Explanations of model series and engine codes are contained in the table (▷ page 11)

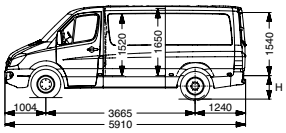
3.5 t		
906.731 MC2 / MC3 / MG1 / MG2 / MG3 / MR2  	**906.733** MC2 / MC3 / MC9 / MG1 / MG2 / MG3  	
906.731 MC2 / MC3 / MG1 / MG2 / MG3 / MR2  	**906.733** MC2 / MC3 / MC9 / MG1 / MG2 / MG3  	**906.735** MC2 / MC3 / MC9 / MG1 / MG2 / MG3 
906.131 MC1 / MC2 / MC3 / MC4 / MG1 / MG2 / MG3  	**906.133** MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3  	**906.135** MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3 
906.231 MC1 / MC2 / MC3 / MC4 / MG1 / MG2 / MG3  	**906.233** MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3  	**906.235** MC1 / MC2 / MC3 / MC4 / MC9 / MG1 / MG2 / MG3 

For the dimension "H", see "Tender drawings" in the body manufacturer portal (▷ page 20).

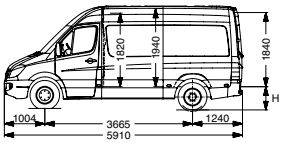
Explanations of model series and engine codes are contained in the table (▷ page 11)

5.0 t (4.6 t)

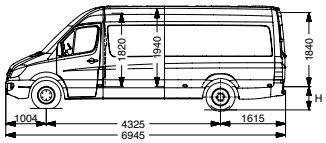
906.653
MC1 / MC2 / MC3 / MC4 / MC9 /
MG1 / MG2 / MG3



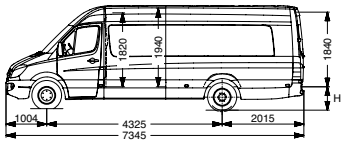
906.653
MC1 / MC2 / MC3 / MC4 / MC9 /
MG1 / MG2 / MG3



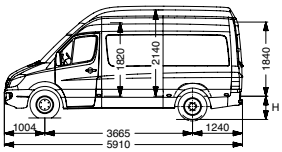
906.655
MC1 / MC2 / MC3 / MC4 / MC9 /
MG1 / MG2 / MG3



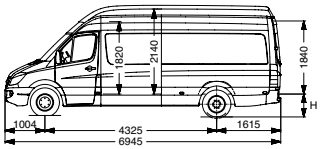
906.657
MC1 / MC2 / MC3 / MC4 / MC9 /
MG1 / MG2 / MG3



906.653
MC1 / MC2 / MC3 / MC4 / MC9 /
MG1 / MG2 / MG3



906.655
MC1 / MC2 / MC3 / MC4 / MC9 /
MG1 / MG2 / MG3



906.657
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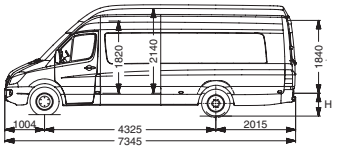
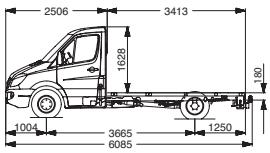
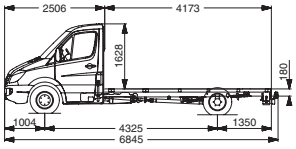
MG1 / MG2 / MG3



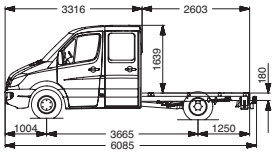
906.153
MC1 / MC2 / MC3 / MC4 / MC9 /
MG1 / MG2 / MG3



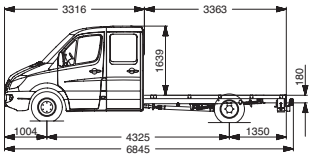
906.155
MC1 / MC2 / MC3 / MC4 / MC9 /
MG1 / MG2 / MG3



906.253
MC1 / MC2 / MC3 / MC4 / MC9 /
MG1 / MG2 / MG3



906.255
MC1 / MC2 / MC3 / MC4 / MC9 /
MG1 / MG2 / MG3



For the dimension "H", see "Tender drawings" in the body manufacturer portal (▷ page 20).

Explanations of model series and engine codes are contained in the table (▷ page 11)

2.3 Advice for body manufacturers

Technical advice on body compatibility

Mr. Krings and his team will be pleased to advise body manufacturers and issue certificates of endorsement.

Telephone:	+49 (0)711-17-41786
	+49 (0)711-17-50810
	+49 (0)711-17-22870
	+49 (0)711-17-24950
Fax:	+49 (0)711-17- 32323
Postal address:	Daimler AG
	HPC (internal post code) A446
	Abteilung VAN / EZA, D-70546 Stuttgart, Germany

Technical advice on the basic vehicle

Contact **Mr. Binus** and his team at the order processing office of the Düsseldorf factory if you have any questions relating to the configuration and equipment of the basic vehicle.

Telephone:	+49 (0)211-953-3570
	+49 (0)211-953-2881
	+49 (0)211-953-3558
	+49 (0)211-953-3754
	+49 (0)211-953-2408
Fax:	+49 (0)211-953-3565
Postal address:	Daimler AG
	Werk Düsseldorf
	Abteilung VAN / PSO D-40467 Düsseldorf, Germany

Technical advice outside Germany

Contact the body manufacturer organiser at Daimler AG in your country for technical advice on modifications.

All contact persons with their job description can also be found in the body manufacturer portal under

https://bb-infoportal.mercedes-benz.com/portal/apps/ansprechpartner_db/

2.3.1 Certificate of endorsement

Daimler AG does not issue any body / equipment approvals for non-MB bodies. These directives only supply important information and technical specifications to body manufacturers explaining how to handle the product. For this reason, Daimler AG recommends that all work on the basic vehicle and body be carried out in compliance with the Mercedes-Benz body / equipment mounting directives.

Daimler AG advises against attachments, bodies, equipment and modifications which:

- are not produced in accordance with Mercedes-Benz body / equipment mounting directives
- exceed the permitted maximum gross vehicle weight
- exceed the permissible axle loads

Daimler AG issues certificates of endorsement voluntarily based on the following criteria:

Daimler AG's assessment shall be based solely on the documents submitted by the body manufacturer carrying out the modifications. The assessment and the endorsement shall only cover the expressly defined scopes and their basic compatibility with the designated chassis and its connection points or, in the case of chassis modifications, the basic feasibility of the design for the designated chassis. The certificate of endorsement shall not refer to the overall design of the body, its functions or its intended field of operation. The endorsement shall only apply if design, production and assembly are performed by the body manufacturer carrying out the modifications in accordance with the state of the art and in compliance with the valid body / equipment mounting directives of Daimler AG – unless deviations have been endorsed in these directives. Nevertheless, the certificate of endorsement shall not release the body manufacturer carrying out the modifications from its product liability or its obligation to perform its own calculations, tests and trials on the entire vehicle in order to ensure that the entire vehicle produced by the body manufacturer meets the required specifications for operating and road safety and handling characteristics.

Accordingly, it shall be the sole duty and responsibility of the body manufacturer to ensure the compatibility of its attachments, bodies, equipment and modifications with the basic vehicle and to guarantee the operating and road safety of the vehicle.

National laws, guidelines and registration regulations must be complied with.

2.3.2 Applying for a certificate of endorsement

In individual cases, the body drawings may be submitted to the department responsible before the start of work (▷ page 17). The drawings shall contain the following information:

- All deviations from Mercedes-Benz body / equipment mounting directives.
- Complete data on dimensions, weights and centre of gravity (weight certificates).
- How the body is attached to the chassis.
- The vehicle's conditions of use, e.g.:
  - on poor roads
  - in very dusty conditions
  - at high altitude
  - at extreme outside temperatures
- Certificates ("e" mark, seat tensile strength test, etc.)

Submitting the required documentation in full will make queries on our part unnecessary and will speed up the endorsement procedure.

2.3.3 Legal claims

- No legal claim can be made as to the issue of a certificate of endorsement.
- Daimler AG reserves the right to refuse the issue of a certificate of endorsement due to ongoing technical development and the knowledge gained from it, even if a similar endorsement was issued in the past.
- The certificate of endorsement may be restricted to individual vehicles.
- The retroactive granting of a body endorsement for vehicles already completed or delivered can be refused.
- The body manufacturer alone shall be responsible for:
  - the functionality and compatibility with the basic vehicle of its attachments, bodies, equipment or modifications
  - operating and road safety
  - all attachments, bodies, equipment or modifications and fitted parts

2.4 Product and vehicle information for body manufacturers

In addition to the possibility of directly contacting the body manufacturer support staff at Mercedes-Benz (▷ page 18), as a body manufacturer you are also able to obtain detailed information on our products and systems.

2.4.1 Body manufacturer portal

General

The body manufacturer portal is the central communications platform between Mercedes-Benz Commercial Vehicles and you, as our partner in the body manufacturer industry. The body manufacturer portal provides information and access to body-related topics on all model series of Mercedes-Benz trucks and vans. The portal can be accessed at the following address:

https://bb-portal.mercedes-benz.com/

MBAS-Web Technology

In the **MBAS-Web (Technology)** section of the portal, you can find the relevant technical data sheets, tender drawings, circuit diagrams, engine diagrams and body / equipment mounting directives. In addition to the current model series, the directives for vehicle models which are no longer produced are also available here. Ensure that work is only ever carried out based on the current body / equipment mounting directives.

Under **Current Topics**, you can find the latest product information in the form of body manufacturer information bulletins (newsletters) or the "ABH-Aktuell" magazine.

You are also able to add your **Company Profile** to the portal so that you can present your company and products to us, to our sales staff and, after a further step, to customers.

You are thus optimally equipped to provide your customers with quick, cost-efficient and comprehensive advice and feasibility studies, to plan and determine the final vehicle design, to compile quotations and to prepare designs.

Design data and drawings

As a body manufacturer, you can obtain original 3D data for the Sprinter BM906. 3D data can be ordered using a form which is available in the "Supplemental Information" catalogue in the body manufacturer portal.

CERON registration

It is possible to register for the CERON system using a form which is available in the "Supplemental Information" catalogue in the body manufacturer portal.

Additional information on the CERON system can be found in section 2.4.5 "CERON" (▷ page 22).

2.4.2 Information for non-DC body manufacturers

Non-MB body manufacturers can find aftersales information on the "Service&Parts net" portal at

http://service-parts.mercedes-benz.com

The following topics are covered:

- Service / parts information
- Diagnostics
- SCN coding
- Special tools
- Tips

2.4.3 Workshop Information System (WIS)

The Workshop Information System (WIS) is available in the "Service&Parts net" under the heading "Service / parts information". For example, the WIS contains:

- Basic data (dimensions, tightening torques)
- Function descriptions
- Circuit diagrams
- Workshop manuals
- Maintenance data sheets

Non-MB body manufacturers can purchase access to WIS from the following address:

http://open-after-sales.daimlerchrysler.com

You can obtain further information about the WIS from any Daimler branch or call:

Telephone:	+49 (0)711-17-83170
Fax:	+49 (0)711-17-40082
Postal address:	Daimler AG
	HPC R800 (internal postcode)
	Abteilung GSP / TIM, D-70546 Stuttgart, Germany

2.4.4 STAR DIAGNOSIS

The diagnostic tool STAR DIAGNOSIS is available in "Service&Parts net" under the heading "Diagnosis". The STAR DIAGNOSIS diagnostic tool was developed by Mercedes-Benz to facilitate vehicle diagnosis. STAR DIAGNOSIS can be used to read out fault entries from the vehicle and diagnose them. It can also be used to change control unit parameters e.g. on the parameterizable special module (PSM).

Fault entries which occurred during the mounting of the body can also be erased.

STAR DIAGNOSIS can also be used to update control units by means of SCN coding. For example, online SCN coding must be used on Sprinter model designation 906 to update the data (coding) for the instrument cluster.

It is possible to connect the STAR DIAGNOSIS unit to the central server of Daimler AG during SCN coding over a LAN or WLAN connection. The relevant SCN coding is requested online and is used to uniquely identify the control unit variants installed in the vehicle. The data for the hardware, flashware and vehicle-specific coding is encrypted.

Additional information on SCN coding can also be found in Service&Parts net.

STAR DIAGNOSIS can be purchased or leased by body manufacturers.

If you have any questions about STAR DIAGNOSIS, contact your Daimler sales and service outlet or:

Telephone:	+49 (0)711-17-83170
Fax:	+49 (0)711-17-40082
Postal address:	Daimler AG
	HPC R800 (internal postcode)
	Abteilung GSP / TIM, D-70546 Stuttgart, Germany

2.4.5 CERON

The CERON (Certification Online) system is a platform for exchanging and providing documents on the system approvals and overall operating permits of the EU (European Union) and ECE (Economic Commission for Europe). Here you can find e.g. documents on ETA (European Type Approval) and GOP (General Operating Permit) for trucks, vans, buses and Unimogs.

Use of the CERON system is chargeable.

It is possible to register for the CERON system using a form which is available in the Supplemental Information catalogue in the body manufacturer portal.

2.4.6 PIT (product information for vans)

You can access the PIT system via the body manufacturer portal. The PIT system contains information on vehicle equipment possibilities (codes, suspension variants, overview of products, towing capacities etc.).

2.5 Product liability

Both vehicle manufacturers and body manufacturers must always ensure that the products they are responsible for manufacturing are safe when they are brought into circulation and do not represent a safety hazard to third parties. Otherwise, there may be consequences under civil, criminal or public law. Every manufacturer is always liable for the product that it has manufactured.

Body manufacturers bear responsibility for e.g.:

- the operating and road safety of the body
- the operating and road safety of parts and modifications
- testing and maintaining the operating and handling safety of the vehicle after the body / equipment is mounted (the body and / or equipment must not have a negative effect on the driving, braking or steering characteristics of the vehicle)
- influences of parts on or modifications to the chassis
- consequential damage resulting from the attachment, equipment or modification
- consequential damage resulting from retrofitted electrical and electronic systems
- maintaining the operational reliability and freedom of movement of all moving parts of the chassis after the body / equipment is mounted (e.g. axles, springs, propeller shafts, steering, transmission linkage, etc.) even in the case of diagonal torsion between the chassis and the bodies

Work or modifications performed to the chassis or body must be entered in the "Confirmations by the body manufacturers" section of the maintenance booklet.

2.6 Ensuring traceability

There is a possibility that body-related hazards may only be detected after the vehicle is delivered, making retroactive market measures necessary (customer information bulletins, warnings, recalls). To ensure that these measures can be implemented as efficiently as possible, it must be possible to trace the product after delivery.

We strongly recommend that body manufacturers store the serial number / identification number of their body together with the chassis identification number of the basic vehicle in their databases for this purpose and to allow them to use the Central Vehicle Register (ZFZR) of the Federal Office for Motor Vehicles in Germany or a comparable database in other countries. On this note, the storage of customer addresses is also recommended as is giving subsequent owners the possibility to register their details.

2.7 Mercedes star and logo

The Mercedes star and Mercedes-Benz logo are trademarks of Daimler AG.

The Mercedes star and Mercedes-Benz logo may not be removed or attached to another point without approval.

Mercedes-Benz stars and Mercedes-Benz logos supplied separately must be attached at the points specified by Mercedes-Benz.

Points of attachment at the rear of the vehicle

The Mercedes-Benz logo shall be affixed at the bottom left-hand side of the rear end of the vehicle.

The Sprinter logo shall be affixed at the bottom right-hand side of the rear end of the vehicle.

Overall appearance of the entire vehicle

Daimler AG reserves the right to demand the removal of the Daimler AG trademark if the vehicle fails to comply with the image and the quality standards required by Mercedes-Benz.

Non-MB emblems

- may not be affixed next to Mercedes-Benz trademarks
- may not be affixed at any other points on the vehicle without the approval of the Daimler AG department responsible (▷ page 17)

2.8 Accident prevention

The body and attached or installed equipment must comply with all applicable laws and regulations, and with health and safety and accident prevention regulations, safety regulations and information sheets issued by accident insurers.

All technical means shall be used to avoid operating conditions that may be unsafe or liable to cause an accident.

In Germany, information for commercial carriers is available from the Berufsgenossenschaft für Fahrzeughaltungen (German Trade Association of Vehicle Owners):

Telephone:	+49 (0) 40 39 80-0
Fax:	+49 (0) 40 39 80-19 99
E-mail:	info@bgf.de
Homepage:	www.bgf.de
Postal address:	Berufsgenossenschaft für Fahrzeughaltungen, Fachausschuss "Verkehr" Sachgebiet "Fahrzeuge" Ottenser Hauptstrasse 54 D-22765 Hamburg, Germany

National laws, guidelines and registration regulations must be complied with.

The body manufacturer shall be responsible for compliance with these laws and regulations.

2.9 Reprocessing components – recycling

Environmental note

When planning bodies or equipment, the following principles for environmentally compatible design and material selection shall be taken into account, in particular with regard to EU Directive 2000 / 53 / EC.

Body manufacturers shall ensure that attachments and bodies (or conversions) comply with current environmental legislation and applicable regulations, in particular EU Directive 2000 / 53 / EC concerning end-of-life vehicles and EU Directive 2003 / 11 / EC concerning restrictions on the bringing into circulation and use of certain dangerous substances and dangerous preparations.

The installation documentation for the conversions shall be kept by the vehicle owner and, if the vehicle is to be scrapped, handed over to the dismantling company concerned at the time of vehicle handover. This is intended to ensure that even converted vehicles are processed in an environmentally responsible manner.

Materials with risk potential, such as halogen additives, heavy metals, asbestos, CFCs and CHCs, are to be avoided.

- It is preferable to use materials which permit recycling and closed material cycles.
- Materials and production processes that generate only low quantities of easily recyclable waste during production must be selected.
- Plastics are to be used only where they provide advantages in terms of cost, function or weight.
- In the case of plastics, and composite materials in particular, only compatible substances within one material family are to be used.
- For components which are relevant to recycling, the number of different types of plastics used must be kept to a minimum.
- It must be assessed whether a component can be made from recycled material or with recycled elements.
- It must be ensured that components can be dismantled easily for recycling, e.g. by snap connections, pre-weakened points, easy accessibility, or by using standard tools.
- It must be ensured that service products can be removed simply and in an environmentally responsible manner by means of drain plugs, etc.
- Wherever possible, painting and coating components should be avoided and dyed plastic parts should be used instead.
- Components in areas at risk from accidents must be designed in such a way that they are damage-tolerant, repairable and easy to replace.
- All plastic parts are to be marked in accordance with VDA code of practice 260, e.g. "PP – GF30R".

2.10 Quality system

World-wide competition, increased quality standards demanded by the customer from the van as a whole, national and international product liability laws, new organisational forms and rising cost pressures make efficient quality assurance systems a necessity in all sectors of the automotive industry.

In order to comply with these requirements, a working group within the Association of German Automobile Manufacturers (VDA) has produced a "Guide to quality assurance for the manufacturers of trailers, bodies and containers". It was published in VDA Volume 8 and is based on the ISO 9000 ff. standards.

For the reasons quoted above, we urgently advise body manufacturers to set up a quality management system with the following minimum requirements:

- To devise, set up and monitor a quality assurance system within the company concerned
- To set out responsibilities in an organisational chart
- To appoint a manager responsible for quality
- To ensure that the instructions for processes, work and inspections are up-to-date and available in all departments and at all workplaces
- To ensure that the employees involved are adequately qualified

When planning bodies, in addition to a user-friendly and maintenance-friendly design, the careful choice of materials and, in consequence, the associated corrosion protection measures (▷ page 64) are of great importance.

3.1 Selecting the chassis

In order to ensure safe operation of the vehicle, it is essential to choose the chassis carefully in accordance with the intended use.

Planning should therefore consider the following items in particular and adapt them to the intended use:

- Wheelbase
- Engine / transmission
- Axle reduction ratio
- Maximum permissible gross vehicle weight
- Position of the centre of gravity

Before carrying out any work on the body or modification work, the delivered vehicle must be submitted to a check to verify whether it fulfils the necessary requirements.

For more information on the chassis and body variants on offer, see the section 2.2 "Model overview" (▷ page 13) or contact the department responsible (▷ page 17).

On the Mercedes-Benz homepage, you can assemble your vehicle in the Configurator and view the available items of special equipment:
www.mercedes-benz.de

3.2 Vehicle modifications

Before starting work on the body, the body manufacturer must check whether:

- the vehicle is suitable for the planned body
- the chassis model and equipment are suitable for the operating conditions intended for the body

You can plan bodies by requesting the department responsible to send you tender drawings, product information and technical data or you can retrieve this information from the communications system (▷ page 20).

Furthermore, you must note the special equipment that is fitted by the factory (▷ page 43).

As supplied ex works, all vehicles comply with EC Directives and national regulations (except for some vehicles for non-European countries).

The vehicles must still comply with EC Directives and national regulations after modifications have been carried out.

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Adequate clearances must be maintained in order to ensure the function and operational safety of assemblies.

⚠ Risk of accident

Do not carry out any modifications to the steering or brake system. Any modifications to the steering and the brake system may result in these systems malfunctioning and ultimately failing. The driver could lose control of the vehicle and cause an accident.

!

On no account should modifications be made to the noise encapsulation.

Vehicle approval

The body manufacturer must inform the officially recognised approval authority or inspector of any modifications to the chassis.

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National laws, guidelines and registration regulations must be complied with.

3.3 Dimensions and weights

On no account should modifications be made to the vehicle width, vehicle height or vehicle length if they exceed the threshold values specified in the current version of the body / equipment mounting directives.

For all dimension and weight specifications, please refer to the tender drawings and technical data in the Mercedes-Benz body manufacturer portal (▷ page 20) and to the Technical Threshold Values (▷ page 44). They are based on a vehicle that is fitted with standard equipment. Items of special equipment are not taken into consideration.

Weight tolerances of up to +5% in production must be taken into consideration (in accordance with DIN 70020 in Germany).

The permissible axle loads and the maximum permissible gross vehicle weight must not be exceeded. Information about axle loads and the maximum permissible gross vehicle weight is contained in the "Technical advice on the basic vehicle" section (▷ page 17).

⚠ Risk of accident

The vehicle tyre load-bearing capacity must not be exceeded by overloading the vehicle beyond its specified gross vehicle weight. The tyres can otherwise overheat and suffer damage. The driver could lose control of the vehicle and cause an accident.

The braking distance may increase considerably when the vehicle is overloaded.

You will find information regarding permissible weights on the vehicle type identification plates on the vehicle itself (▷ page 32) and in the "Technical details" section (▷ page 252).

⚠ Risk of accident

Make sure that you do not exceed the permissible axle loads. Doing so would prevent the ESP system from functioning correctly on vehicles which are equipped with this feature. The driver could lose control of the vehicle and cause an accident.

Information about changes in weight is available from your contact at Mercedes-Benz (▷ page 17).

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All bodies must comply with the individual axle loads and the permissible gross vehicle weight.

The permitted number of vehicle occupants and a sufficient margin for the payload must also be taken into account.

Take the weight of special equipment into consideration when making calculations.

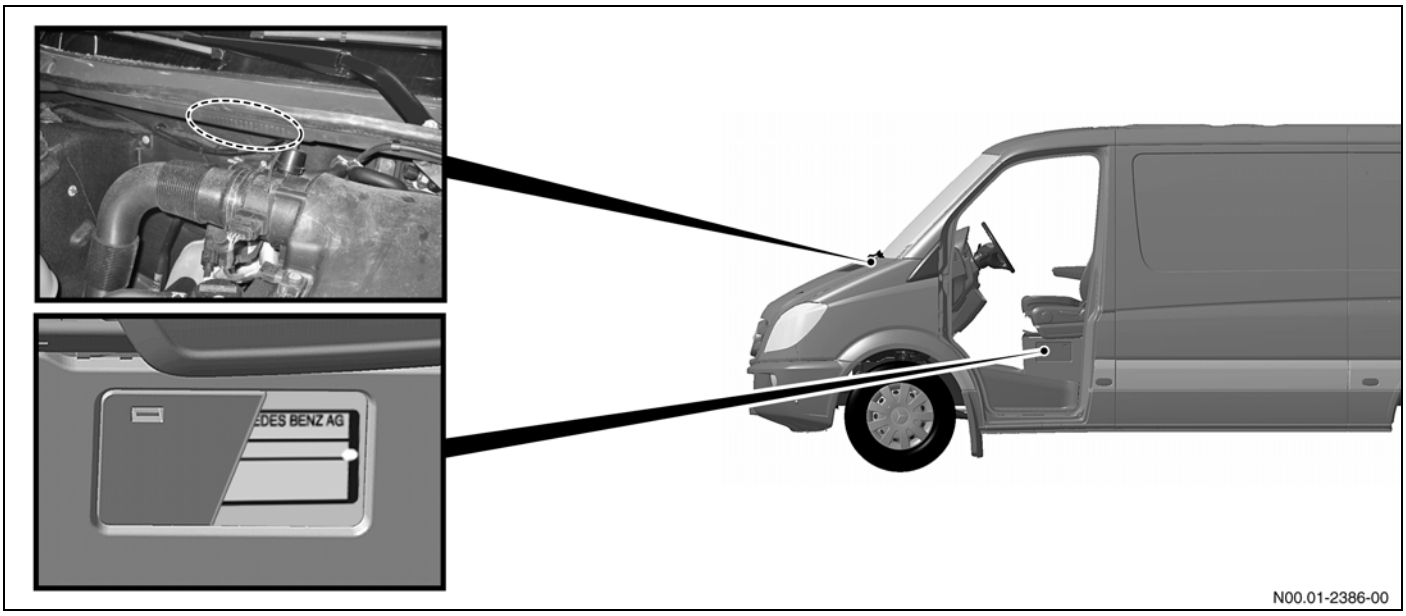
National regulations and guidelines must be observed.

3.4 Vehicle type identification data

The vehicle identification number (VIN) and the vehicle identification plate may neither be changed nor fitted to a different point on the vehicle.

The vehicle identification number is on the waist rail in the engine compartment.

The type plate with the vehicle identification number and details of permissible weights is on the base of the driver's seat.



Location of vehicle type identification data

3.5 Vehicle stability

For approval of the vehicle with body / equipment mounted, a calculation of the height of the centre of gravity of the laden vehicle must be submitted in accordance with EC Brakes Directive 71 / 320 / EEC and ECE R13.

See section 4 "Technical threshold values for planning" (▷ page 44) for the permissible CoG heights.

Daimler AG will make no statements concerning:

- driving characteristics
- braking characteristics
- steering characteristics, and
- behaviour during ESP intervention

of bodies for payloads with an unfavourably located centre of gravity (e.g. rear, high and side loads) as attachments, bodies, equipment and modifications will have a considerable impact on the above characteristics. Only the body manufacturer is in a position to make an assessment.

⚠ Risk of accident

If an attachment, the body, mounted equipment or modifications cause an extreme displacement of the centre of gravity on a vehicle equipped with ESP, it may be necessary to deactivate ESP. You can obtain more information from the department responsible (▷ page 17).
If ESP has been deactivated, the driver will then have to adapt his / her style of driving accordingly (reducing cornering speed, avoiding sudden steering wheel movements, etc.). When driving dynamics become critical the vehicle behaves like a vehicle without ESP. The permissible axle loads, gross vehicle weights and centre of gravity locations must be complied with.

Neither in kerb condition nor with equipment installed nor with modifications having been carried out may the permissible wheel, axle, or gross vehicle weights ever be exceeded.

⚠ Risk of accident

Make sure that you do not exceed the permissible axle loads. Doing so would prevent the ESP system from functioning correctly on vehicles which are equipped with this feature. The driver could lose control of the vehicle and cause an accident.

Further information regarding permissible weights is contained on the vehicle type identification plates on the vehicle itself (▷ page 32).

3.6 Tyres

The body manufacturer must ensure that:

- there is always sufficient space between the tyre and the mudguard or wheel arch, even if snow or anti-skid chains are fitted and the suspension is fully compressed (also allowing for axle twist) (▷ page 134) and that the relevant data in the tender drawings are observed.
- only permissible tyre sizes are used (see vehicle documents) (▷ page 48)

⚠ Risk of accident

Exceeding the specified tyre load-bearing capacity or the permissible maximum tyre speed can lead to tyre damage or tyre failure. You could lose control of the vehicle, cause an accident and injure yourself and other people.

For this reason, only fit tyres of a type and size approved for your vehicle and observe the tyre load-bearing capacity required for your vehicle and the tyre speed index.

In particular, comply with national regulations concerning the approval of tyres. These regulations may define a specific type of tyre for your vehicle or may forbid the use of certain tyre types which are approved in other countries.

If you have other wheels fitted:

- the brakes or components of the suspension system could be damaged
- wheel and tyre clearance can no longer be guaranteed
- the wheel brakes or components of the suspension system may no longer function correctly

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For more information (▷ page 20) and (▷ page 48).

3.7 Bolted and welded connections

3.7.1 Bolted connections

If it is necessary to replace standard bolts with longer bolts, use only bolts:

- of the same diameter
- of the same strength grade
- of the same type
- with the same thread pitch

⚠ Risk of accident

Do not modify any bolted connections that are relevant to safety, e.g. that are required for wheel alignment, steering or braking functions. They may otherwise no longer function correctly. The driver could lose control of the vehicle and cause an accident.

Parts must be refitted in accordance with Mercedes-Benz after-sales service instructions and using suitable standard parts. We recommend the use of genuine Mercedes-Benz parts.

- VDI guideline 2862 must be applied to all installation work.
- It is strictly prohibited to shorten the length of the free clamping bolt, change to the reduced shaft or use bolts with a shorter thread.
- No design modification is possible if bolts are tightened to the required torque and angle by Mercedes-Benz.
- The settling behaviour of bolted connections must be observed.

ⓘ

Information about Mercedes-Benz after-sales instructions is available from any Mercedes-Benz Service Centre.

Additional tensioned parts must be of equal or greater strength than the preceding tensioned assembly.

The use of Mercedes-Benz tightening torques assumes coefficients of friction for the bolts in the tolerance range of [= 0.08 ... 0.14].

We recommend the use of standard Mercedes-Benz parts.

3.7.2 Welded connections

General

In order to maintain the high standard of welding demanded by Mercedes-Benz, the work must only be carried out by appropriately qualified welders.

The following is recommended in order to achieve high-quality welds:

- clean the area to be welded thoroughly
- make several short welding beads rather than one long bead
- make symmetrical beads to limit shrinkage
- avoid more than three welds at any one point
- avoid welding in strain-hardened zones
- spot welds or step welds should be offset

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The battery must be disconnected before all welding operations. Airbags, seat belts, the airbag control unit and airbag sensors must be protected from welding splashes or removed if necessary.

Parts of the floor or the roof are laser-welded.

The panelling of the side wall is laser-soldered with the roof edge panelling.

Choice of welding method

The mechanical properties of weld seams depend on selecting the adequate welding method and on the geometry of the elements to be joined.

If overlapping sheets are to be welded, the choice of welding method will depend on whether only one or both sides of the workpiece is / are accessible.

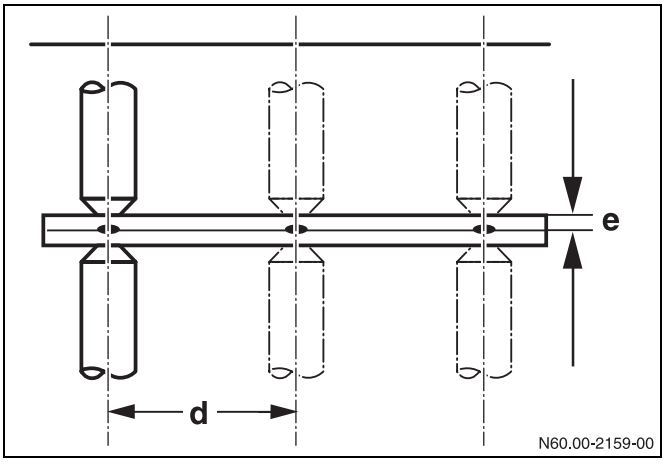
Accessible sides	**1**	Gas-shielded plug welding
	2	Resistance spot welding

Resistance spot welding

Resistance spot welding is used for welding overlapping parts which are accessible from both sides. Spot welding of more than two sheet layers must be avoided.

Distance between spot welds:

To avoid shunt effects, the specified distances between the spot welds must be maintained (d = 10e + 10 mm).



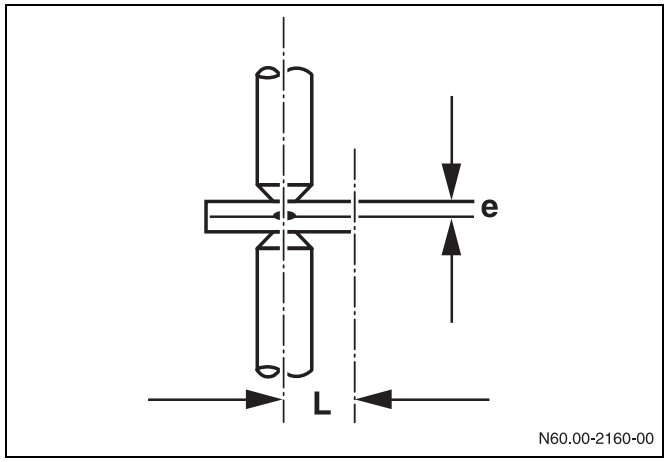
Ratio of sheet thickness to distance between spot welds

d Distance between spot welds

e Sheet thickness

Distance from sheet edge:

To avoid melting core damage, the specified distances to the sheet edge must be maintained (L = 3e + 2 mm).



Ratio of sheet thickness to distance from the edge

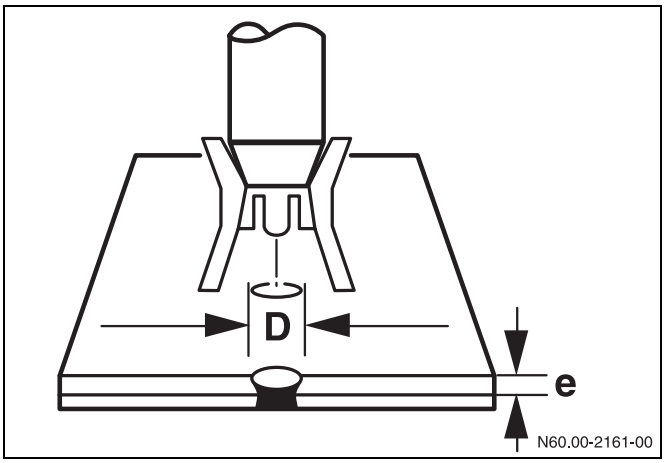
e Sheet thickness

L Distance from sheet edge

Gas-shielded plug welding

If overlapping sheets can only be welded from one side, use either inert gas plug welding or tack welding.

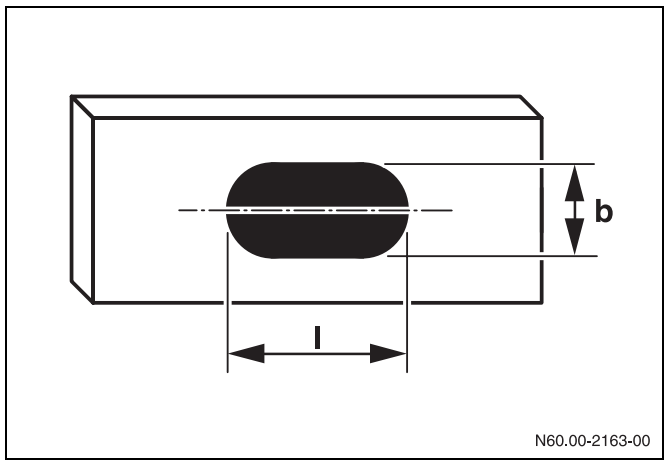
If the joint is produced by stamping or drilling followed by plug welding, the drilled area must be deburred before welding.



Ratio of sheet thickness to plug hole diameter

D = plug hole diameter [mm]	4.5	5	5.5	6	6.5	7
e = sheet thickness [mm]	0.6	0.7	1	1.25	1.5	2

Mechanical quality can be additionally improved by the use of slotted holes (l = 2 x b).



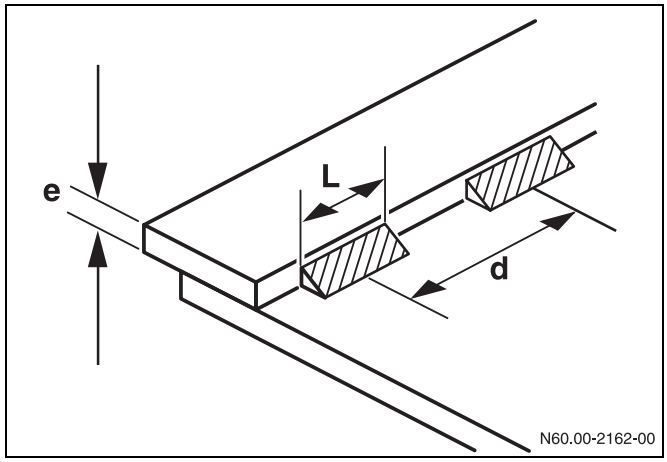
Ratio of width to length of slotted holes

b Width of slotted hole

l Length of slotted hole

Tack welding

If sheet thickness is > 2 mm, overlapping sheets can also be joined by tack welding (30 mm < L < 40 x e; d > 2 L).



Ratio of sheet thickness to distance between spot welds

d Distance between tack weld centres

e Sheet thickness

L Length of tack weld

Do not perform welding work on:

- Assemblies such as the engine, transmission, axles, etc.
- Chassis, except on chassis frame extensions

For additional information, see sections 4 "Technical threshold values for planning" (▷ page 44) and 5 "Damage prevention" (▷ page 62) and section 7.2.1 "General information on the bodyshell/body" (▷ page 118) and the Mercedes-Benz Workshop Information System (WIS).

Anti-corrosion protection after welding

On completion of all welding work on the vehicle, you must comply with the specified corrosion protection measures (▷ page 64).

When carrying out welding work, note the instructions specified by Mercedes-Benz in 5.2 "Welding work" (▷ page 63) and "Modifications to the basic vehicle" (▷ page 118).

3.8 Noise insulation

If modifications are carried out on any parts whose operation produces noise, e.g.

- engine
- exhaust system
- air intake system
- tyres, etc.

sound level measurements must be made.

National regulations and guidelines must be observed.

In Germany,

EC Directive 70 / 157 / EEC or

§ 49.3 StVZO (low-noise) must be observed.

- Noise-insulating parts fitted as standard must not be removed or modified.
- The level of interior noise must not be adversely affected.

!

All modifications to the vehicle must comply with vehicle sound levels as defined in EC Directive 70 / 157 / EEC.

!

To prevent modifications from changing the vehicle's sound levels, it must be ensured that interior sound levels are minimised when planning bodies (▷ page 167).

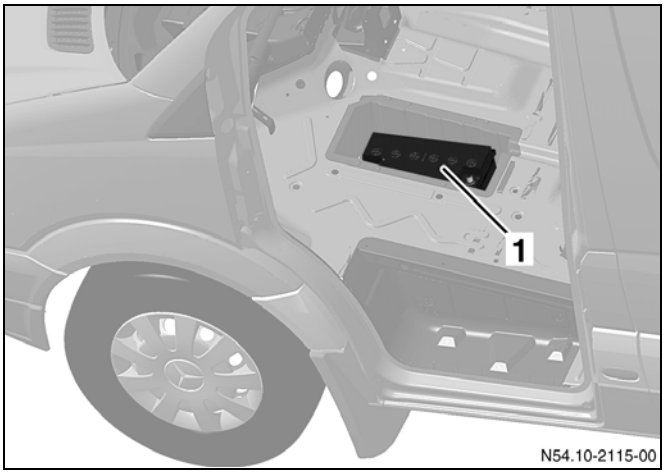
3.9 Maintenance and repairs

Maintenance and repair of the vehicle must not be hindered by the body. The Operating Instructions must be observed.

- Maintenance points and assemblies must remain easily accessible.
- Stowage boxes must be fitted with maintenance flaps or removable rear panels.
- The battery compartment must be sufficiently ventilated, with provision for air to enter and exit.
- Check the condition and capacity of batteries and service them in accordance with the manufacturer's specifications (▷ page 41).

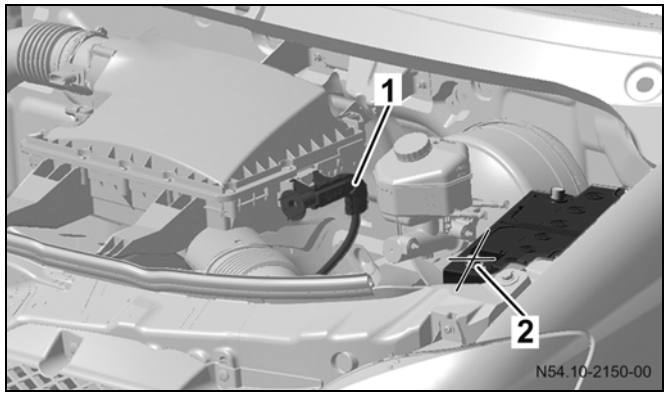
!

Leaving the vehicle parked up for long periods of time can lead to battery damage. This can be avoided by disconnecting the battery and storing it in an appropriate manner (▷ page 41).



Installation location of the main battery

1 Main battery



Installation location of the jump-starting connection

1 Jump-starting connection

2 Positive terminal, additional battery – not suitable for jump-starting

The jump-starting connection or the main battery must be used if you intend to use an external power source to start the vehicle.

!

The additional battery in the engine compartment must not be used for connection to an external power supply as this could result in damage to the vehicle (▷ page 71).

The cost of any additional work made necessary by the body and which has to be carried out during warranty, maintenance or repair work will not be carried by Daimler AG.

The following must be observed by the body manufacturer before delivery of the vehicle:

- Check the headlamp setting or have this checked at a qualified specialist workshop. We recommend a Mercedes-Benz Service Centre.
- Retighten the wheel nuts to the specified torque.

- Daimler AG recommends adapting the scopes of maintenance work on the body to each individual body using the relevant Mercedes-Benz service systems. This applies both to the scope and type of service work, and for determining the service due dates for servicing intervals based on time elapsed and distance covered.

The body manufacturer must provide the vehicle with operating instructions and maintenance instructions for the body and any additional equipment installed. These instructions must be in the language of the country in which the vehicle is to be used.

3.9.1 Storing the vehicle

Storage in an enclosed space:

- Clean the entire vehicle
- Check the oil and coolant levels
- Inflate the tyres to 0.5 bar above the specified tyre pressures
- Release the hand brake and chock the wheels
- Disconnect the battery and grease battery lugs and terminals

Storing the vehicle in the open (< 1 month):

- Carry out the same procedure as for storing in an enclosed space
- Close all air inlets and set the heating system to "Off"

Storing the vehicle in the open (> 1 month):

- Carry out the same procedure as for storing in an enclosed space
- Fold the windscreen wipers away from the windscreen
- Close all air inlets and set the heating system to "Off"
- Remove the battery and store it in accordance with the manufacturer's specifications (▷ page 41)

Maintenance work on the stored vehicle (in storage for > 1 month)

- Check the oil level once a month
- Check the coolant once a month
- Check the tyre pressures once a month

Removing the vehicle from storage

- Check the fluid levels in the vehicle
- Adjust the tyre pressures to the manufacturer's specifications
- Check the battery charge and install the battery
- Clean the entire vehicle

3.9.2 Battery maintenance and storage

To avoid damage to the battery, disconnect the battery if the vehicle is to be parked up for a period longer than 1 week.

If the vehicle is parked up for periods of longer than 1 month, remove the battery and store it in a dry place at temperatures of between 0 °C to 30 °C.

Store the battery in an upright position.

The battery charge must be kept above 12.55 V at all times.

If the voltage drops below 12.55 V but not below 12.1 V, the battery must be recharged.

If the battery voltage drops below 12.1 V, the battery is damaged and it will have to be replaced.

3.9.3 Work before handing over the modified vehicle

The manufacturer must confirm the work and modifications carried out by making an entry in the Maintenance Booklet.

Checking the entire vehicle

Check the vehicle for perfect condition. Damage must be repaired where necessary.

Checking the brake system

The brake fluid must be renewed every two years.

If it is not known how long a vehicle equipped with a hydraulic brake system has been in storage, the brake fluid must be renewed.

Check electrical and hydraulic lines for all types of damage and replace if necessary.

Checking the battery

Check, and correct if necessary, the battery charge before handing over the vehicle.

Checking the tyres

Before handing over the vehicle, check that the tyres are inflated to the specified pressure and check the tyres for damage. Damaged tyres must be replaced.

Checking wheel alignment

We recommend that the wheel alignment be checked if modifications have been made by a body repair workshop. More detailed information is contained in the Mercedes-Benz Workshop Information System (WIS).

3.10 Special equipment

We recommend using equipment available as option codes to adapt the body to the vehicle optimally.

Information about all special equipment available as a code is available from your Mercedes-Benz Service Centre or from body manufacturer advisors (▷ page 17).

On the Mercedes-Benz homepage, you can assemble your vehicle in the Configurator and view the available items of special equipment:

www.mercedes-benz.de

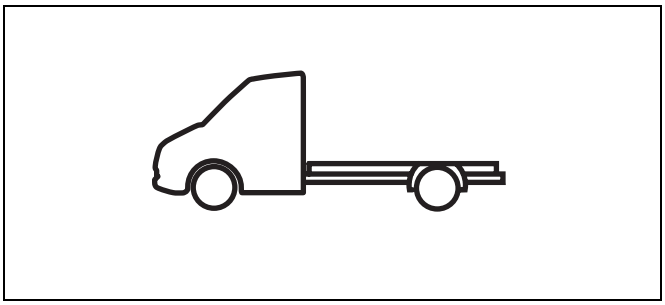
Special equipment (e.g. reinforced springs, frame reinforcement, auxiliary tanks, anti-roll bars, etc.) or retrofitted equipment increases the unladen weight of the vehicle.

The actual vehicle weight and axle loads must be determined by weighing before mounting.

Not all special equipment can be installed in any vehicle without problems. This applies particularly to retrofitting.

4.1 Threshold values of the basic vehicle

This section contains the basic vehicle technical threshold values which are important for planning work. In addition, you will find more information in the other sections of the current version of the body / equipment mounting directives.



4.1.1 Steerability

- In all load states, the front axle load must represent at least the following proportion of the gross permissible vehicle weight:

M1 licensed	at least 30% of the gross vehicle weight
N1 to N3 licensed	at least 25% of the gross vehicle weight

- The permissible axle loads must be observed regardless of the load situation.

4.1.2 Extreme permissible positions of centre of gravity

y-axis:	The maximum wheel load (1 / 2 the axle load) of the laden vehicle may only be exceeded by 4%.

Centre of gravity heights with ESP

The CoG height with ESP may be max 1,300 mm.

If the CoG height of the overall vehicle is over 1,300 mm, this can have a negative effect on ESP control quality. If driving comfort is impaired in isolated cases, we recommend deactivating the ESP.

4.1.3 Vehicle dimensions

Vehicle width

(in accordance with Section 42 Para. 3 of StVZO (German Road Traffic Licensing Regulations)) not including additional headlamps	
Standard headlamps	≤ 2,502 mm
Xenon headlamps	≤ 2,216 mm

Depending on body / vehicle width	
Standard mirrors	Body width ≤ 2,190 mm
Special equipment Code FS1	Body width 2,190 mm to 2,300 mm
Special equipment Code FS2	Body width 2,300 mm to 2,360 mm

Vehicle height

(in accordance with Section 42 Para. 3 of StVZO (German Road Traffic Licensing Regulations))
4,000 mm

Vehicle length

(in accordance with Section 42 Para. 3 of StVZO (German Road Traffic Licensing Regulations))

4.1.4 Parts which must not be welded:

- The A- and B-pillars
- Top and bottom chord of the frame
- Radii
- In the vicinity of the airbags
- Plug welding is only permissible in the vertical webs of the longitudinal frame member.

Additional information can be found under "Damage prevention" (▷ page 63) and "Planning of bodies" (▷ page 35).

4.1.5 Parts which must not be drilled:

- The A- and B-pillars
- Top and bottom chord of the longitudinal frame member
- At load application points (e.g. spring supports)
- At front-axle or rear-axle supporting points
- In the vicinity of the airbags

Holes in the longitudinal frame member are the result of the production process and are not suitable for all attachments, bodies, equipment and conversions. On no account may holes resulting from the production process be used, as this could damage the frame.

More information is contained under "Planning of bodies" (▷ page 35).

4.2 Suspension threshold values

General

Several suspension variants are available ex factory. A suitable suspension variant must be selected depending on the planned body, see 2.4.6 PIT (product information for vans), page 22.

Suspension package	Description	Codes included by model designation		
		906.X1X	906.X3X	906.X5X
CF2	Increased roll stabilisation through modification of torsion bar diameter	C40+, C33	C42+, C45	C42+, C45
CF3	Increased roll stabilisation with reinforced RA shock absorbers		C43+, C45+, CF6+, C47+	C43+, C45+
CF4 (previously CE1)	Increased roll stabilisation with increased body damping		C42+, C45+, CF6	C42+, C45+, CF6
CF5 (previously CE6)	Increased roll stabilisation with increased body damping and harder RA suspension springs		C43+, C45+, CF6+, C33	C45+, CF6+, C33

+ For 3.5 t vehicles in combination with suspension package CF3, we recommend adding code C21 Two-stage rear springs if the rear axle load is below 1,200 kg.

The contents of the suspension packages can vary from that shown here depending on the selected model designation and other equipment.

Description of special equipment available ex factory:

Code	Description
A50	Reinforced front axle
C17	Suspension for lower overall height
C21	Two-stage rear springs
C33*	Harder rear springs
C36	Rear springs with weaker stage II
C38	Rear springs for weight variant 3.88 t
C39	Comfort rear springs for weight variant 3.88 t
C40*	Front axle anti-roll bar
C42*	Rear axle anti-roll bar under frame

* Code cannot be ordered separately

Code	Description
C43*	Reinforced rear axle anti-roll bar under frame
C45*	Reinforced anti-roll bar on front axle
C47	Reinforced shock absorbers
CF2	Suspension for application A
CF3	Suspension for application B
CF4	Suspension for application C
CF5	Suspension for application D
CF6*	Reinforced front springs and shock absorbers
CT1*	Vibration damper

* Code cannot be ordered separately

4.2.1 Permissible axle loads

See "General" (▷ page 11) for more information.

⚠ Risk of accident

Make sure that you do not exceed the permissible axle loads. Doing so would prevent the ESP system from functioning correctly on vehicles which are equipped with this feature. In addition, overloading could damage the suspension system and load-bearing parts. The driver could lose control of the vehicle and cause an accident.

Information about axle loads and the maximum permissible gross vehicle weight is contained in the "Technical advice on the basic vehicle" section (▷ page 17).

4.2.2 Approved tyre sizes

On vehicles with "harder anti-roll for chassis with motor caravan body" (Code CE6) the following minimum rear axle loads must be maintained in all driving conditions:

Gross vehicle weight	Minimum rear axle load
3.5 t	1,200 kg
3.88 t	1,850 kg
5 t	2,250 kg

Gross vehicle weight [t]	Equipment		Tyre size	Weight and speed index
3.0			205 / 75 R16 C	110 / 108R
3.5			235 / 65 R16 C	115 / 113R
	[2]		235 / 60 R17 C	117 / 115R
	[3]		225 / 75 R16 C	116 / 114R
3.88			235 / 65 R16 C	121N (116R)
4.6			195 / 75 R16 C	107 / 105R
	[1]	FA RA	235 / 65 R16 C 285 / 65 R16 C	115 / 113R 128N (116R)
	[2]		205 / 75 R16 C	110 / 108R
5.0			195 / 75 R16 C	107 / 105R
	[2]		205 / 75 R16 C	110 / 108R

[1] With Supersingle special equipment, Code RH9
[2] Special equipment
[3] All-wheel drive and SW code Z12

4.2.3 Diameter of turning circle

Refer to:

- Section 32d StVZO (German Road Traffic Licensing Regulations)
- European Union: 97 / 27 / EC
- European Union: 96 / 53 / EC

Wheelbase [mm]	Diameter of turning circle [m]
3,250	12.3
3,665	13.5
4,325	15.6

4.2.4 Modifications to the axles

No modifications whatsoever may be made to the suspension or the axles (▷ page 111).

4.2.5 Modifications to the steering system

On no account may any modifications be made to the steering system (▷ page 111).

4.2.6 Modifications to the brake system

On no account may any modifications be made to the brake system.

On no account may any modifications be made to disc brake air inflow and air outflow (▷ page 113).

Wheel chocks are specified for vehicles with a permissible gross vehicle weight > 4 t according to Section 41 Para. 14 StVZO (German Road Traffic Licensing Regulations).

4.2.7 Modifications to springs, spring mountings / shock absorbers

Modifications to springs and shock absorbers can only be made if they are matched at the front and rear. The combination determined at the factory must be used.

You can obtain more information and, if necessary, request the certificates of endorsement from the department responsible (▷ page 17).

On no account should springs or shock absorbers be used if they do not correspond to the characteristics of standard parts or parts obtainable as special equipment. We recommend the use of standard Mercedes-Benz parts.

On no account should modifications be made to the spring mountings (▷ page 111).

4.2.8 Wheel alignment

No modifications whatsoever may be made to wheel alignment settings (▷ page 111).

4.3 Bodyshell threshold values

4.3.1 Modifications to the bodyshell

See "Modifications to the basic vehicle" (▷ page 118) for more information.

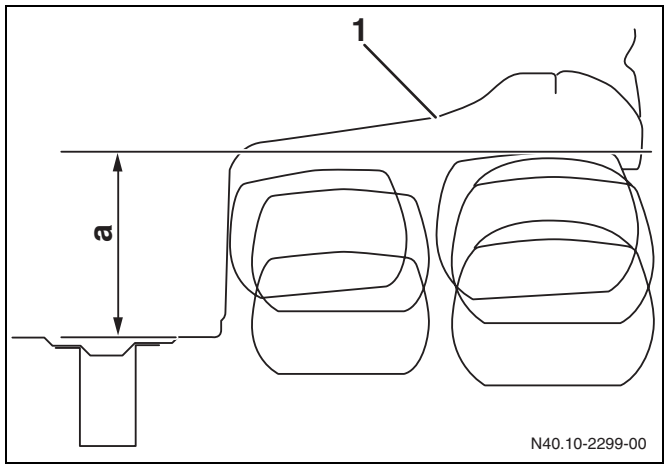
- No modifications whatsoever may be made to the cross-member structure from the front of the vehicle back to, and including, the B-pillar.
- On no account should modifications be made to the rear door opening including the roof area (▷ page 132).
- In the event of modifications to the load-bearing structure, the total equivalent rigidity of the structure fitted by the body manufacturer must at least equate to that of the standard vehicle.
- Clearances for fuel filler necks, fuel tank lines and fuel lines must be maintained.
- It is not permissible to drill holes in or perform welding work on the A-pillar or B-pillar.
- If modifications are made to the side wall of the panel van or the passenger van, the rigidity of the modified body must be equal to that of the basic vehicle.
- If bodies are mounted on basic vehicle cabs, a fuel level sensor shield may be necessary depending on the body type. See section 7.3.1 "Fuel system (petrol, diesel, gas)" (▷ page 144).

4.3.2 Threshold values of the vehicle frame

If modifications are made to the wheelbase or the frame is extended, the material of the extension element must have the same quality and dimensions as the standard chassis frame (▷ page 200).

Vehicle name	Model designation	Material
Sprinter	906	H240 LA or S235 JRG

4.3.3 Wheel arch lowering



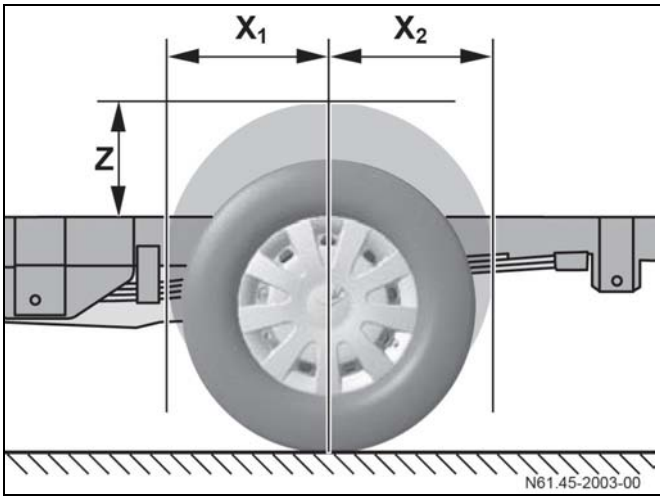
Maximum wheel arch lowering

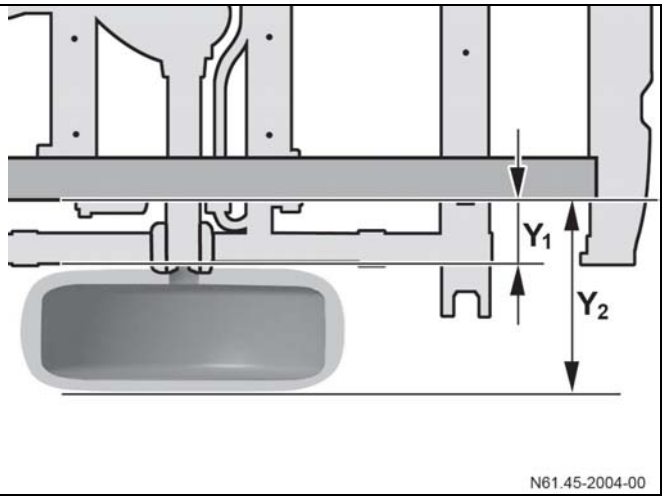
1 Contour of standard panel van wheel arch

a Maximum possible extent of lowering

The minimum required wheel clearance is measured from the floor in the panel van or the flange between the upper and lower chord of the longitudinal frame member on chassis vehicles.

Permissible gross vehicle weight [t]	Tyres	Dimension a [mm]
3.5 (longitudinal frame member, straight)	205 / 75R16	260
	235 / 65 R16	260
4.6 – 5 (longitudinal frame member, tapered)	285 / 65 R16	260
	2 x 195 / 75R16	225
	2 x 205 / 75R16	235
3.5 (all-wheel drive)	225 / 75R16	200
5.0 (all-wheel drive)	205 / 75R16	190





Chassis wheel arch limits

Permissible gross vehicle weight [t]	Tyres	Dimensions [mm]				
		X_1	X_2	Y_1	Y_{2**}	Z
3.0	205 / 75R16	410	410	195	520	260
3.5	235 / 65 R16	410	410	195	520	260
4.6	285 / 65 R16	445	445	245	635	260
4.6 – 5.0*	2 x 195 / 75R16	405	405	120	630	225
	2 x 205 / 75R16	410	410	115	635	235
3.5 (all-wheel drive)	225 / 75R16	430	430	195	510	200
5.0 (all-wheel drive)*	2 x 205 / 75R16	410	410	115	638	190

* On vehicles with twin tires, the inside of the inner wheel was used for Y_1 and the outside of the outer wheel for Y_2.

** With maximum wheel arch trim to wheel centre.

More information can be found under "Modifications to the basic vehicle" (▷ page 134).

4.3.4 Vehicle overhang

The maximum vehicle overhang without exceeding the permissible axle loads and centres of gravity is:

Maximum overhang lengths	
Wheelbase l [mm]	**Overhang length [mm]**
3,250	1,650
3,665	1,850
4,325	2,200

Extensions to overhang lengths may make it necessary to reduce the maximum permissible trailer load or noseweight. In such cases, we recommend that you consult the department responsible (▷ page 17).

4.3.5 Attachment to the frame

- Attachment to the frame must be performed as per section 7.2.2 "Attachment to the frame" (▷ page 122).
- The body must be secured to the basic vehicle by means of body support brackets fitted at the factory or by means of additional body support brackets (▷ page 203).
- The body support brackets must be secured using two bolts for each body support bracket.

4.3.6 Modifications to the wheelbase – non-specified body lengths

- On no account should modifications be made to the wheelbase by moving the position of the rear axle.
- Modifications to the frame must be performed as per 7.2 "Bodyshell / body" (▷ page 118).

Recommended cutting points on the frame

Wheelbase [mm]	Permissible gross vehicle weight [t]	A_V [mm]	A_H [mm]
3,665	3.5 / 3.88	2,285	1,305
4,325	3.5 / 3.88	2,285	1,305
3,665	4.6 / 5.0	2,205	1,420
4,325	4.6 / 5.0	2,205	1,420

Values refer to a chassis with cab

A_V... Distance to centre of front axle A_H... Distance to centre of rear axle

- Avoid frame cuts in the area of frame inserts.
- The offset between the cutting point on the mounting frame and the cutting point must be > 100 mm.
- If modifications to the wheelbase have been carried out, they must never cause the exhaust tailpipe to be directed at any vehicle components (e.g. tyres).
- More information can be found under "Modifications to the basic vehicle" (▷ page 128).

4.3.7 Vehicle roof / roof load

Maximum roof loads			
Panel van [kg] LH1	High roof panel van [kg] LH2	Extra-high roof panel van [kg] LH3	Cab, crewcab [kg]
300	150	0	100

Roof arches or supporting parts may not be removed or damaged without being replaced.

The connection between the roof arch and the side wall must be of sufficient bending resistance (▷ page 139).

Wheelbase [mm]	Quantity required
3,250	≥ 4 roof arches
3,665	≥ 5 roof arches
4,325	≥ 6 roof arches

Roof arches	Position
1	to the rear of the front doors (B-pillar)
2	at the centre of the load compartment sliding door (between the B- and C-pillars)
3	in the centre of the vehicle behind the load compartment sliding door (C-pillar)
4-6	between the C-pillar and the rear end of the vehicle (rear pillar)

Roof height [mm]	Moment of inertia I_x per roof arch [mm^4]
≤ 250	≥ 40,000
≤ 400	≥ 65,000
≤ 550	≥ 86,000

4.4 Threshold values of engine peripherals / drivetrain

4.4.1 Fuel system

- On no account should modifications be made to the fuel system (▷ page 144).

4.4.2 Modifications to the engine / drivetrain components

- On no account may any modifications be made to the engine air intake.
- Modifications to propeller shaft lengths may only be carried out by a company qualified in propeller shaft engineering.
- It is not possible to retrofit any engine speed regulation equipment, other than that which is available as an optional extra.
- On no account should modifications be made to the exhaust system, especially in the vicinity of exhaust gas aftertreatment components (diesel particle filter, catalytic converter, Lambda probe, etc.).

4.4.3 Engine cooling system

On no account should modifications be made to the cooling system (radiator, radiator grille, air ducts, etc.) (▷ page 146).

The complete cross-section of the cooling air intake surfaces must remain unobstructed. This means:

- at least 11 dm^2 for the front grille (radiator and condenser)
- at least 7 dm^2 for the opening in the bumper (charge-air cooler flow)

4.5 Threshold values for the interior

4.5.1 Modifications to airbags and belt tensioners

⚠ Risk of injury

On no account may any modifications be made to the airbag system or the belt tensioner system.

Modifications to or work incorrectly carried out on a restraint system (seat belt and seat belt anchorages, belt tensioner or airbag) or its wiring could cause the restraint systems to stop functioning correctly. This means, for example, that airbags or belt tensioners may be activated inadvertently or may fail in the event of an accident even though the rate of deceleration exceeds the deployment threshold.

- On no account should modifications be made to airbag components or in the vicinity of airbag components and sensors.
- On no account should modifications be made to the roof lining or its attachment if the vehicle is equipped with windowbags.
- The vehicle interior must be designed in such a way that airbags can fully deploy without impediment (▷ page 159).
- On no account should modifications be made around the airbag control unit (▷ page 159).

More information can be found under "Modifications to the basic vehicle" (▷ page 159).

4.5.2 Modifications to seats

⚠ Risk of injury

It is not permitted to modify the seats or mount seats on the wheel arches. Otherwise the seats could become detached from their anchorages in the event of an accident.

More information can be found under "Modifications to the basic vehicle" (▷ page 166) and "Modifications to the interior" (▷ page 208).

If a rear bench seat with two- or three-point seat belts deviates from the standard seat design, it must comply with the requirements of EC Directives 76 / 115 / EEC and 74 / 408 / EEC.

4.6 Electrics / electronics threshold values

See section 6 "Electrics / electronics" (▷ page 69).

4.6.1 Vehicle perimeter and side marker lamps

Vehicle perimeter lamps are required by law on all vehicles with total widths of over 2.10 m in accordance with Section 51b, Para. 2, of the StVZO (German Road Traffic Licensing Regulations).

Side marker lamps are required on all vehicles with a length of over 6 m as specified by EC Directive 76 / 756 / EEC.

4.6.2 Retrofitting electrical equipment

All equipment fitted must be tested in accordance with EC Directive 94 / 54 / EEC and must bear the "e" mark.

Comfort may be impaired in individual cases.

4.6.3 Mobile communications systems

- The maximum transmission output must not be exceeded.

Waveband	Maximum transmission output [W]
Short wave (f < 50 Mhz)	100
4 m band	30
2 m band	50
Trunked radio / Tetra	35
70 cm band	35
GSM 900 / AMPS	10
GSM 1800	10
UMTS	10

4.6.4 CAN bus

On no account should modifications be made to the CAN bus or the components connected to it.

The programmable special module (Code ED5) can be used to access individual types of data available on the CAN bus (▷ page 98).

4.6.5 Electronic Stability Program

Risk of accident

The location, position and mounting of the ESP yaw rate sensor must not be modified. On no account should modifications be made to wiring or ESP components. Otherwise there is a danger that the ESP system may no longer function correctly. This would increase the risk of an accident, especially when driving near the system's limits.

4.7 Threshold values for additional equipment

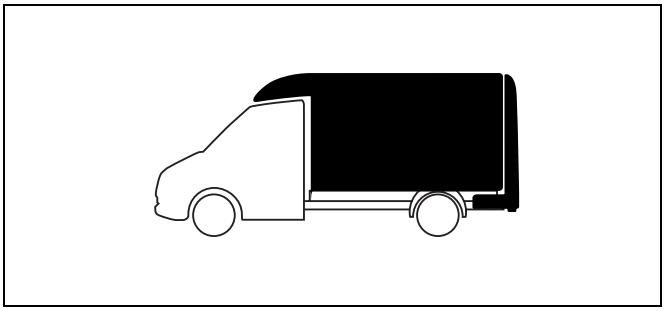
If auxiliary equipment (e.g. additional air-conditioning compressors, pumps, etc.) is retrofitted, the following must be observed:

- The operation of vehicle components must not be adversely affected.
- The freedom of movement of vehicle parts must be guaranteed in all driving situations.

4.8 Threshold values for attachments

- Under EC Directive 89 / 297 / EEC, all vehicles weighing over 3.5 t are required to be equipped with side underride guards.
- Under Section 32b of the StVZO (German Road Traffic Licensing Regulations), vehicles are required to be equipped with an underride guard if:
  - the distance between the rear of the vehicle and the rear axle is more than 1,000 mm.
  - the ground clearance of the chassis as well as the main body parts exceeds 550 mm for the unladen vehicle across the entire width.
- The maximum permissible lifting load of a lifting platform is 500 kg on a fully enclosed model and 750 kg on chassis. Attachment as per section 7.6.6 "Loading tailgate (lifting platform)" (▷ page 190) is essential.

4.9 Threshold values for the body

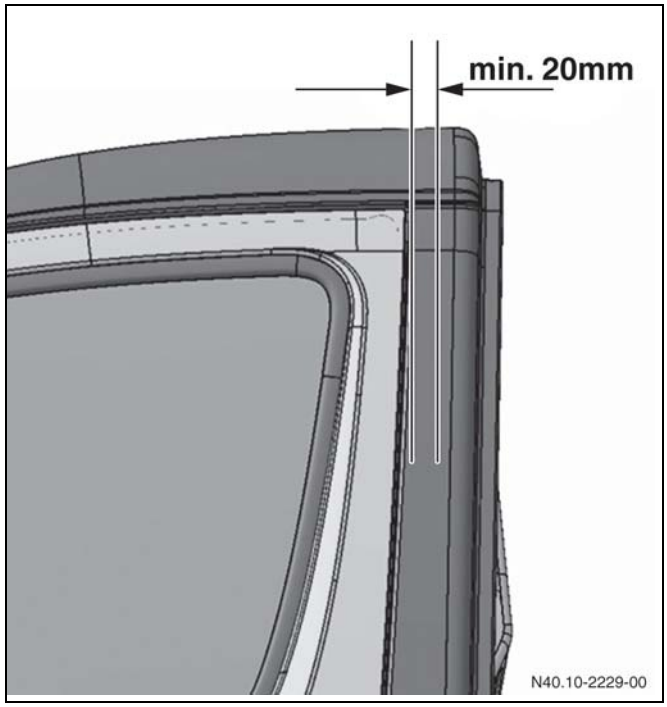


See section 8 "Construction of bodies" (▷ page 200).

The standard fuel filler cap must not be removed or covered with any "blocking" parts (▷ page 236).

The minimum distance between the cab and a separate body must be > 50 mm.

The minimum distance between the rear edge of the door and an integrated body must be > 20 mm. Otherwise, the rear edge of the door may come into contact with the body in the event of an accident, and in extreme cases the door may be jammed.



Minimum distance between rear edge of door and integrated body

4.9.1 Threshold values of the mounting frame

Required moment of resistance[1] of mounting frame:	
Up to maximum standard wheelbase	30 cm^3
Over maximum standard wheelbase	> 34.5 cm^3

[1] Each individual mounting frame longitudinal member must have the moment of resistance specified here.

Observe any differing specifications which may apply, see 8.7 "Platform bodies" (▷ page 228) and 8.10 "Tipper bodies" (▷ page 231).

Material quality of specified mounting frame made of steel

Material	Tensile strength [N/mm²]	Yield strength [N/mm²]
H240LA (DIN EN 10268-1.0480)	350-450	260-340
S235JRG2 (DIN EN 10025-1.0038)	340-510	≥ 235

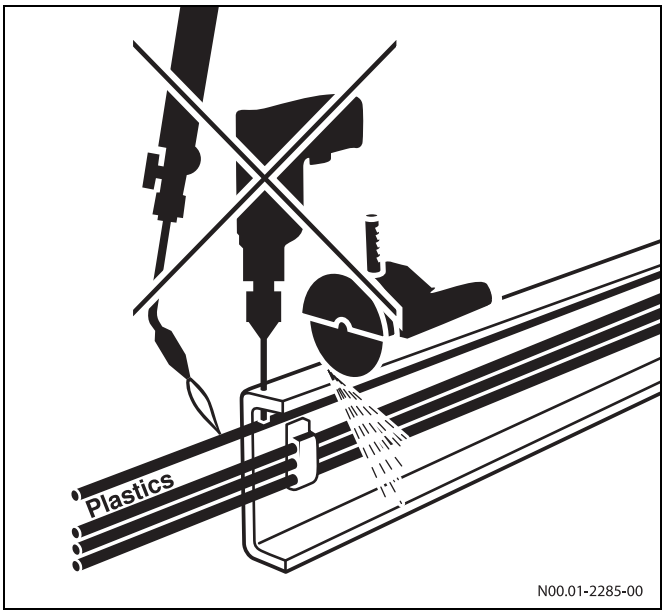
Additional information can be found in section 8 "Construction of bodies" (▷ page 200).

Any work carried out on the vehicle must comply with accident prevention regulations.

Comply with all national regulations and laws.

5.1 Brake hoses / cables and lines

Cover plastic lines, brake hoses and brake cables before carrying out any welding, drilling and grinding work or before working with cutting discs. If necessary, the plastic lines, brake hoses and brake cables should be removed.



Test each of the systems for pressure loss and leaks after installing compressed-air lines and hydraulic lines.

No other lines may be attached to brake hoses.

Lines must be protected from heat by means of insulation.

Risk of accident and injury

Work carried out incorrectly on the brake hoses or cables may impair their function. This may lead to the failure of components or parts relevant to safety.

5.2 Welding work

Risk of injury

Welding in the vicinity of the restraint systems (airbag or belts) can cause these systems to no longer function correctly. Welding is therefore not permitted in the vicinity of the restraint systems.

Risk of accident

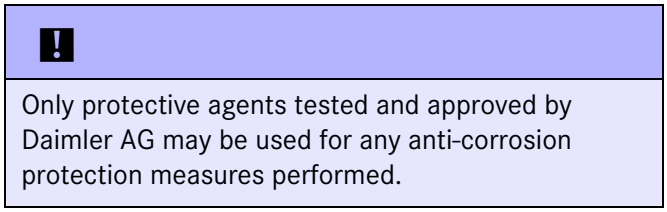
Welding work that is not performed correctly could lead to failure of components relevant to safety. It would then not be possible to rule out the risk of an accident. For this reason, the following safety precautions must always be observed during any work involving welding:

- Welding work on the chassis may only be carried out by trained personnel.
- Before performing welding work, components which may contain flammable or explosive gases, e.g. fuel system, NGT natural gas system (▷ page 150), must be removed or protected from sparking with a fire-resistant covering. Gas cylinders which are damaged by sparking during welding must be replaced.
- Before welding operations in the vicinity of the seat belts, airbag sensors or the airbag control unit, these components must be removed for the duration of the work. You will find important information about handling, transporting and storing airbag units under 7.4 "Interior" (▷ page 158).
- Before welding, cover springs and air bellows to protect them from welding spatter. Do not touch springs with welding electrodes or welding tongs.
- Welding work is not permitted on assemblies such as the engine, transmission, axles, etc.
- Disconnect the positive and negative terminals from the battery and cover them.
- Connect the welding-unit earth terminal directly to the part to be welded. Do not connect the earth clamp to assemblies such as the engine, transmission or axles.
- Do not touch electronic component housings (e.g. control modules) and electric lines with the welding electrode or the earth contact clamp of the welding unit.
- Weld only with electrodes connected to the positive pole of a direct current source. Always weld from bottom to top.
- The maximum current may be 40 A per mm of electrode diameter.
- Use only completely dry lime basic jacket electrodes (2.5 mm diameter).
- MIG welding is permissible.
- Only use welding wires with a thickness of between 1 and 1.2 mm.
- The yield point and tensile strength of the welding material must be at least equal to that of the material to be welded.
- Plug welding is only permissible in the vertical webs of the longitudinal frame member.
- Welds must be ground down and reinforced with angular profiles to prevent notching from welding penetration.
- Avoid welds in bends.
- There must be at least 15 mm between the weld and the outer edges.

You will find further information about welding operations in the "Planning of bodies" (▷ page 35), "Modifications to the basic vehicle" (▷ page 111) and "Bodyshell" (▷ page 118) sections and in the Mercedes-Benz Workshop Information System (WIS).

5.3 Corrosion protection measures

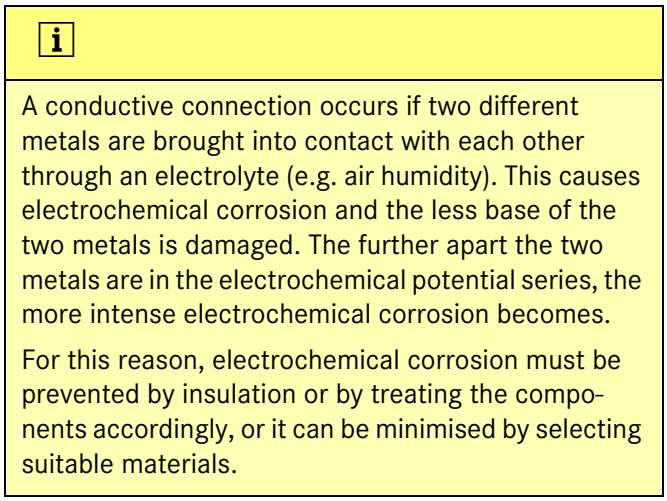
Surface and anti-corrosion protection measures must be carried out on the areas affected after modifications and installation work have been performed on the vehicle.



Only protective agents tested and approved by Daimler AG may be used for any anti-corrosion protection measures performed.

Planning measures

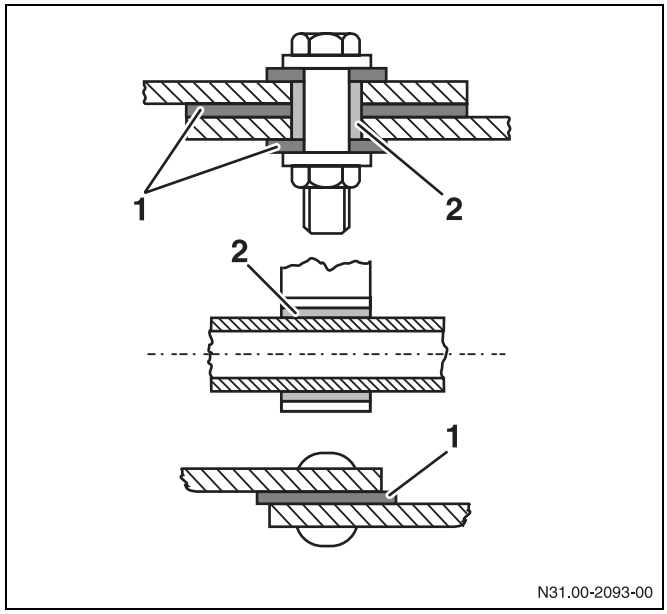
Anti-corrosion protection measures should be included in the planning and design stages by selecting suitable materials and designing components accordingly.



A conductive connection occurs if two different metals are brought into contact with each other through an electrolyte (e.g. air humidity). This causes electrochemical corrosion and the less base of the two metals is damaged. The further apart the two metals are in the electrochemical potential series, the more intense electrochemical corrosion becomes.

For this reason, electrochemical corrosion must be prevented by insulation or by treating the components accordingly, or it can be minimised by selecting suitable materials.

Preventing contact corrosion by means of electrical insulation



Preventing contact corrosion

1 Insulating washer

2 Insulating sleeve

Contact corrosion can be prevented by using electrical insulation such as washers, sleeves or bushings.

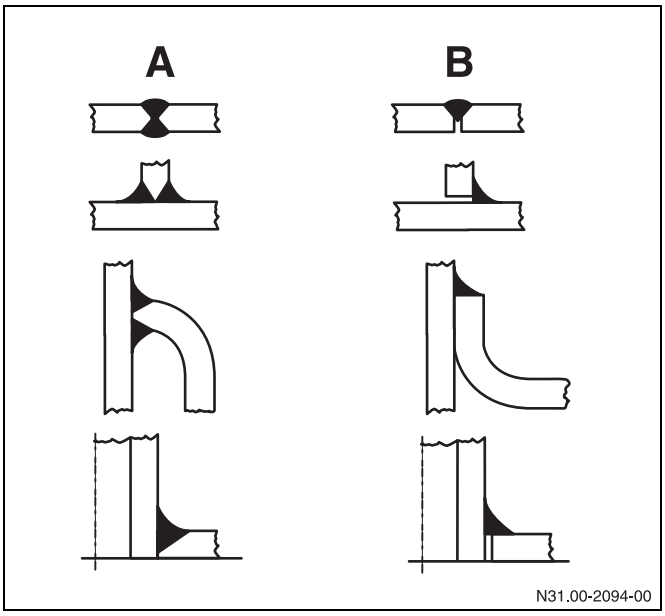
Avoid welding work on inaccessible cavities.

Component design measures

Corrosion can be prevented by design measures, in particular the design of joints between different materials or the same kind of materials:

There is a risk of dirt or humidity accumulating in corners, edges, beads and folds.
Design measures for counteracting corrosion can be implemented using inclined surfaces and drains, and by avoiding gaps in the joints between components.

Gaps inherent in the design of welded connections and how to avoid them



Examples of types of welded connections

A = correct (through-welded)	B = incorrect (gap)

Coating measures

The vehicle can be protected by applying protective coatings (e.g. galvanisation, painting or zinc coating applied by flame) (▷ page 66).

After all work on the vehicle:

- Remove drilling chips.
- Deburr sharp edges.
- Remove any burned paintwork and thoroughly prepare surfaces for painting.
- Prime and paint all unprotected parts.
- Preserve cavities with wax preservative.
- Carry out corrosion protection measures on the underbody and frame parts.

5.4 Painting work / preservation work

The temperature of the spray booth may only briefly exceed 60 °C. The drying temperature may be max. 60 °C for a drying period of 30 min. Control units or other components can be damaged at higher temperatures.

Paintwork or preservation agent damaged by the body manufacturer must be repaired by the body manufacturer.

Observe the following points:

- Daimler AG quality standards for initial painting and paintwork repairs must be adhered to.
- Only materials tested and approved by Daimler AG may be used for any painting or preservation work performed.
- The body manufacturer must observe the coat thickness for each individual coat as specified by the factory.
- Paint compatibility must be guaranteed when repainting.

You can obtain information on the paint materials and coat thicknesses used at the factory and Mercedes-Benz paint numbers from any Mercedes-Benz Service Centre.

Mask the following areas before painting:

- Disc brakes
- Brake hoses
- Gearing unit for parking brake
- Contact areas between wheels and wheel hubs
- Contact surfaces of wheel nuts / wheel bolts
- Brake fluid reservoir
- Vents on transmission, axles, etc.
- Sealing surfaces
- Windows
- Door locks
- Door retainers in the rear door hinges
- Door retainers and opening limiters in the centre guide rails
- Contact surfaces on the guide rails for the sliding doors
- Moving parts of the sliding door carriage
- Airbags and seat belts
- Parktronic sensors (▷ page 104)

Additional information on paintwork and preservation can be found in the "Guidelines for painting" under **https://aftersales.mercedes-benz.com**

5.5 Towing and tow-starting

Before towing or tow-starting, read the "Towing" section in the detailed Operating Instructions.

5.6 Storing and handing over the vehicle

Storing

To prevent any damage while vehicles are in storage, we recommend that they be serviced and stored in accordance with the manufacturer's specifications (▷ page 40).

Handing over

To prevent damage to the vehicle or to repair any existing damage, we recommend that the vehicle be subjected to a full function check and a complete visual inspection before it is handed over (▷ page 42).

6.1 General information

Risk of accident

Work incorrectly carried out on equipment and its software can prevent this equipment from working correctly. Since the electronic systems are networked, this can also affect systems that have not been modified.

Malfunctions in the electronic systems can seriously jeopardise the operating safety of the vehicle.

Have work on or modifications to electronic components carried out at a qualified specialist workshop which has the necessary expertise and tools to carry out the work required.

Mercedes-Benz recommends that you use a Mercedes-Benz Service Centre for this purpose.

In particular, work on systems relevant to safety must be carried out at a qualified specialist workshop.

Some of the safety systems only function when the engine is running. For this reason, do not switch off the engine when the vehicle is in motion.

A positive total charge balance must be ensured when additional electrical consumers are installed (▷ page 75).

Do not release or remove the battery terminals when the engine is running.

Rapid-charge the batteries only after disconnecting them from the vehicle's electrical system. Both the positive and negative terminals must be disconnected.

- Electrical and electronic components must fulfil the test requirements of ISO 16750.
- Observe the directives on (▷ page 71) when installing additional batteries.
- Cables routed in the vicinity of exhaust systems must be insulated against high temperatures (▷ page 114).
- Cables must be routed in such a way that there are no chafing points (▷ page 114).
- The batteries must be disconnected if the vehicle is not in use for extended periods (more than 20 days). The batteries must have sufficient charge when the vehicle is put into operation again (▷ page 41).
- Observe the Operating Instructions.

You can obtain more information from the department responsible (▷ page 17).

6.2 Electromagnetic compatibility (EMC)

Electromagnetic compatibility describes the ability of an electrical system to act neutrally in the vicinity of other systems when operating at full function. It does not interfere with any of the active systems in the vicinity, nor does it suffer any interference.

Electrical interference occurs in vehicle electrical circuits because of the various consumers.
At Mercedes-Benz, electronic components installed at the factory are checked for their electromagnetic compatibility in the vehicle. If subsequent modifications are made, this may cause discomfort in some cases (e.g. radio noise).

When retrofitting electric or electronic systems, they must be tested for electromagnetic compatibility and this must be documented.

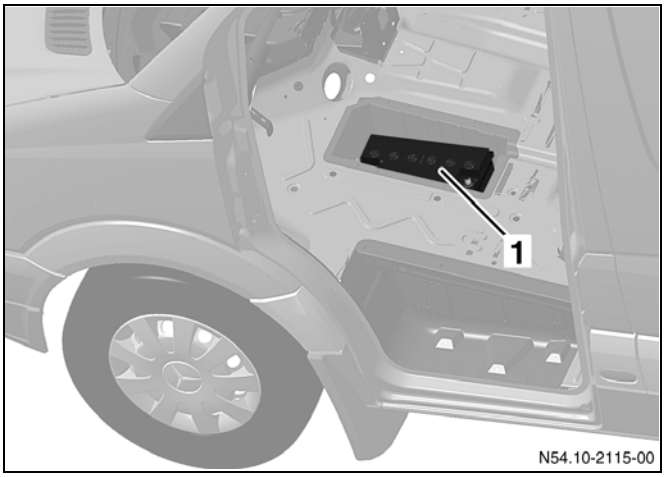
The equipment must possess type approval in accordance with EU Directive 72 / 245 / EEC (as currently amended) and must bear the "e" mark.

The following standards provide information on this:

- CISPR 12
- CISPR 25
- ISO 7637
- ISO 10605
- ISO 11451
- ISO 11452
- MBN 10284
- EC Directive 72 / 245 / EEC
- ECE-R 10

6.3 Battery

The main battery is located in the floor on the left-hand side, to the front of the driver's seat.



Installation location of the main battery

1 Main battery

A moderate current draw requires the use of the uprated battery (Code EE8, E28 or ED4). An additional battery must be used for a high current draw.

In order to facilitate tapping power from the additional battery (code E28), a tap (fuse box) is available in the driver seat box. This means that it is not necessary to route additional lines from the vehicle interior (body manufacturer consumers) to the additional battery in the engine compartment (▷ page 76).

6.3.1 Retrofitting a battery isolating switch

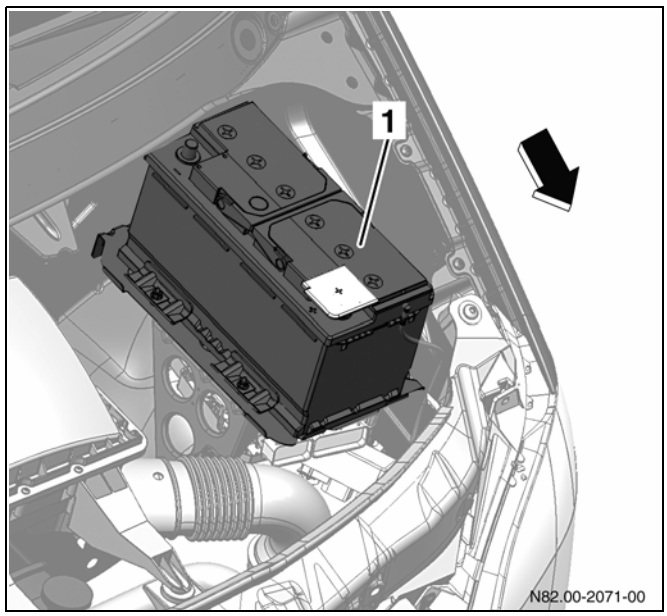
Additional information on special equipment can be obtained from your Mercedes-Benz Service Centre, the relevant department (▷ page 17) or under 3.10 "Special equipment" (▷ page 43).

6.3.2 Retrofitting an additional battery

General information about additional batteries

Capacities >100 Ah must not be connected directly to the vehicle's electrical system because this could cause damage to the basic vehicle.

We recommend the use of lead-antimony batteries fitted in the location provided in the engine compartment.



Location of the additional battery

1 Additional battery

Arrow Front of vehicle

Additional batteries must be connected to the vehicle on-board electrical system using a suitable cutoff relay and fuse. You can obtain more information and a design proposal from the department responsible (▷ page 17).

If the additional battery is installed in the passenger compartment, a ventilation system of adequate size must be installed to transport any gases released to the atmosphere via a central degassing hose.

The additional battery may only be used to power auxiliary consumers such as the auxiliary heating, loading aids or electrical equipment in motor caravans (fridge, etc.).

Multiple additional batteries

If the vehicle is already equipped with one additional battery, no more additional batteries may be connected in parallel without a charging current limitation system. This can be implemented by means of additional electronics. The body manufacturer must ensure that the maximum charging current for both additional batteries is 40 A. If this is not the case, the basic vehicle may be damaged.

A suitable alternator must be selected to ensure that the overall charging balance is positive.

Retrofitting multiple additional batteries requires a certificate of endorsement from the department responsible (▷ page 17).

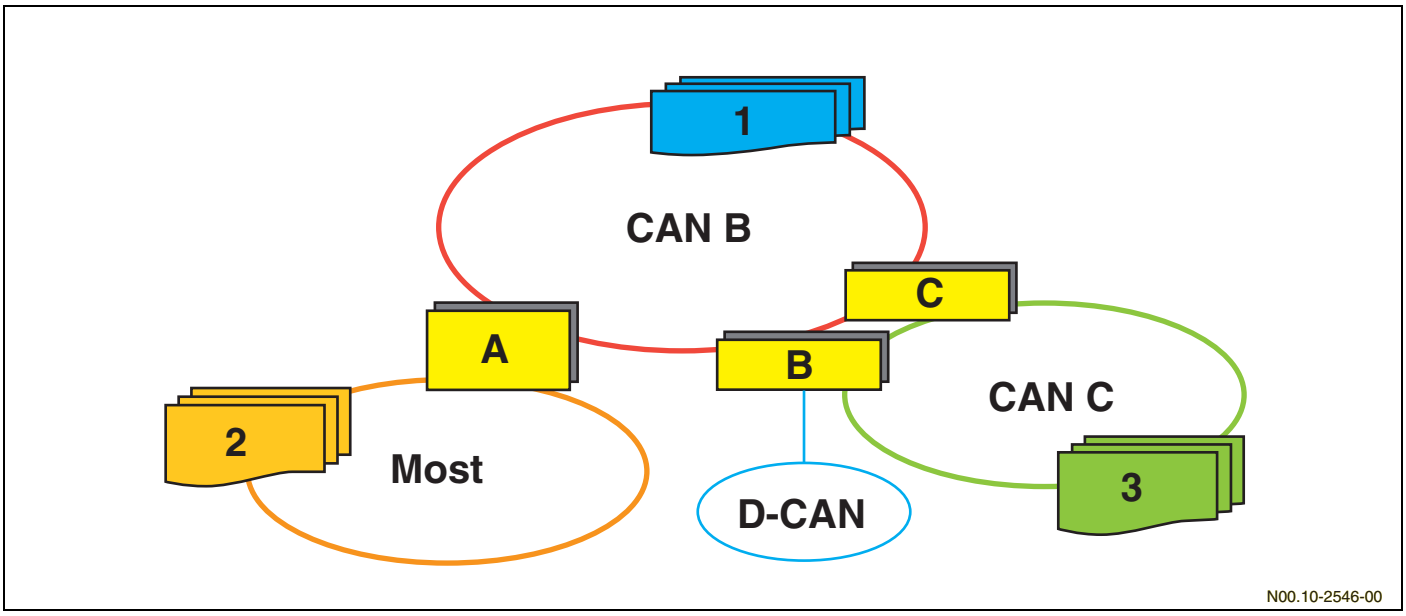
6.3.3 Battery maintenance and storage

Batteries must be checked regularly for voltage loss (self-discharge) even when removed. Only the electrolyte level check is not required with low-maintenance batteries.

Information on maintaining and storing batteries can be found under 3.9.2 "Battery maintenance and storage" (▷ page 41).

6.4 Interfaces

6.4.1 CAN bus and networking



1 I-CAN = interior CAN (CAN B, 83.333 kBit / s)	2 MOST = optical bus	3 M-CAN = engine CAN (CAN C, 500 kBit / s) D-CAN = diagnostics CAN (500 kBit / s)
Tyre pressure monitor$_1$	CD changer$_1$	Brake system
Restraint system electronics	Telephone$_1$	Jacket tube module
Overhead control panel$_1$		Electronic selector lever module$_1$
Signal acquisition and actuation module		Transmission control unit$_1$
Door control unit		Engine control unit
Electric sliding door, left / right$_1$		Sensor cluster Ax / Ay / wz
Fuel-fired heater booster$_1$		Diagnostics interface
Keyless Entry$_1$		Tachograph$_1$
Upper control panel		Reduction control unit$_1$
Trailer control unit$_1$		Automatic headlamp range control$_1$
Parktronic$_1$		
Parameterizable special module$_1$		
Air-conditioning control$_1$		
PTC heater booster$_1$		
Auxiliary heating, water$_1$		

1 Special equipment

A Head unit / radio, interface between I-CAN and MOST

B Electronic ignition switch, interface between I-CAN and M-CAN

C Instrument cluster, interface between I-CAN and M-CAN

⚠ Risk of accident

As all consumers are networked and internally monitored, no modifications should be made to the CAN bus (e.g. breaking, extending or tapping). Any modifications to the length, cross-section or resistance of the wiring harness can lead to failure of safety-relevant components or to impaired comfort.

Internal and external vehicle diagnosis can be carried out by means of the OBD diagnostic socket (SAE 1962). All control units are capable of self-diagnosis and have an internal fault memory.

Communication with the relevant control unit can be established using the STAR DIAGNOSIS tester and the software developed for this unit.

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You can obtain more information from a Mercedes-Benz Service Centre.

6.4.2 Electric wiring / fuses

If the routing has to be altered, avoid routing across sharp edges and through narrow cavities or near moving components.

Only lead-free PVC-sheathed cables with an insulation limit temperature of ≥ 105 °C may be used. Connections must be made professionally and water-tight.

The line must be dimensioned in accordance with the current level drawn and protected with fuses.

The following table applies to cables with an insulating limit temperature of ≥ 105 °C

Max. permanent current [A]	Fuse rating [A]	Conductor cross-section [mm²]
0 – 4.9	5[1]	0.5
5 – 9.9	10[1]	1
10 – 18	20[1]	2.5
19 – 28	30[1]	4
29 – 35	40[2]	6
36 – 48	50[2]	10
49 – 69	70[2]	16
70 – 98	100	25
99 – 123	125	35
124 – 148	150	50

[1] Form C; DIN 72581 flat plug

[2] Form E; DIN 72581 flat plug

6.4.3 Lengthening of cables

If cables are lengthened (e.g. in connection with a wheelbase extension), cables of the same or a greater cross-section must be used. We recommend the use of cables that conform with DIN 72551 or ISO 6722-3. The protective effect of fuses must not be impaired.

All connections must be made professionally and water-tight in accordance with IP 69k (resistant to high-pressure cleaning).

Cables to the ABS sensors on the rear axle may be lengthened by no more than 2.7 m. The cables to each sensor must be twisted with a loop length of 40 ... 58 mm.

6.4.4 Additional power circuits

If additional power circuits are installed, they must be protected against the main power circuit by fuses of adequate rating.

The dimensions of the wiring used must be adequate for the load and the wiring must be protected against the effects of tearing, impact and heat.

6.4.5 Control switches

Depending on the vehicle's equipment, up to eight switch positions are available in total for additional special-purpose bodies and equipment. Code L72 includes a "non-MB body electrics" switch.

6.4.6 Retrofitting electrical equipment

Please observe the following if auxiliary electrical consumers are retrofitted:

- Alternators with LIN technology approved by Daimler AG must be used for high current draw requirements.
- Do not connect additional alternators to the on-board network.
- Do not connect additional consumers to fuses already assigned.
- Do not connect additional wires (e.g. with insulation piercing devices) to existing wires.
- Provide consumers with adequate protection by means of additional fuses.

All equipment fitted must be tested in accordance with EU Directive 72 / 245 / EEC and must bear the "e" mark.

Additional electrical consumers must be connected by means of the terminal strip for auxiliary consumers (Code EK1) available from the factory as described under 6.4.8 "Power supply" (▷ page 76).

⚠ Risk of accident

Tampering with and unauthorised installations in the vehicle electrical / electronic systems can impair the functioning of these systems. This can lead to failure of components or of parts relevant to safety, and may result in accidents or damage to the vehicle.

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Furthermore, tampering with the vehicle electrical / electronic systems can invalidate the warranty or the general operating permit.

6.4.7 Retrofitting an alternator

If additional electrical consumers are retrofitted, the increased power requirement can be met by fitting higher-rated alternators.

The following alternators are available as special equipment (option codes) from the factory:

Code	U [V]	I [A]
–	14.3	90
M 39	14.3	150
M 49	14.3	180
M 46	14.3	220

If additional equipment is fitted, factory-fitted power take-offs must be used (▷ page 170).

For retrofitting alternators, we recommend N62 versions available from the factory as special equipment.

The following points must be observed if you intend to have other alternators retrofitted:

- On no account should the installation of an alternator impair vehicle parts or their function.
- The battery must have sufficient capacity and the alternator must generate sufficient power (▷ page 75).
- The alternator circuit must be provided with additional fuse protection (▷ page 74).
- The additional belt pulley, Code N63, is available from the factory as special equipment for driving air-conditioning compressors.
- Electrical lines must be routed correctly (▷ page 74).
- There must be no impairment of the accessibility or easy maintenance of installed equipment.
- There must be no impairment of the required engine air supply and cooling (▷ page 146).
- The guidelines of the equipment manufacturer for compatibility with the basic vehicle must be observed.
- The operating instructions and the maintenance manual for the additional equipment must be supplied on handing over the vehicle.

6.4.8 Power supply

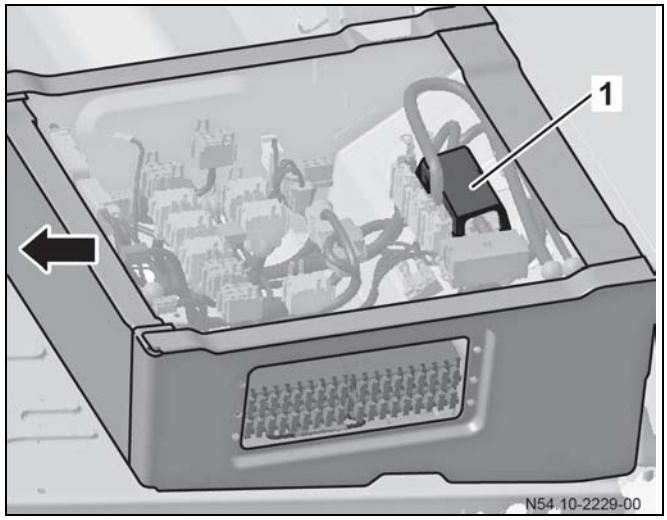
Power tap via EK1

Additional electrical consumers must be connected by means of the terminal strip for auxiliary consumers (Code EK1) available from the factory or via an additional battery (▷ page 71). The terminal strip is installed inside the driver's seat base (at the front, on the right-hand side of the vehicle) and has three terminals:

1st terminal D+	12 V / 10 A
2nd terminal 30	12 V / 25 A
3rd terminal 15	12 V / 15 A

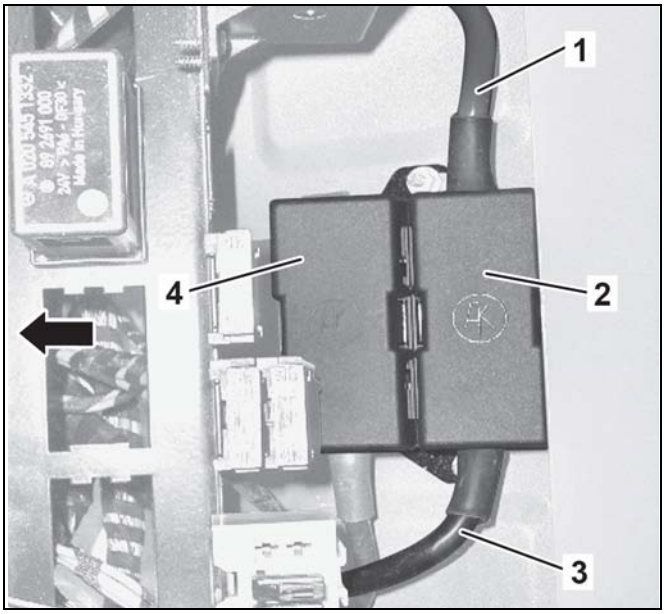
Power tap at additional battery tapping point

In order to facilitate tapping power from the additional battery (code E28), a tap (fuse box) is available in the driver seat box. This means that it is not necessary to route additional lines from the vehicle interior (body manufacturer consumers) to the additional battery in the engine compartment.



Driver seat box (LHD vehicles)

1	Fuse box
Arrow	Direction of travel



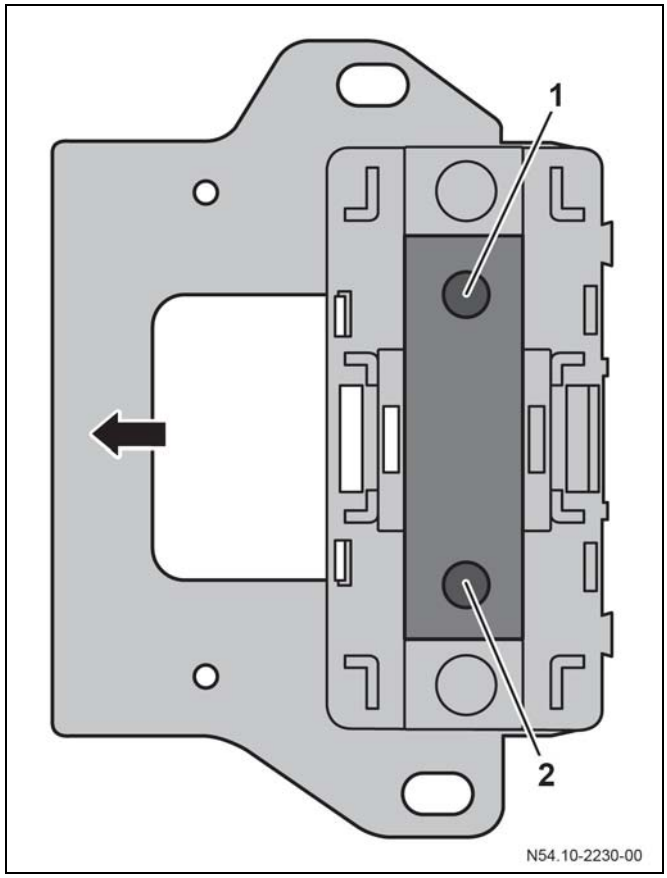
Example of design of fuse box in driver seat box on left-hand drive vehicles (LHD)

1	Cutoff relay line (LHD)
2	Standard fuse box (LHD)
3	Additional battery tapping point (LHD)
4	Second fuse box, standard or from body manufacturer
Arrow	Direction of travel

Ex factory fuse box

The tapping point for auxiliary consumers is the terminal in the fuse box with a direct line from the additional battery (positive terminal). The cover must be removed to connect and install the fuse.

Auxiliary consumers on the additional battery must be fused separately.



Assignment of ex factory fuse box

	LHD vehicle	RHD vehicle
1	Cutoff relay line	Additional battery tapping point
2	Additional battery tapping point	Cutoff relay line
Arrow	Direction of travel	

Determining the tapping point through measurement

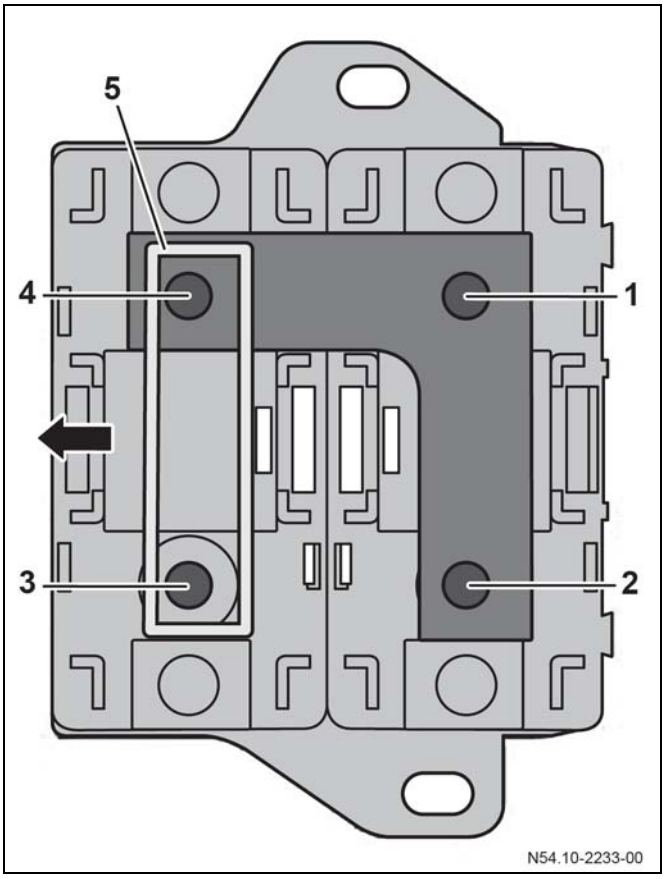
- Move vehicle key to 0 position
- Disconnect earth cable from additional battery (in engine compartment)
- Check cables on fuse box individually for voltage against the additional battery earth:
  The current conducting cable is the direct feed line of the additional battery.
- Reconnect earth cable to additional battery

Mounting a second fuse box and fuse

Depending on the vehicle equipment, a second fuse box may already be installed ex factory. If the vehicle is only equipped with one fuse box, a second fuse box can be mounted to the grub screws provided in order to connect further consumers. After removing the copper bridge installed at the plant, the second fuse box is connected via a right-angled copper bar. The auxiliary consumer can be connected to the additional battery with a suitable fuse as per ISO 8820 SF51.

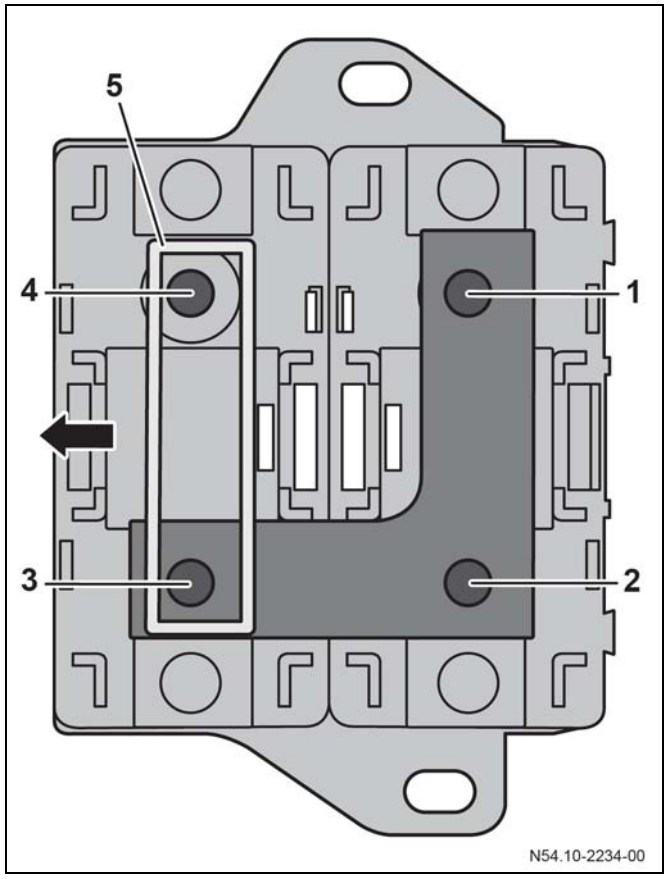
Preconditions for connection to the additional battery include:

- Max. one factory-installed fuse box in the seat box
- Only the 35 mm² lines are screwed to the fuse box on both sides
- Fuse box, part number A 000 540 5950
- Right-angled copper bar, part number A 000 545 3802
- Washer, part number A 004 990 3282
- Suitable fuses as per ISO 8820 SF51



Second fuse box (LHD vehicles)

1	Cutoff relay line
2	Additional battery tapping point
3	Auxiliary consumer connection, fused
4	Positive terminal via bridge
5	Fuse
Arrow	Direction of travel



Second fuse box (RHD vehicles)

1	Additional battery tapping point
2	Cutoff relay line
3	Positive terminal via bridge
4	Auxiliary consumer connection, fused
5	Fuse
Arrow	Direction of travel

Two ex factory fuse boxes

Depending on the special equipment, a consumer may already be connected to the additional battery of the vehicle at the factory via a second fuse box.

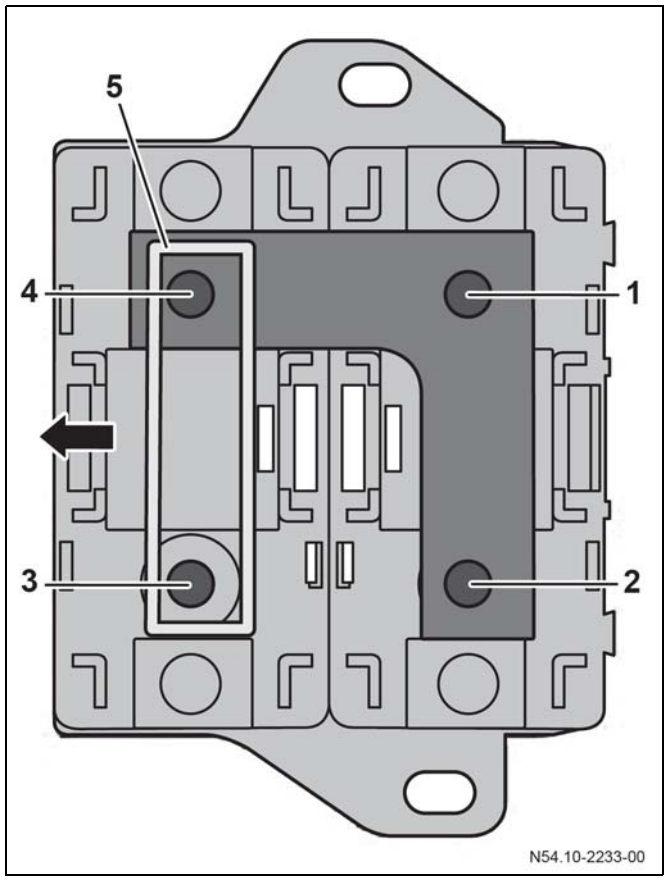
> **!**
>
> No more consumers may be connected to the second factory-installed fuse box. Other consumers must be connected to the additional battery directly at the tapping point.

- A suitable fuse box with fuse is required for all additional consumers.
- An appropriate overall charge balance must be ensured in all vehicle conditions.

On vehicles with the following special equipment, the fuse box is used at the factory and is not available for additional consumers (this table only shows some examples):

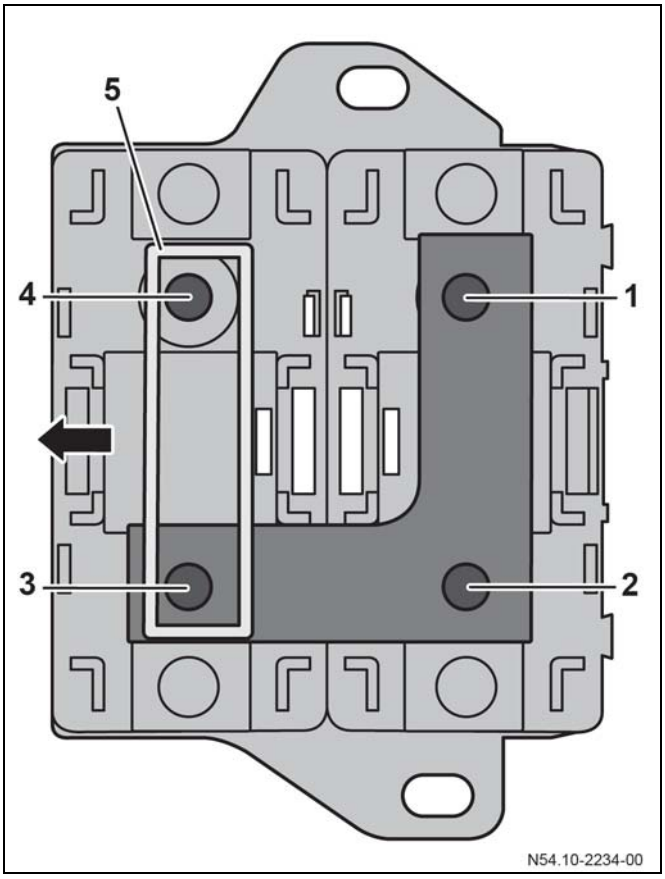
Special equipment	Code	Maximum power
Retarder preinstallation	BR9	100 A
Loading tailgate preinstallation	EV3	120 A
Three-way dump truck preinstallation	PS7	250 A
Cargo lift preinstallation	W60	approx. 120 A

Location of second fuse box with special equipment Code BR9, EV3, P57, W60



Second fuse box (LHD vehicles)

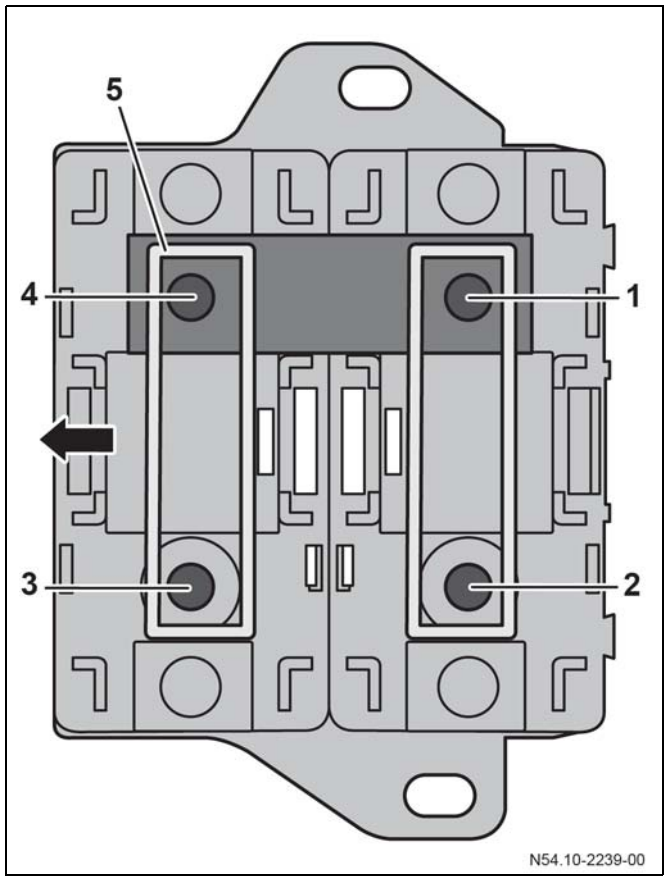
1	Cutoff relay line
2	Additional battery tapping point
3	Connection with standard code
4	Positive terminal via bridge
5	Fuse
Arrow	Direction of travel



Second fuse box (RHD vehicles)

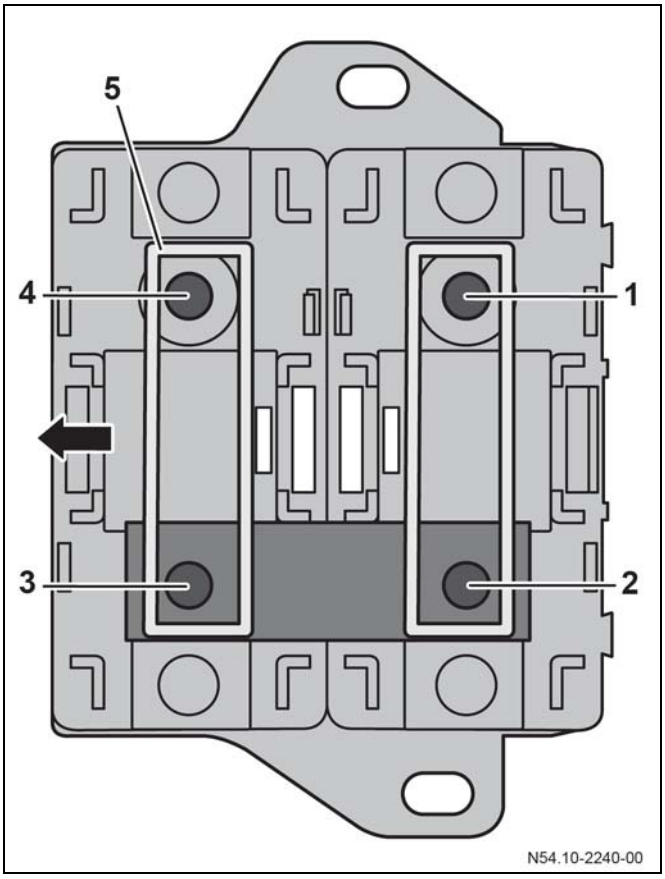
1	Additional battery tapping point
2	Cutoff relay line
3	Positive terminal via bridge
4	Connection with standard code
5	Fuse
Arrow	Direction of travel

Location of second fuse box with special equipment (code EV3, P57, W60) with code BR9



Second fuse box (LHD vehicles)

1	Cutoff relay line
2	Retarder tapping point
3	Tapping point with standard code
4	Additional battery tapping point
5	Fuse
Arrow	Direction of travel



Second fuse box (RHD vehicles)

1	Retarder tapping point
2	Cutoff relay line
3	Additional battery tapping point
4	Tapping point with standard code
5	Fuse
Arrow	Direction of travel

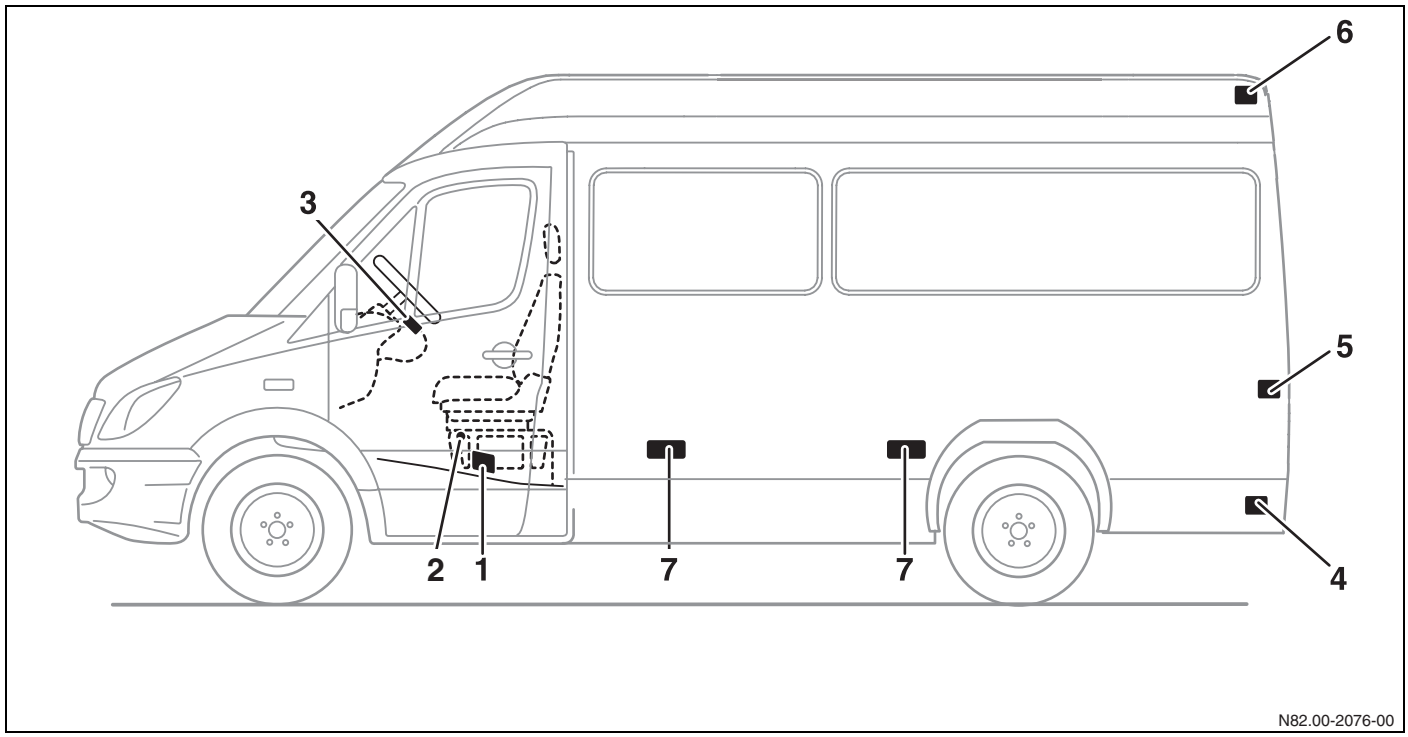
If a vehicle is already equipped with a consumer which uses the fuse box in the seat box at the factory, an additional fuse box is required. Otherwise, overloading can occur and the fuse may be tripped.

More information on tapping power for special equipment can be obtained from the relevant department (▷ page 17).

When installing additional electrical consumers, especially on vehicles with special equipment installed ex factory which uses the additional battery (fuse box in driver seat box), the body manufacturer must ensure a positive overall charging balance.

Additional information on special equipment can be obtained from your Mercedes-Benz Service Centre, the relevant department (▷ page 17) or under 3.10 "Special equipment" (▷ page 43).

The electrical interfaces available as special equipment on the vehicle are depicted in the illustration below:



	Code	Description
1	EK1	Terminal strip for the electrical connection on the driver's seat base
2	E46	12 V socket in cab (max. 15 A); position: driver seat frame
3	L72	Electrics for body interior lighting, 3-pin junction in the left-hand seat base, switch on the dashboard
4	E57	Electrics for trailer power socket
5	L76	Extended tail lamps wiring harness (2 m)
6	L77	Additional electrical equipment for turn signal lamps
7	LB2	Provision for side marker lamps

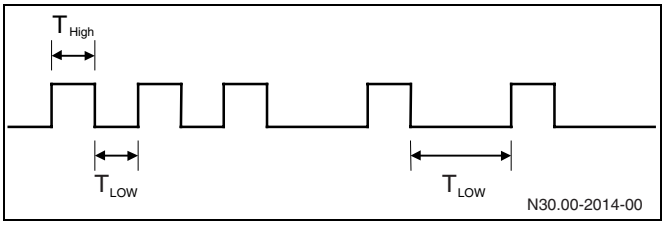
6.4.9 Speed signal

The "Highline" and "Lowline" instrument clusters output an electronic speed signal at pin 9 of the instrument cluster connector.

The speed signal (positive to earth) acts as a distance and speed signal for external electronics, e.g. taximeters or speed-dependent volume controllers. The signal is protected against short-circuit to earth and battery voltage and is not monitored.

The signal is output at 4 pulses per metre. The pulse width is 4 ms.

At 112.5 km / h, the pulse duration is the same as the pulse pause. This 1:1 ratio is maintained for higher speeds. This means that, at higher speeds, the pulse length and the pause length become shorter at the same time.



Ratio of pulse duration / pulse pause

Speed signal (I_{max} = 20 mA):

T_{High} Ua > = 8 V

T_{Low} Ua < = 1 V

6.4.10 Earth bolts

The earth bolts provided by Daimler AG for retrofitting electrical attachments or installations must be used to ensure the optimum earth connection with the basic vehicle.

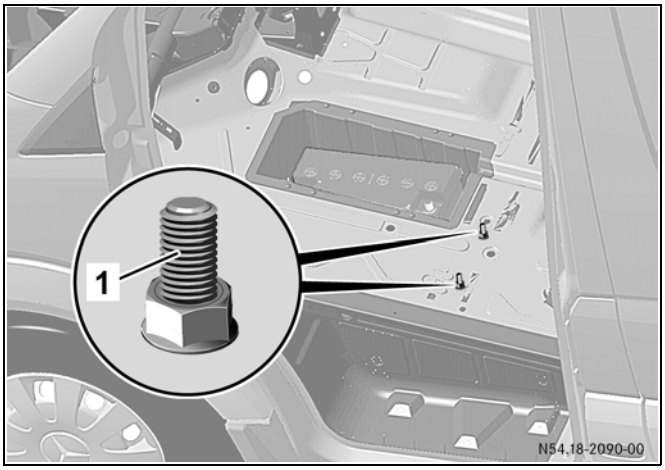
There are two earth bolts (M6) in the area of the driver seat in the left seat base; a further earth bolt (M6) is located under the vehicle on the cross member in front of the rear axle.

⚠ Risk of accident and injury

The use of any other earth bolts may lead to malfunctions in safety systems. This can cause (safety-relevant) components to fail and fault messages may be entered in the instrument cluster.

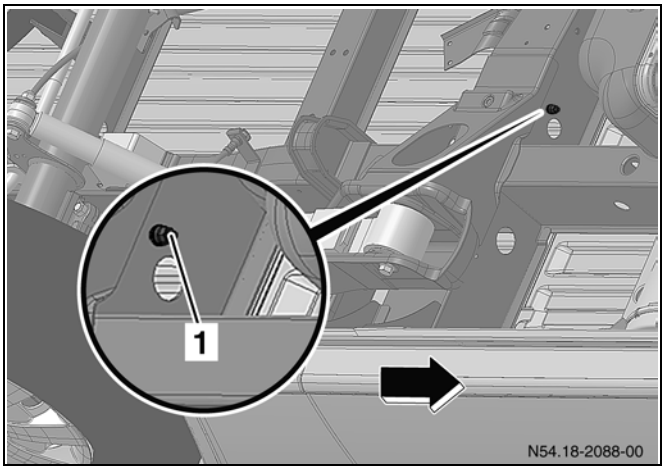
- No more than 4 cable shoes may be screwed onto one earth bolt.
- The nuts must be tightened to a torque of 6 Nm.
- On low frames, the frame beyond the B-pillar to the rear must no longer be used as an earth return.
- The earth bolts of the safety systems must not be used for bodies.

For other requirements, please consult the department responsible (▷ page 17).



Cab earth connection, bodyshell

1 Earth bolt connection



Frame earth connection (3.5 t to the front of the rear axle)

1 Earth bolt connection

Arrow Front of vehicle

6.5 Lighting

6.5.1 Adjusting the headlamps

National regulations shall apply.

The headlamp basic setting must be observed (see vehicle identification plate).

On vehicles with Code CE8 "Raised body for Euro-Sprinter (motor caravan)" it is not possible to adjust the headlamps without the body installed. For this reason, the body manufacturer must perform a headlamp adjustment after mounting the body.

Only check the headlamp setting with the vehicle unladen (ready to drive – full tank and with one driver or 75 kg load).

- Park the vehicle on a level, horizontal surface.
- Align the headlamp beam adjuster and the vehicle at right angles to each other.
- Correct the tyre pressures (refer to the tyre pressure table).
- Move the headlamp range control to the basic setting "**0**".
- Switch on the headlamps.
- Every headlamp must be checked separately and the second headlamp and other lamps must be blacked out while doing so.

The light-dark boundary of the dipped-beam headlamp at a distance of 10 m can be calculated from the height of the headlamp (centre of headlamp to ground) minus the specified headlamp basic setting.

Bi-xenon headlamp basic setting

The basic setting on vehicles with bi-xenon headlamps must be adjusted by a Mercedes-Benz Service Centre using STAR DIAGNOSIS.

Headlamp basic setting:

1% = 10 cm, 1.5% = 15 cm, 2% = 20 cm

etc.

Risk of death

There is a risk of fatal injuries from the high voltage in the xenon headlamps. Do not touch any components under high voltage. On no account may persons with electronic implants (e.g. pacemakers) carry out any work on xenon headlamps.

6.5.2 Fitting additional lamps

National regulations shall apply.

If moving vehicle parts cover lighting equipment by more than 50% during operation, the vehicle must be safeguarded accordingly.

An appropriate note must be attached at a point where it can easily be seen by the driver of the vehicle.

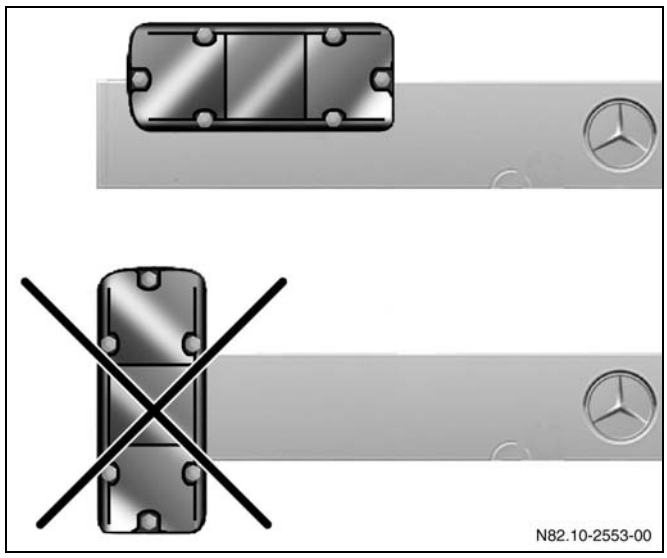
6.5.3 Tail lamps

National regulations apply to all lamp and turn signal units.

The following special equipment is available from the factory as option codes to carry out retrofitted modifications to the vehicle tail lamps:

Code	Special equipment designation	Description / function
L90	Omission of tail lamps	Retrofitting of other lamps and turn signal units is possible; the connections and cable sets are retained
L76	Tail lamp wiring harness lengthened	The lengthened tail lamp wiring (approx. 2 m) acts as provision for retrofitting tail lamps in a different location.
L77	Additional electrical equipment for turn signal lamps	On chassis with cab and crewcab, the additional wiring at the vehicle rear end is provided for additional turn signal lamps on the body.

Position of standard tail lamps



The standard tail lamps must be installed in a horizontal position. Otherwise water may enter through the ventilation holes and lead to the failure of the standard tail lamps or malfunctions in the electronic systems!
If tail lamps are to be used in any other position, the body manufacturer must use suitable tail lamps of its own!

6.5.4 Marker lamps

Side marker lamps

To increase passive safety, all complete vehicles with a total length of over six metres must be equipped with side marker lamps in compliance with EU Directive 76 / 756 / EEC.

Chassis with cab and crewcab can be equipped at the factory with the special equipment "Provision for side marker lamps" (Code LB2). On vehicles with Code LB2, subsequent parameterization / enabling using STAR DIAGNOSIS is necessary.

In addition, Code LB1 "Side marker lamps" is available for all models. On chassis with cab and crewcab, the marker lamps are mounted on the left and right longitudinal frame members (lamps and brackets are included in the package in a separate bag). On vehicles with Code LB1, subsequent parameterization / enabling using STAR DIAGNOSIS is not necessary.

Vehicle perimeter lamps / front perimeter lamps

Perimeter lamps increase passive safety and are required by law on vehicles with a width of over 2.10 m. They may be attached on vehicles from a width of 1.80 m. (Section 51 b, Para 2, StVZO (German Road Traffic Licensing Regulations)).

The "Perimeter lamps" option is available from the factory (Code L07).

6.5.5 Exterior lamps

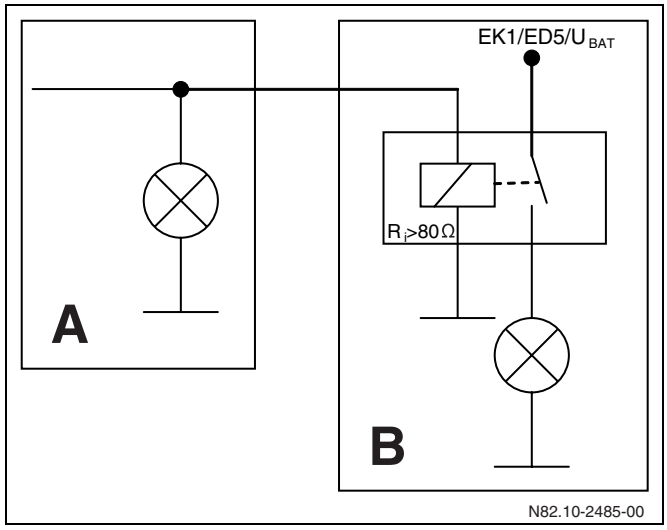
> **!**
>
> In order to ensure that the standard bulb failure monitor functions correctly, only bulbs of the same type and same output rating as standard bulbs (▷ page 253) may be installed.

Lamp monitoring

The signal acquisition and actuation module (SAM) monitors all outputs for open load (wire break) and short circuit. If a lamp is not connected or is overloaded, a fault entry is stored in the memory of the SAM control unit. The vehicle owner or the driver must be informed. It is recommended that an entry be made in the Service Booklet. The fault entry must be addressed during a service if read using STAR DIAGNOSIS.

Additional lamps

Additional lamps must be connected via the PSM or a separate cubic relay. A standard cubic relay (Ri > 80 Ohms) can optionally be connected in parallel with the exterior lamps (with the exception of the centre high-mounted brake lamp, turn signals, licence plate illumination, side markers and perimeter lamps). This will not have any negative effect on lamp monitoring.



Connection of an additional lamp

A Scope of the basic vehicle

B Scope of the body manufacturer

A warning buzzer can be optionally connected in parallel with the reversing lamps. The current rating of the warning buzzer must be no more than 300 mA. We recommend the use of a warning buzzer with piezo technology.

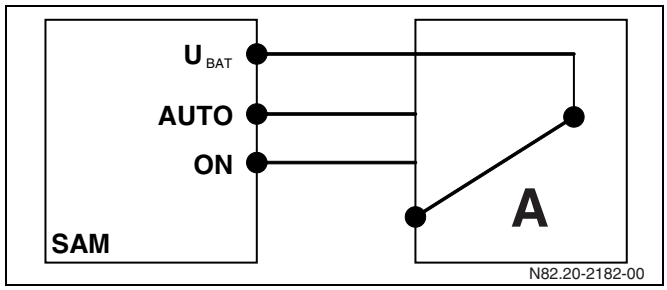
The centre high-mounted brake lamp is an LED with a rating of approximately 1.8 W and cannot be replaced by a filament bulb.

6.5.6 Interior lamps

All interior lamps can be replaced by other body-manufacturer-specific lamps. The interior lamps are operated via read-back switches networked by the SAM (signal acquisition and actuation module).

The system is only monitored for short circuits, maximum load 80 W. The lights are dimmed as standard. Dimming must be deactivated in the SAM if fluorescent lighting or load relief relays are used. This is achieved by means of the "Working lamps" option (Code L63).

The read-back switch must always be connected to the SAM, otherwise the interior lamps cannot function.



Read-back switch switching principle

U_{BAT}	Interior lighting power supply (+ 12 V)
AUTO	Lighting controlled by SAM, e.g. when door opened
ON	Interior lamp permanently lit
A	Read-back switch (interior lighting)

6.5.7 Rain / light sensor

It is only permitted to fit the rain / light sensor (Code JA5) in conjunction with the standard / optional WSS variants provided. There is otherwise a risk of malfunction.

The overhead control panel (DBE) must also be fitted (contains the interface).

6.6 Mobile communications systems

If mobile communication systems (e.g. telephone, CB radio) are retrofitted (▷ page 57), the following requirements must be fulfilled in order to avoid malfunctions developing on the vehicle at a later stage:

- All electronic equipment fitted requires type approval in accordance with EU Directive 72 / 245 / EEC and must bear the "e" mark.
- The ring-shaped MOST network uses a fibre-optic cable as a data carrier for transferring audio and control signals. This system supports the synchronous transfer of data at high baud rates, is insensitive to electromagnetic interference (EMC), does not itself cause electromagnetic interference and can transfer both audio and control data simultaneously. The system is available with the ignition OFF and is activated by a separate wake-up line.

The fibre-optic cable must not be kinked. The minimum bending radius is 25 mm.

6.6.1 Equipment

The maximum transmission output must not be exceeded.

Waveband	Maximum transmission output [W]
Short wave (f < 50 Mhz)	100
4 m band	30
2 m band	50
Trunked radio / Tetra	35
70 cm band	35
GSM 900 / AMPS	10
GSM 1800	10
UMTS	10

- The mobile communications systems and brackets must not be positioned in the deployment area of the airbags (▷ page 162).
- The equipment must be permanently installed. Mobile devices may only be operated inside the cab if they are connected to an exterior aerial which has been installed in such a manner that it is reflection-free.
- The transmitter unit must be installed as far away from the vehicle's electronic system as possible.
- The unit must be protected against moisture and heavy physical shocks; the permissible operating temperature must be observed.

6.6.2 Connecting and routing the wiring for the aerial (radio)

- Comply with manufacturer's notes and installation instructions.
- An aerial can be installed anywhere on the vehicle roof. The maximum transmission output must not be exceeded.
- The connection should be made directly to terminal 30 via an additional fuse. Disconnect the unit from the electrical system before jump-starting.
- The wiring routes must be kept as short as possible. The wires must be twisted and screened (coaxial cable). Chafing points must be avoided.
- Ensure that the system has a good earth connection to the body (aerial and equipment).
- The aerial and connecting cables between the transmitter, receiver and operating panel must be routed separately from the vehicle wiring harness in the vicinity of the body earth.
- Route the aerial cable in such a way that it is not kinked or pinched.
- Comply with regulations on the transport of hazardous goods (GGVS: German Law on the Road Transport of Hazardous Goods), and ADR (European Agreement concerning the International Carriage of Dangerous Goods by Road).

6.7 Electronic ignition lock (EZS)

6.7.1 General information

- The processes involved in the access authorisation for the central locking (ZV) are verified and controlled by the signal acquisition and actuation module (SAM) and the door control unit (TF).
- When the key is inserted, infrared communication with the remote control key is achieved by inductive energy transmission.
- When the remote control values are transmitted to the drive authorisation system III (FBS III), the electronic steering lock (ELV) and the engine control unit are released.
- When the remote control key is removed, the ELV is locked if the last recorded speed signal was ≤ 3 km / h and the key is withdrawn by at least 4 mm. If the last speed signal received was ≥ 3 km / h, locking does not occur until the door switch reports the driver's door open for longer than 1 second.
- The remote control key activates the individual terminals (15, 15R) depending on the position in the ignition lock to which it is turned.
- The remote control key is mechanically locked when turned.
- If key identification is unsuccessful (invalid key), the lifting solenoid in the electronic ignition switch prevents the remote control key from turning.
- If key identification is successful, the memory functions are assigned.
- The electronic ignition switch acts as an interface (gateway) between the interior CAN (CAN B) and the engine compartment CAN (CAN C) for data exchange between the two bus systems.
- The diagnostics CAN acts as a central diagnostics interface with all control units with diagnostics capability.
- An HF receiver is integrated.
- Where control units are networked, the electronic ignition lock sends global information such as the model series and the country variant to the CAN-B and CAN-C control units (global variant coding) on the network.

6.7.2 Central locking / post-delivery integration of doors of body manufacturer

General

Body manufacturers have the option of adapting the central locking to the body or type of use. The following functions can be implemented via variant coding in the EZS with STAR DIAGNOSIS:

- Activation of automatic locking
  - Speed (adjustable, default 15 km / h)
  - Ignition ON
  - Automatic locking when last open door is closed (post function)
- Deactivation of automatic opening
- Option of deactivating automatic CL opening on security vehicles
- Post-delivery integration of body manufacturer doors in central locking

Activating automatic locking using STAR DIAGNOSIS

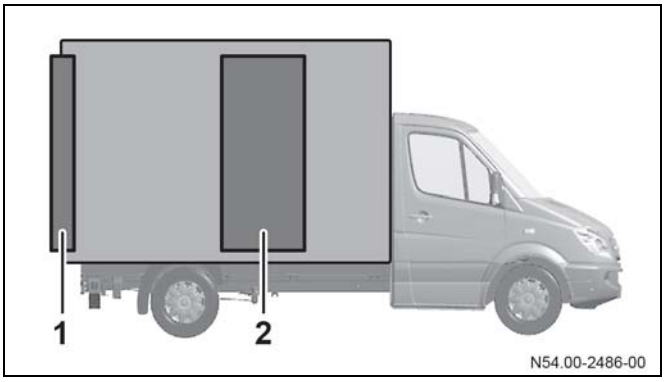
- Speed (adjustable, default 15 km / h)
- Ignition ON
- Automatic locking when last open door is closed (post function)

Deactivating automatic unlocking using STAR DIAGNOSIS

On emergency vehicles it is possible to deactivate automatic central unlocking. This is a function that can be set by means of variant coding in the EZS using STAR DIAGNOSIS. You can obtain further information from the department responsible (▷ page 17).

Post-delivery integration of body manufacturer doors

Depending on the vehicle equipment, it is possible for body manufacturers to integrate additional doors in the body into the central locking system of the chassis. They are operated via the ignition key of the basic vehicle.



Example of body manufacturer doors

1 Hinged rear door

2 Side door

There are two options for integrating additional doors into the central locking system of the chassis:

- Integration of additional doors via PSM
- Integration of additional doors via SAM

Integration of additional doors via PSM

The PSM can be used to read out signal IDs (e.g. "close door", "open door") from the vehicle CAN in order to actuate additional central locking elements or relays in the body via a PSM output.

Information on parameterization possibilities can be obtained in the comprehensive "PSM function description", which is available in the body manufacturer portal under

http://bb-infoportal.mercedes-benz.com/van/psm-information

Advantage:

- Body manufacturers can use their own door locks and components.

Disadvantage:

- The additional doors actuated via the PSM are not monitored for their "open" or "closed" state. The vehicle is thus not able to recognise whether all additional doors are closed and locked after a locking procedure and no indications are given on the instrument cluster.

Condition:

- The special equipment PSM (Code ED5) is required.

Integration of additional doors via SAM

Non-standard doors can be registered with the vehicle electronics after installation via STAR DIAGNOSIS. The additional doors are connected directly to the signal acquisition and actuation module (SAM). The information about additional doors is provided to the vehicle in the form of an O-code (O04). This code can be parameterized via STAR DIAGNOSIS e.g. in a Mercedes-Benz Service Centre.

Advantage:

- Parameterization and installation of a PSM is not required.

Conditions:

- Vehicle must be at least equipped with a SAM low (▷ see page 252).
- Locks with a feedback function must be used. The use of original Mercedes-Benz locks is recommended.
- Max. three additional doors (right door, left door, rear doors) are possible.

More detailed information on the integration of additional doors by the body manufacturer (circuit diagram, components etc.) can be obtained from the relevant department (▷ page 17).

Rescue vehicle preinstallation

The settings required for rescue vehicles, e.g. passive circuits for rear-door and sliding-door actuators, can be carried out using STAR DIAGNOSIS using the following settings:

- Right-hand sliding door "not present"
- Left-hand sliding door "not present"
- Rear door "not present"
- Common unlocking of control circuits 1 and 2
- Front passenger's door "not present"

Keyless entry

Key localisation and recognition is supported by five or six LF aerials and one HF aerial. Operation of these aerials must not be impaired by modifications to the body.

Installation location of the HF aerial

- Driver's door B-pillar, belt sash guide level

Installation location of the LF aerials

- One or two aerials in the load compartment roof for load compartment monitoring, position may differ depending on the body
- Two aerials in the driver's / front passenger's door for cab monitoring
- Two aerials in the sliding door or side wall for monitoring the outside of the vehicle

Operation of the LF aerials is affected by changes in the amount of metal in their vicinity (within an approximate radius of 30 cm).

6.8 Windows and doors

6.8.1 Power windows / window hinges

The gearing ratio for heavier windows must be adjusted to ensure that the motor draws the same electrical power.

The time required to open / close the windows must not exceed 10 seconds. The motor is thermally protected, i.e. the availability of the power window function may be restricted after long operating periods.

The power windows and the window hinges can only be controlled using the door control panel. The switches are voltage coded and must only be replaced with equivalent genuine parts.

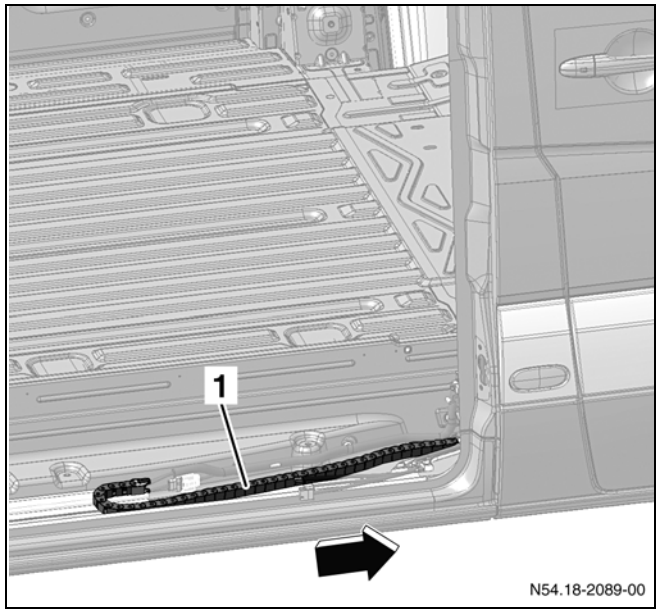
6.8.2 Load compartment sliding door

The electrical components of the load compartment sliding door of the Sprinter – model series 906 are connected to the on-board electrical system via a fixed electrical connection in the form of a cable track (drag chain), located under the step for the load compartment sliding door.

The cable track must be taken into consideration in the event of any modifications around the doorway. The cable track can be used for the requirements of the body manufacturer following consultation with the department responsible (▷ page 17).

The system for the electric load compartment sliding door has been designed for a maximum door weight of 65 kg. On no account should modifications be made to the door kinematics or the locks, rails, carriages, closing aids and trap guard strips.

> **!**
>
> Correct operation of the integrated trap guard (trap guard strip and path / time monitoring) must be ensured in the event of any modifications in this area, e.g. the window installation.



Load compartment sliding door with energy chain

1 Cable track (drag chain)

Arrow Front of vehicle

6.8.3 Sliding sunroof

A Mercedes-Benz sliding sunroof can only be fitted in conjunction with an overhead control panel (DBE). The length of the wiring harness between the sliding sunroof motor and the DBE must not be more than 6 m.

6.8.4 Windscreen wipers

We recommend the use of genuine Mercedes-Benz wiper motors.

If necessary, a second wiper motor can be connected via a load relief relay (R_i > 80 Ohms).

The wiper motor must be connected to the signal acquisition and actuation module (SAM) by means of a read-back line. If there is no read-back line, a fault message will be stored in the fault memory of the SAM.

6.8.5 Exterior mirrors

The output of the mirror heater (12 V / 20 W) is monitored by the door control unit. The mirror heating is deactivated if a fault entry is stored.

The door control unit must be modified if different mirrors (without a heater or with a different heater) are used.

The mirror adjustment is load-directed and can be relocated if required.

6.8.6 Windscreen heating / rear window heating

The original heaters can be replaced with heaters with the same power rating:

Windscreen heating P = 942 W ±15% at 13 V

Rear window heating P = 2 x 151 W ± 15 W at 13.5 V

If higher heat outputs are required, the relays, lines and fuses must be modified accordingly.

6.9 Electronic Stability Program (ESP)

ESP is a dynamic vehicle control system which controls both dynamic directional and transverse forces acting on the vehicle.

Greater driving stability is provided by ESP with an extended sensor system that constantly compares the current actual vehicle direction with the desired direction of movement.

ESP improves vehicle stability in all driving situations, e.g. when accelerating, braking and freewheeling, when driving in a straight line and cornering.

Together with the signals of other sensors, a processor monitors that the direction specified by the driver is maintained.

If the vehicle deviates from the correct path (oversteering or understeering), the system produces a stabilising counteraction by applying the brakes on individual wheels.

⚠ Risk of accident

On no account may any of the following modifications be made to vehicles equipped with ESP:

- Modifications to the permissible gross vehicle weight
- Wheelbase modifications outside the approved ranges (▷ page 127)
- Modifications to the sensors (steering angle sensor, yaw rate sensor, wheel rotational speed sensor)
- Changes to the vibration characteristics at the installation location of the yaw rate sensor by modifications to the body
- Changes to the position of components
- Modifications to the suspension
- Modifications to wheels and tyres
- Modifications to the engine
- Modifications to the steering system
- Modifications to the brake system
- Conversion to a semitrailer tractor vehicle

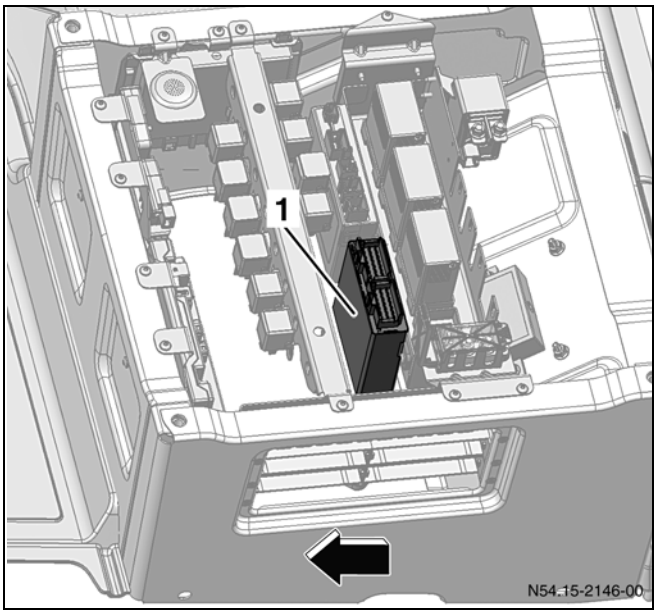
Modifications to vehicles with ESP may cause this system to stop functioning correctly and may lead to system shutdowns and incorrect control interventions. The driver could lose control of the vehicle and cause an accident.

6.10 Parameterizable special module (PSM)

The networking of the various control units and components is not achieved through analogue means with wiring but digitally using multiple networks.

- Two high-speed Controller Area Networks (HS CAN and engine CAN)
- One diagnostics CAN
- One low speed CAN (interior CAN)
- One digital, optical bus (MOST)

All subscribing control units can read the messages sent on the CAN bus and are programmed to support the CAN language, or CAN protocol. The PSM was developed to give body manufacturers access to individual types of CAN bus data. The PSM is available under Code ED5.



Location of the PSM

1 PSM with cable connector in driver's seat cushion

Arrow Front of vehicle

The PSM is able to read the messages of the various bus data and then, for example, translate them into switching signals at the outputs provided ("high" or "low") or PWM signals (pulse width modulation) or forward them to a specific body manufacturer CAN (conforming to ISO11992-3). The electronics installed by the body manufacturer then have access to the necessary signals.

The PSM provides a clearly defined, diagnostics-compatible and EMC-tested interface between the vehicle and the body.

Customer-specific requirements may be special inputs, such as an external engine start and stop, or special outputs, such as pulse pause modulated engine speed or CAN-bus-compatible control units in bodies or trailers.

The cabling on the vehicle must not be tampered with, as this would lead to fault messages from the other control units on the CAN bus.

The PSM is connected to the vehicle network via the LSCAN bus and therefore has access to all messages sent by the linked control units (e.g. idle contact active, parking brake active, speed C3, engine speed). In contrast, individual signals can be monitored or generated at analogue and digital inputs and outputs.

Example:

- The engine control unit sends the engine speed in a message, which can be read by the PSM. The PSM converts the engine speed information into a PPM signal and makes this available at an output.
- In the opposite direction, the PSM can convert the position of a hand throttle into an HS CAN message and thus request the desired engine speed of the engine.

The parameters of the PSM are programmed using STAR DIAGNOSIS. For additional information on STAR DIAGNOSIS (▷ page 21).

Information on parameterization possibilities can be obtained in the comprehensive "PSM function description", which is available in the body manufacturer portal under

https://bb-infoportal.mercedes-benz.com/portal/kat_ze.0.html?&no_cache=1&L=

Information on standard parameterization possibilities such as working speed control, engine start / stop etc. can be obtained from your Mercedes-Benz service centre.

Information on parameterization possibilities which are not covered by the "PSM function description" can be obtained from the relevant department (▷ page 17).

Professional training on the PSM is available at:

http://www.global-training.de

When writing a standard coding (retarder for example), all previous parameters are deleted. We recommend backing up data beforehand.

6.10.1 PSM functions

Read-in from ICAN:

- Vehicle status
  - ▶ Terminal 15
  - ▶ Terminal 61
  - ▶ Secure from the outside, ...
- Light status
  - ▶ LDS and LSS requests (e.g. main-beam headlamps, turn signals, low beams, front fog lamps etc.)
  - ▶ Hazard warning lamps OBF
- Window status
  - ▶ Windscreen and rear window wipers
  - ▶ Windscreen heating and rear window heating
- Central locking
  - ▶ Doors open / closed, unlocked / locked
- Engine CAN information
  - ▶ Wheel rotation speed
  - ▶ Road speed
  - ▶ Engine speed, ...
  - ▶ Cruise control operation
  - ▶ Brakes applied, ...
  - ▶ Transmission
  - ▶ Clutch information
  - ▶ Steering angle, ...
  - ▶ Tachograph information in accordance with the FMS-Standard
- Equipment attributes
  - ▶ Door installation
  - ▶ Sliding sunroof
  - ▶ Transmission, ...

Output on ICAN

- Light control
  - ▶ Parking lamps
  - ▶ Side lamps
  - ▶ Turn signals
  - ▶ Main-beam headlamps, ...
- Alarm functions
  - ▶ Alarm-triggered flashing of main-beam headlamps
  - ▶ Front foglamps
  - ▶ Warning flashers
  - ▶ Horn
- Sliding sunroof
  - ▶ Opening and closing of the sliding sunroof at the rear
- Central locking function
  - ▶ Lock / unlock front, load compartment and entire vehicle
- Windscreen and rear window
  - ▶ Windscreen wipers and rear window wiper
  - ▶ Windscreen heating and rear window heating
- Miscellaneous functions
  - ▶ Control buzzer (in the passenger van) and interior lighting
  - ▶ Charging active
  - ▶ Retarder operation
- Warning signals
  - ▶ PSM defective
  - ▶ Undervoltage

6.10.2 Mini-PLC

The mini-PLC (mini programmable logic controller) is a module with freely programmable and freely interconnectable function blocks for creating any signal links that may be required:

- 32 AND / NAND / OR / EXOR / NOR / EXNOR
- 16 RS and D flip-flops
- 8 retriggerable / non-retriggerable timer stages
- 8 hysteresis links with adjustable thresholds
- 8 threshold value switches with 3 stages
- 8 counters

6.10.3 ABH CAN

There is a second CAN bus available on the PSM:
The body manufacturer CAN (ABH-CAN).

- High-speed CAN Class C
- Extended CAN identifier (29-bit)
  - ▶ Baud rate can be changed between 500 kBit / s, 250 kBit / s and 125 kBit / s
  - ▶ Signal format: Intel (LSB first)
  - ▶ All bus contents can be activated separately and independently of each other through parameterization:
    - FMS (send direction only)
    - ISO11992-2 and 3 (abridged)
    - Freely assignable messages (J1939)

These body / equipment mounting directives cannot describe in full the wide variety of capabilities of the PSM. Further information can be obtained from the PSM Function Description and from the relevant department (▷ page 17).

6.11 Signal acquisition and actuation module (SAM)

The power circuit on the Sprinter – model series 906 comprises the signal acquisition and actuation module (SAM) in conjunction with a fuse and relay block (SRB). This power circuit supplies the systems and control units with power, depending on the function sequence. Requirements are sent to the SAM either on the CAN or via directly read switches and sensors. The fuses on the fuse and relay blocks also provide protection for individual components.

You will find information about other functions in the "Technical details" section (▷ page 252).

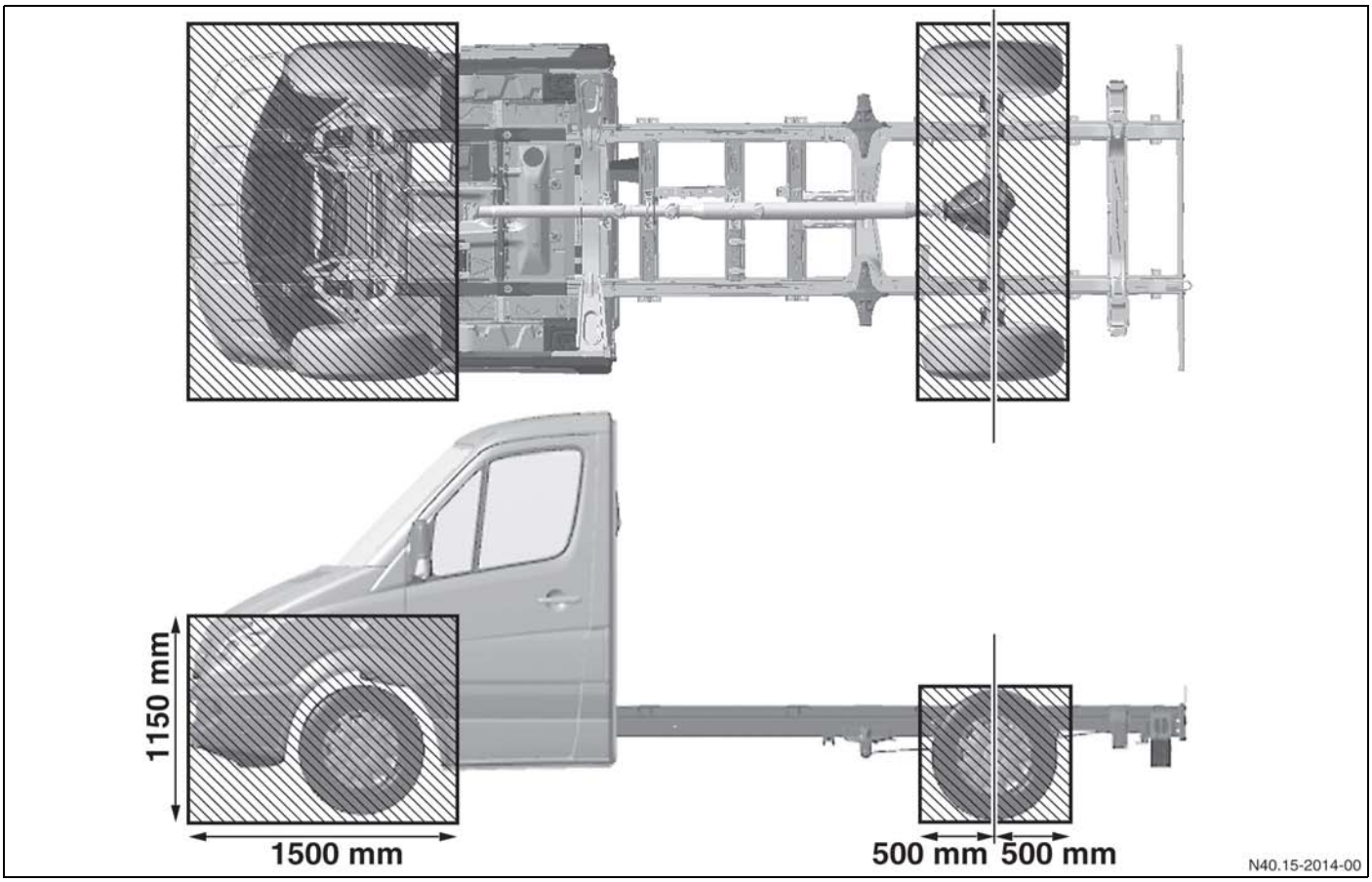
6.12 Tyre pressure monitoring system

⚠ Risk of accident

Do not carry out any modifications in the grey-shaded area of the vehicle substructure (see illustration). Otherwise, the function of the tyre pressure monitoring system may be compromised by the effects of reflections. This might result in the driver being unaware of any tyre pressure loss, and he / she could cause an accident. Furthermore, the vehicle may no longer meet licensing requirements.

The aerial position for the front axle is in the front of the engine compartment on the right-hand longitudinal member near the jack support point and behind the right-hand headlamp on the inside of the A-pillar.

The aerial position for the rear axle is to the rear on the underbody between the wheels (panel van and passenger van) or on the left-hand longitudinal member near the axle (cab and crewcab). On low frame vehicles, the aerials are below the axle support.



Restricted areas for tyre pressure monitoring system

6.13 Parktronic

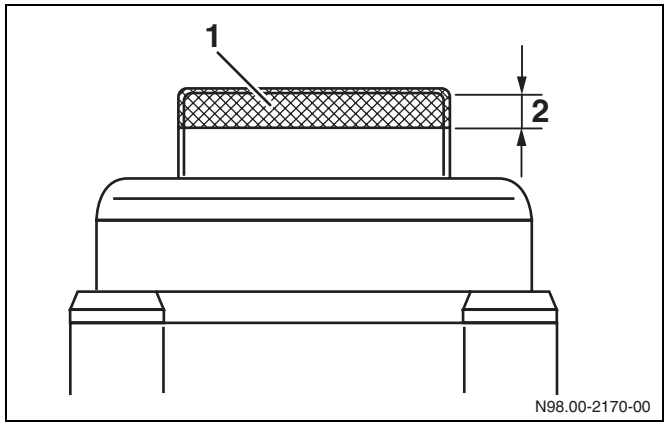
- If approved attachments are retrofitted, it is necessary to have Parktronic coded with the appropriate parameter record by Mercedes-Benz.
- After-market painting of the bumper is not permitted with the Parktronic ultrasonic sensors fitted. The coat of paint impairs the emission and reception of the ultrasonic signals.

Sensors which are already painted must not be repainted or touched up.
In order to ensure that they function correctly throughout their operating life, sensors must be painted before being installed.
Unpainted sensors and sensors painted in a range of colours are available from Mercedes-Benz.

The maximum thickness the paint coat on the cover may have without impairing sensor operation is 120 µm. This also includes repeated painting applications and the coat of cathodic dip paint (KTL coat). The KTL coat thickness is between 12 µm and 25 µm.

It is therefore necessary to make spot checks of the paint coat thickness to ensure faultless operation of the sensors.

It is essential that not only the cover itself but also the cylindrical edge of the sensor cover be coated with paint evenly all the way round and covering at least 2 mm.



Area of cylindrical edge of the sensor cover to be painted

1 Area to be painted

2 Maximum coat thickness 120 µm

The coat of paint may not be ground off mechanically, as this could damage the chromate layer or the cathodic dip paint layer or the sensor covering.

If the surface has been cathodically electroprimed, the paint must not be removed by chemical means as this could damage the cataphoretic electroprimer layer. A new layer cannot be applied afterwards. Nor is it permitted to touch up damaged areas chemically or mechanically.

Attachment parts fitted in the detection range of the sensors may impair operation of the Parktronic system (e.g. trailer coupling, overhangs of bodies, wheel carriers, steps, brush guards).

6.14 Retarder preinstallation

Risk of accident

The retarder acts as an additional brake on the rear wheels. To prevent the rear wheels from locking up when braking, the ESP must switch the retarder off if it begins to lock up. For this purpose, the retarder must be connected up to the vehicle network via the PSM. The factory setting for the ESP code is "Retarder not present". Both ESP and PSM must be appropriately re-coded after installing the retarder.

Further information on coding the PSM and ESP can be obtained from the department responsible (▷ page 17) or from your Mercedes-Benz service centre.
A "Retrofitting guide for retarder electronics for Sprinter model designation 906" can also be obtained from the department responsible (▷ page 17).

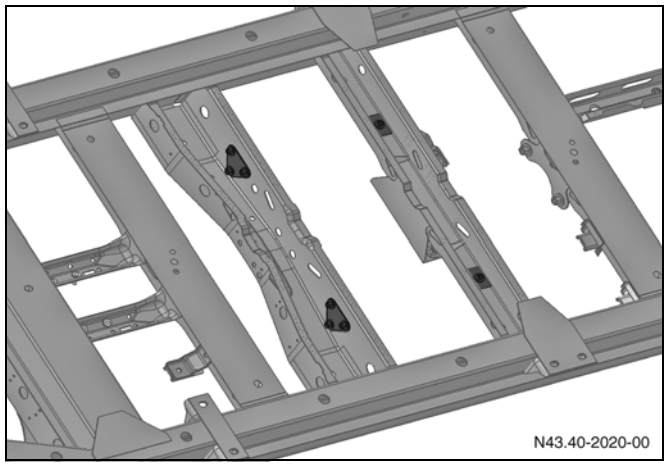
The special equipment Code BR9 "Retarder preinstallation" is designed to be compatible with the Telma CE35 retarder. The scope of the special equipment comprises the wiring for the selector lever, switches and indicator lamps and the high-load power supply to the control box (maximum rating: 100 A). The PSM program will be passively coded once the preinstallation for the Telma retarder has been installed in the vehicle.

The service switch and hand switch are read in by the parameterizable special module (PSM). The PSM forwards the signals to the junction under the vehicle to enable communication with the retarder control unit. The indicator lamp is controlled directly by the retarder.

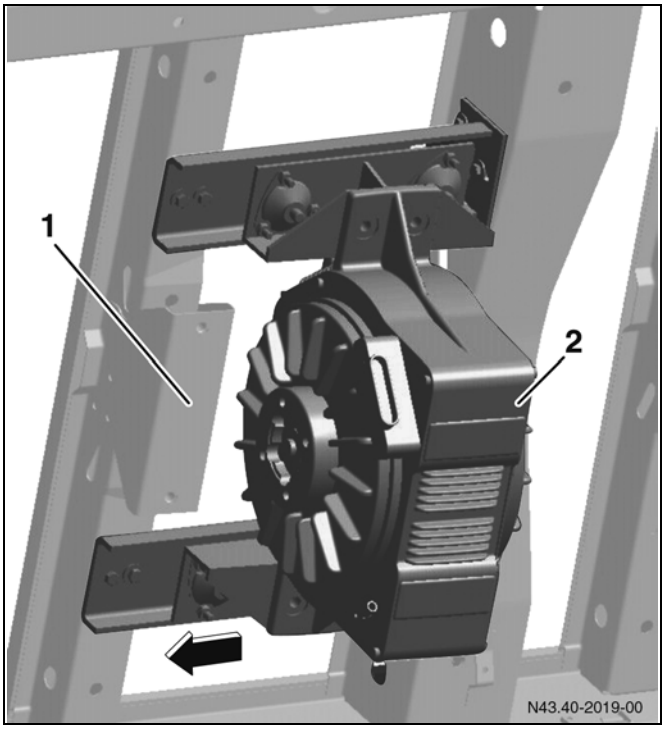
The power supply of the retarder is via a connection on the underbody (terminal 30).

The body manufacturer is responsible for the remaining wiring under the vehicle that is still required (from the control unit to the retarder) and for the positioning of components. The retarder manufacturer is responsible for providing the installation description and the wiring between the control box and the retarder, for example.

For information on mechanical connection, see 7.3.7 "Retarder" (▷ page 149).



Fastening points for retarder preinstallation



Retarder installation using TELMA as an example

1	Suspension of the propshaft intermediate bearing
2	Retarder
Arrow	Front of vehicle

6.15 Lifting platform preinstallation

The "Lifting platform preinstallation" special equipment package (Code EV3) includes among other things the following (in accordance with VDHH requirements):

- Control current preinstallation
- On / off switch in the cab, which closes or opens the control current circuit of the lifting platform
- Main current preinstallation
- 25 mm² earth line, secured to the vehicle frame, with a blue 1-pin ITT Cannon main current connector on the lifting platform end
- 35 mm² positive line, with a 10 mm cable shoe on the battery end for connecting the main current fuse directly to the positive terminal, with a red 1-pin ITT Cannon high current connector on the lifting platform end
- Both lines overhang the end of the right longitudinal member by 1,000 mm. The free line lengths are tied back in the left longitudinal member.

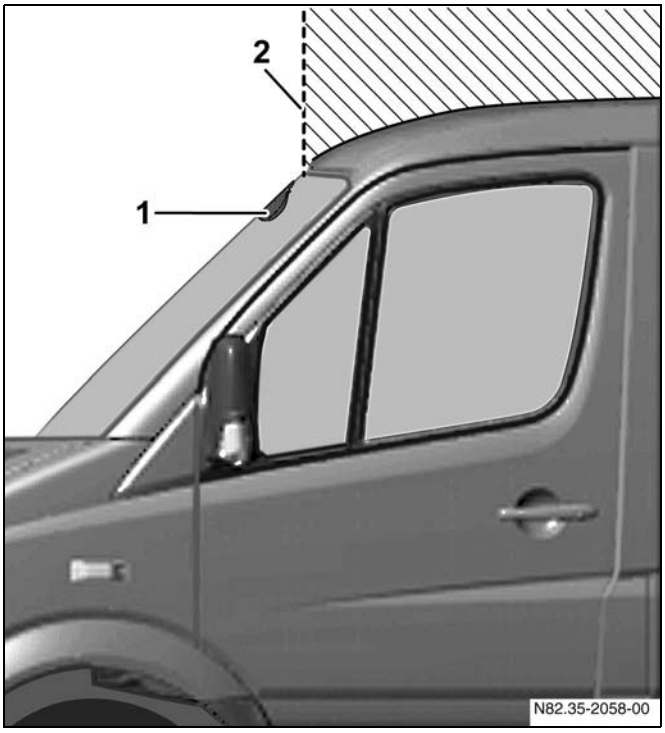
An alternator and a battery with higher capacity as well as an additional battery must be fitted if an electrohydraulic lifting platform is fitted.

Before the lifting platform is used for the first time, the body manufacturer must insert a fuse in the appropriate location in the driver's seat base.

For information on mechanical connection, see "Attachment to the rear frame section" (▷ page 122) and 7.6.6 "Loading tailgate (lifting platform)" (▷ page 190).

6.16 Rain / light sensor

On vehicles with bodies that protrude beyond the limit shown below (e.g. motor caravans with alcove bodies), the function of the rain / light sensor may be impaired.
Therefore, it is not recommended to install a rain / light sensor on vehicles with bodies that protrude beyond this limit.



Limit for bodies on vehicles with rain / light sensor

1 Rain / light sensor
2 Body limit

On no account should any modifications be made to the position of the rain / light sensor or the surrounding area (e.g. changing the standard windscreen), otherwise the rain / light sensor may no longer function correctly.

6.17 Continuous engine operation feature

The continuous engine operation feature (Code MW1) is available ex factory for special-purpose vehicles e.g. police cars, ambulances. It is not possible to retrofit the continuous engine operation feature to the Sprinter.

⚠ Risk of accident

Retrofitting a continuous engine operation feature can cause critical vehicle issues, problems with the vehicle electronics or fault messages. Retrofitting a continuous engine operation feature is therefore not permitted.

6.18 Wiring diagrams

Wiring diagrams can be made available to body manufacturers. Enquiries should be addressed to:

E-mail:
Service.Information@Daimler.com
Fax:
+49 (0)7 11- 17 -8 34 17

Wiring diagrams can also be called up in the Workshop Information System (WIS) (▷ page 21).

Wiring diagrams are also available in the body manufacturer portal under

MBAS-Web (Technology) / Catalogs / Wiring diagrams

https://bb-infoportal.mercedes-benz.com/portal/kat_sp.0.html?&L=

This symbol is used for information relating to the delivered basic vehicle (chassis, panel van and passenger van).

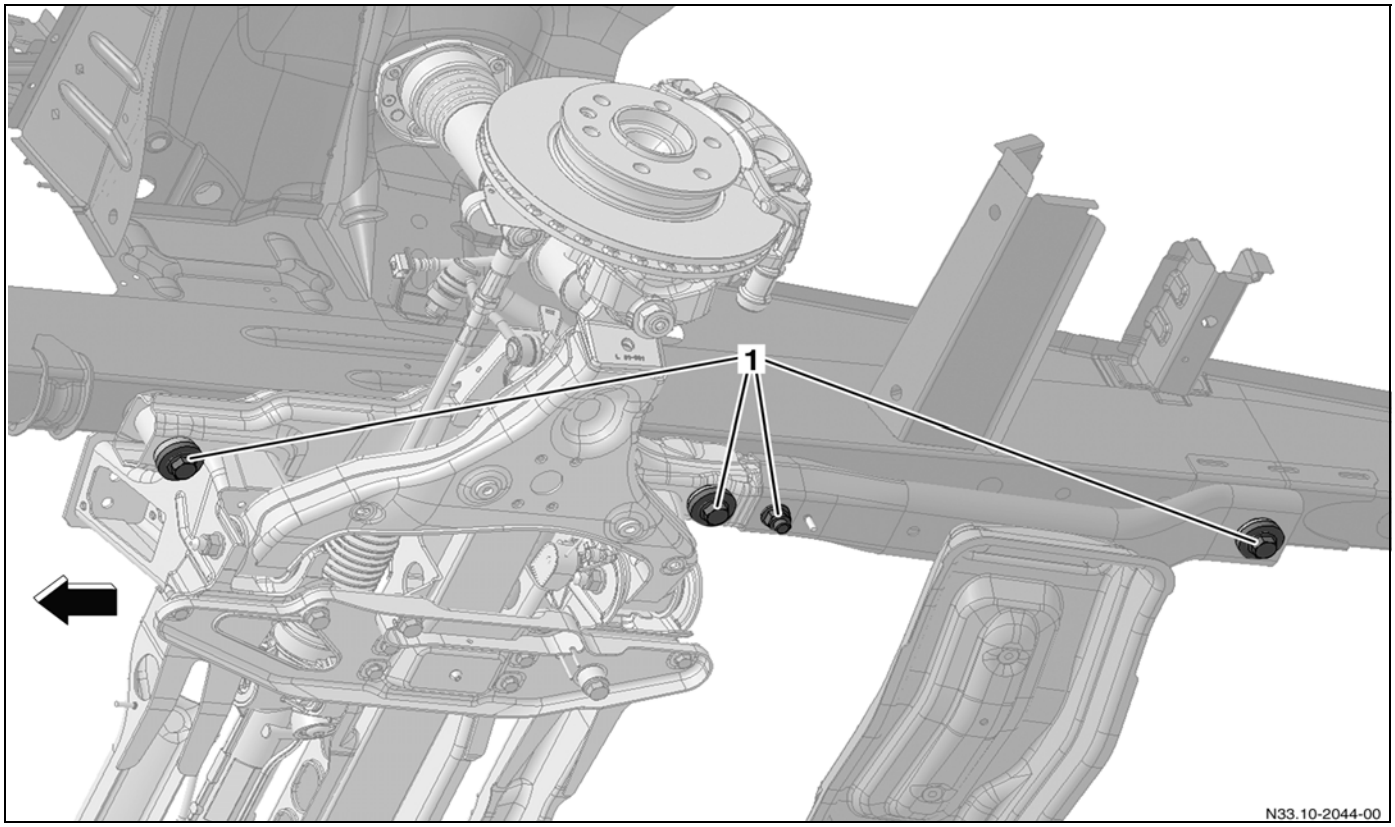
7.1 Suspension

7.1.1 General information on the suspension

Additional attachment parts are not permitted to be secured to the bolting points on the front axle.

⚠ Risk of accident

Modifications to components of the suspension system can result in impaired and unstable vehicle handling characteristics. The driver could lose control of the vehicle and cause an accident. For this reason, no modifications whatsoever may be made to components of the suspension system.



Front axle

1 Bolting points on the front axle

Arrow Front of vehicle

Pay attention to the following in the area of the front axle:

- Front transverse control arms: Changes to wheel alignment settings are not permitted.
- It is not permitted to modify or use the front axle to mount additional equipment or make other modifications.
- Rear rigid axle: Modifications are not permitted
- Brakes: Modifications are not permitted
- Units, sensors, line routing for ESP / ABS: Modifications are not permitted
- When installing the front axle new bolts must always be used. All bolts and threaded joints must be tightened in accordance with Mercedes-Benz tightening specifications. Information is available from your Mercedes-Benz Service Centre.
- VDI guideline 2862 must be observed for all assembly operations, particularly the section relating to bolted connections with particular relevance to safety.
- It is strictly prohibited to shorten the length of the free clamping length, change to a stretch shank or use bolts with a shorter free thread.
- The settling behaviour of bolted connections must be observed.

Information is available from any Mercedes-Benz Service Centre.

Additional tensioned parts must be of equal or greater strength than the preceding tensioned assembly.

The use of Mercedes-Benz tightening torques assumes coefficients of friction for the bolts in the tolerance range of [= 0.08...0.14].

We recommend the use of standard Mercedes-Benz parts.

7.1.2 Springs / shock absorbers / anti-roll bars

General

Several suspension variants are available ex factory. A suitable suspension variant must be selected depending on the planned body, see 4.2 "Suspension threshold values" (▷ page 46) and 2.4.6 PIT (product information for vans), page 22.

Modifications to springs, shock absorbers and anti-roll bars can only be made in the combinations specified by Daimler on the front and rear axle. In this case a certificate of endorsement is not required. For any further modifications the front and the rear axles must be adapted to each other.

You can obtain more information and, if necessary, request the certificates of endorsement from the department responsible (▷ page 18).

- We recommend the use of genuine Mercedes-Benz springs.
- Do not damage the surface or corrosion protection of the spring leaves during installation work.
- Before carrying out welding work, springs must be covered to protect them against welding spatter.
- Do not touch springs with welding electrodes or welding tongs.

On no account should springs or shock absorbers be used if they do not correspond to the characteristics of standard parts or parts obtainable as special equipment. We recommend the use of standard Mercedes-Benz parts.

Risk of accident

On no account should springs and shock absorbers be used if they do not correspond to the characteristics of standard parts or parts obtainable as special equipment. Otherwise, if the vehicle is fitted with ESP, this system may no longer work correctly and could ultimately fail. The driver could lose control of the vehicle and cause an accident.

7.1.3 Brake system

⚠ Risk of accident

Work carried out incorrectly on the brake hoses, lines and cables may impair their function. This may lead to the failure of components or parts relevant to safety. Have work on brake hoses, lines and cables only carried out by an authorised specialist workshop.

After completion of the work, check that the brake system is working correctly. We recommend that the brake system be inspected and approved by a technical inspection centre.

If the routing has to be altered, avoid routing across sharp edges and through narrow cavities or near moving components.

Hydraulic brake system

- Hydraulic brake lines are to be completely replaced by approved 4.75 mm x 0.7 or 6 mm x 0.7 mm rolled laminated tube.
- The bending radius must be > 17.5 mm.
- Lines must only be shaped in a bending machine. The cross-section must not be reduced.
- Fit nuts (part no. 000 997 66 34) on line ends and make the flange (F DIN 74234).
- The inside of the lines must be cleaned before installation.
- The use of plastic lines in hydraulic systems is not permissible.
- The brake fluid must be renewed every two years.
- If it is not known how long a vehicle equipped with a hydraulic brake system has been in storage, the brake fluid must be renewed.
- For routing between two components which move in relation to each other, a flexible line (hose, Stahlflex, etc.) must be used.

Routing lines

Risk of accident

A sufficient distance must be maintained between brake lines and heat sources, sharp-edged or moving parts. Otherwise, the brake system function could be impaired or the brake system could suffer total failure as a result of bubbles forming in the brake fluid or from chafing points in the brake lines.

- We recommend the use of genuine Mercedes-Benz brake line brackets for the attachment of the brake lines.
- The maximum permissible distance between brackets is 500 mm.
- The brake cables must be routed without kinks.
- There must be no angle changes at the end pieces of the brake cable conduit (free strands).

Routing lines along brake hoses / brake lines

No other lines may be attached to brake hoses.

Brake cable for the parking brake / modifying the length of the brake cable

If a new brake cable is required for the parking brake, the new length of the control cable must be determined and a new suitable control cable must be procured.

The brake cable retainers are moment-optimised; modifications are not permitted.

The department responsible will be happy to answer any questions relating to the standard brake cable (▷ page 17).

Disc brakes

Cooling must not be impaired by attaching spoilers below the bumper, additional hub caps or brake disc covers, etc.

Risk of accident

On no account should modifications be made to the air inflow and air outflow of the brake system. Any modifications to the steering and the brake system may result in these systems malfunctioning and ultimately failing. The driver could lose control of the vehicle and cause an accident.

Brake system overheating will not only impair braking ability, it can also cause tyre damage.

For this reason, make sure that there is a sufficient supply of cooling air at all times.

Risk of accident

On no account should modifications be made to brake components (e.g. calipers, discs, etc.) or sensors. Any modifications to brake components may result in these systems not functioning correctly and ultimately failing. The driver could lose control of the vehicle and cause an accident.

Auxiliary brakes / retarders

Retrofitting auxiliary brakes requires a certificate of endorsement from the department responsible.

Additional information can be found under 7.5.6 "Auxiliary brakes / retarders" (▷ page 177) and in the description of the electrical interface under 6.14 "Retarder preinstallation" (▷ page 105).

A preinstallation is available as special equipment for the installation of a retarder (Code BR9). The department responsible will provide information about the scope of the special equipment (▷ page 17).

7.1.4 Air suspension

You can obtain information on retrofitting air suspension from the department responsible (▷ page 17).

⚠ Risk of accident

On no account should springs or shock absorbers be used if they do not correspond to the characteristics of standard parts, components with an endorsement certificate or parts obtainable as special equipment. This applies in particular to the retrofitting of air suspension to the front axle. Otherwise, if the vehicle is fitted with ESP, this system may no longer work correctly and could ultimately fail. The driver could lose control of the vehicle and cause an accident.

⚠ Risk of injury

If attachments are fitted to the front part of the frame, this modified crash structure may cause the airbag units to function incorrectly. This applies in particular to the retrofitting of air suspension to the front axle. For this reason, air suspension must not be retrofitted to the front axle.

7.1.5 Wheels and tyres

Risk of accident

Only fit tyres of a type and size approved for your vehicle and observe the tyre load-bearing capacity required for your vehicle and the tyre speed index.

In particular, comply with national regulations concerning the approval of tyres. These regulations may define a specific type of tyre for your vehicle or may forbid the use of certain tyre types which are approved in other countries.

If you have other wheels fitted:

- the brakes or components of the suspension system could be damaged
- wheel and tyre clearance can no longer be guaranteed
- the wheel brakes or components of the suspension system may no longer function correctly

The body manufacturer must ensure the following:

- There must be sufficient space between the tyre and the mudguard or wheel arch even with snow or anti-skid chains fitted and the suspension completely compressed (allowing for axle twist). The relevant data (▷ page 135) must be observed.
- It is only permissible to fit approved tyre sizes (see the vehicle documents, tender drawings (▷ page 20) or the following table).
- It is only permissible to fit approved wheels (▷ page 20).

You can obtain more information about tyres and wheels from any Mercedes-Benz Service Centre or under 3.10 "Special equipment" (▷ page 43).

Gross vehicle weight [t]	Equipment		Tyre size	Weight and speed index
3.0			205 / 75 R16 C	110 / 108R
3.5			235 / 65 R16 C	115 / 113R
	2		235 / 60 R17 C	117 / 115R
	3		225 / 75 R16 C	116 / 114R
3.88			235 / 65 R16 C	121N (116R)
4.6			195 / 75 R16 C	107 / 105R
	1	FA	235 / 65 R16 C	115 / 113R
		RA	285 / 65 R16 C	128N (116R)
	2		205 / 75 R16 C	110 / 108R
5.0			195 / 75 R16 C	107 / 105R
	2		205 / 75 R16 C	110 / 108R

1 With Supersingle special equipment
2 Special equipment
3 All-wheel drive

7.1.6 Spare wheel

The Sprinter – model series 906 is equipped with the TIREFIT kit as standard. The country-specific equipment or special equipment may include a spare wheel.

When mounting a spare wheel, observe the following:

- Fit it under the frame, on the side of the frame or on the body in accordance with the chassis drawing.
- Observe legal requirements.
- It must be easily accessible and easy to handle.
- It must be double-secured against detachment.

7.2 Bodyshell / body

7.2.1 General information on the bodyshell / body

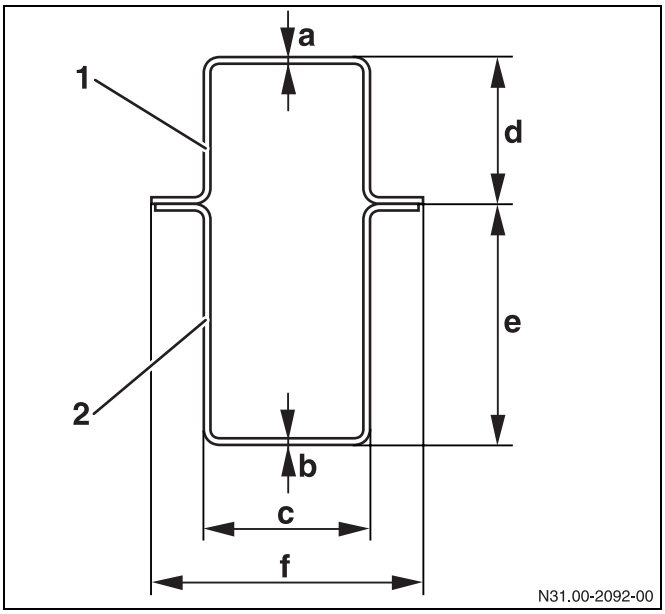
Modifications to the body must not have a negative effect on the function or strength of vehicle equipment or controls or on the strength of load-bearing parts.

In the case of vehicle conversions and mounting bodies, it is not permissible to make modifications that affect the function or freedom of movement of chassis parts (e.g. during maintenance and inspection work) or accessibility to these parts.

Observe the following:

- In the case of wheelbase modifications on vehicles with ESP, the ESP system must be reprogrammed or deactivated using STAR DIAGNOSIS (▷ page 127).
- The TPMS (Tyre Pressure Management System) may malfunction if modifications are made in the direct proximity of the aerials and wheels (▷ page 103).
- On no account should modifications be made to the cross member structure from the front of the cross member through to the rear of the B-pillar.
- On no account should modifications be made to the rear door opening or to the roof area.
- The clearance for the fuel filler neck, fuel tank and fuel lines must be maintained (▷ page 144).
- Avoid sharp-edged corners.
- Brackets (plug welds) must be used to attach additional equipment to the longitudinal and cross members. These require a certificate of endorsement.
- It is not permissible to drill holes in or perform welding work on the A-pillar or B-pillar.
- It is not permissible to make cuts in the C or D-pillar (rear door opening), including the associated roof arch.
- The maximum permissible axle loads must not be exceeded.
- Trailer connections must be checked for correct operation.
- If a trailer coupling is installed, the necessary reinforcements must be present (▷ page 193).
- Holes on the longitudinal frame member are the result of the production process and are not suitable for securing attachments, bodies, equipment and conversions as there is otherwise a risk of damage to the frame.
- If bodies are mounted on basic vehicle cabs, a fuel level sensor shield may be necessary depending on the body type. See 7.3.1 "Fuel system (petrol, diesel, gas)" (▷ page 144).

Section dimensions of longitudinal frame members



Dimensions of the upper chord and lower chord

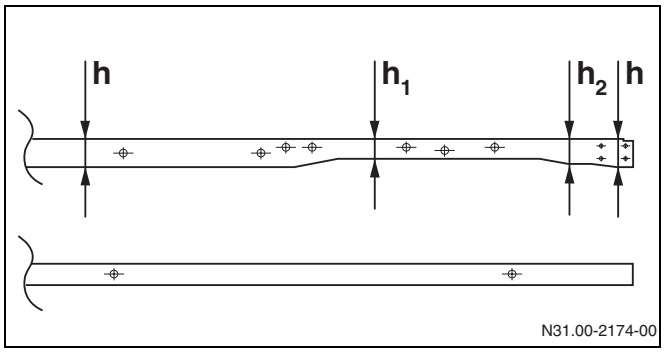
1 Upper chord

2 Lower chord

Permissible gross vehicle weight [t]	a	b	c	d	e	f
3.5 Open model series	2	2	70	61	119 84[1]	118
5 Open model series	3	3	70	80	120 100[1]	126
3.5 Panel van / passenger van		1.5	70	–	120 85[1]	93
5 Panel van / passenger van		3	70	–	120 100[1]	118

[1] In the area of the rear axle

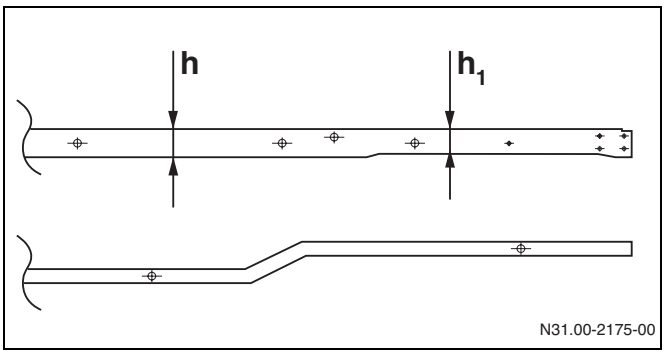
3.5 t longitudinal frame member



Dimensions of the lower chord of the longitudinal frame member

h	120 mm
h1	85 mm
h2	110 mm

5 t longitudinal frame member



Dimensions of the lower chord of the longitudinal frame member

h	120 mm
h1	100 mm

Welding work on the bodyshell

Welding work may only be performed by skilled personnel.

You will find further information about welding operations in the "Planning of bodies" (▷ page 35), "Damage prevention" (▷ page 63) and "Bodyshell" (▷ page 118) sections and in the Mercedes-Benz Workshop Information System (WIS).

On no account should welding work be carried out on the upper and lower chords of the chassis frame.

Plug welding is only permissible in the vertical webs of the longitudinal frame member.

Do not perform any welding work in bends.

Risk of accident

Impermissible drilling or welding work carried out in the area of deployment of the airbags could cause them to function incorrectly (e.g. they could be triggered unpredictably while the vehicle is in motion or fail completely) (▷ page 162). For this reason, welding work must not be performed near airbags.

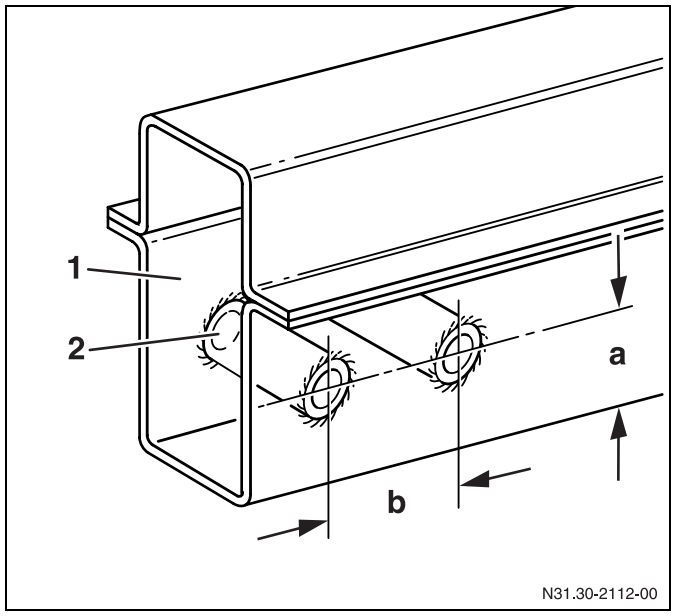
In Germany, the handling, transportation and storage of airbag units is subject to the law on explosive substances (Gesetz über explosionsgefährliche Stoffe).

Drilling work on the frame

Existing holes in the longitudinal frame member result from the production process and may only be used if approved by a certificate of endorsement from the department responsible (▷ page 17).

Drilling in the longitudinal member web is only possible if:

- spacer bushes are welded to the longitudinal members (see illustration)
- distance **a** is at least 20% of the frame height
- the distance between drill holes **b** is at least 50 mm



Drilling work on the longitudinal frame members

1 Chassis frame

2 Spacer bushes

a at least 20% of the frame height

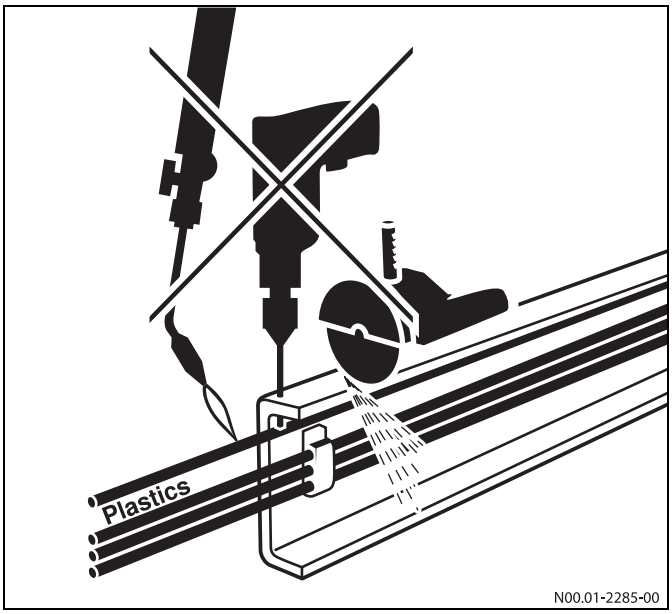
b at least 50 mm

After drilling, deburr and countersink all holes, remove chips from the frame and treat the holes with body cavity sealing.

On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (▷ page 64).

Parts which must not be drilled:

- On the upper and lower chords of the frame (except if drill holes are at the rear end of the frame)
- In areas with a load-bearing function for the rear axle or parts fastened to the frame
- At load application points (e.g. spring supports, brackets, etc.)



Risk of accident

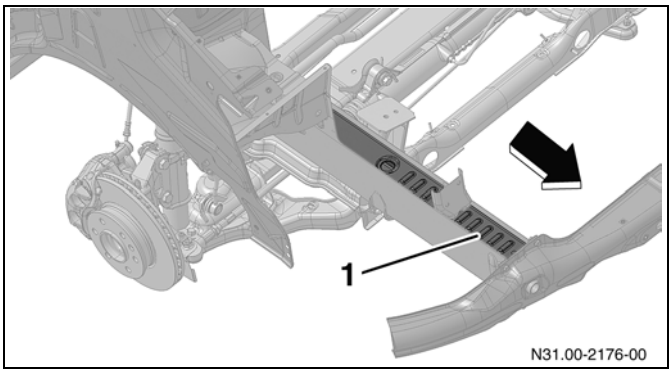
Impermissible drilling in the vicinity of the airbags could cause the airbags on the standard vehicle to function incorrectly (▷ page 162). For this reason, drilling work must not be performed near airbags.

In Germany, the handling, transportation and storage of airbag units is subject to the law on explosive substances (Gesetz über explosionsgefährliche Stoffe).

7.2.2 Attachment to the frame

Attachment to the front frame section

On no account should assemblies, bars, etc. be secured near the frame forestructure or the front axle as this may interfere with the necessary structure for passive safety.



Structure for passive safety

1 Crumple zone on the subframe

Arrow Front of vehicle

Risk of accident

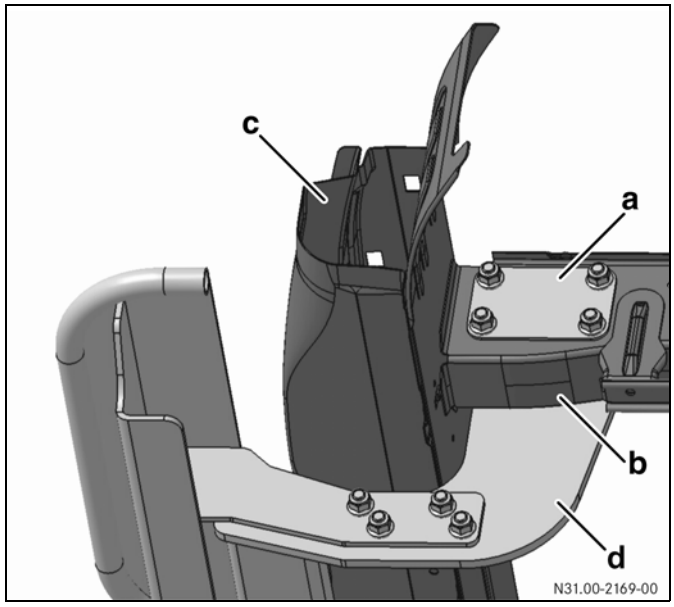
If attachments are mounted on the front frame section, the function of the forward impact structure and the airbag units may be impaired.
If the impact structure is modified, the airbag units may have to be deactivated. Attachments are therefore only permitted to be mounted on the front section of the frame after consultation with the department responsible.

The modifications must not hinder possible repair work on the standard vehicle.

Attachment to the rear frame section

The attachment of additional equipment or bodies to the rear frame section must be analogous to the attachment of the trailer coupling available as special equipment.

For the application of greater forces and moments, an additional support on the end frame cross member is required.



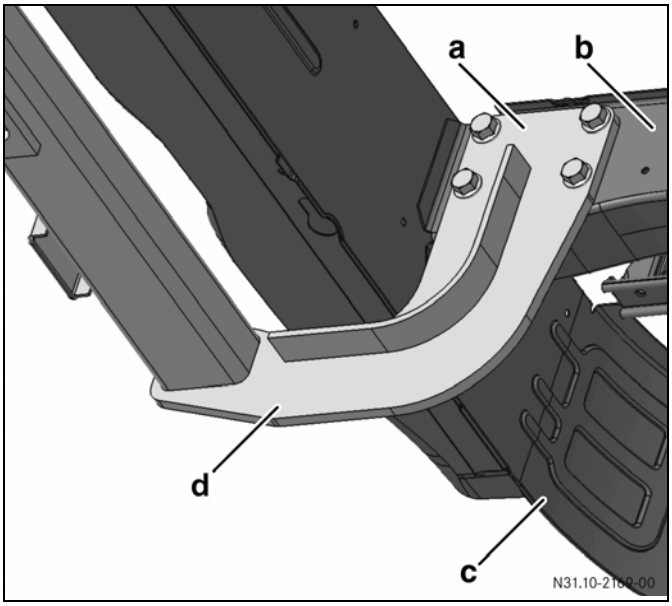
Exterior view

a Attachment of mounting plate to the longitudinal frame member

b Lower chord of the longitudinal frame member

c End frame cross member

d Mounting plate for the trailer coupling



Interior view

a Attachment of mounting plate to the longitudinal frame member

b Lower chord of the longitudinal frame member

c End frame cross member

d Mounting plate for the trailer coupling

A certificate of endorsement is required from the department responsible (▷ page 18).

Additional information on the hole patterns of various trailer coupling variants can be found under 10.3 "Trailer coupling hole patterns" (▷ page 255).

Attachment by means of body support brackets

The body support brackets fitted at the factory must be used for attaching bodies to the vehicle frame. Additional information can be found under 8.1.4 "Attachment to the frame" (▷ page 203).

7.2.3 Chassis frame material

If modifications are made to the wheelbase or the frame is extended, the material of the extension element must have the same quality and dimensions as the standard chassis frame.

Material	Tensile strength [N / mm²]	Yield strength [N / mm²]
H240LA (DIN EN 10268-1.0480)	350 – 450	260 – 340
S235JRG2 (DIN EN 10025-1.0038)	340 – 510	≥ 235

7.2.4 Overhang extension

Modifications to the vehicle overhang are possible and must always take the permissible axle loads and the minimum front axle load into account.
On vehicles with a closed body (passenger van or panel van), an overhang extension is only permitted after consultation with the department responsible (▷ page 17).

- An additional cross member must be fitted if the frame extension exceeds 350 mm.
- Any additional frame cross members must have the same functionality as standard cross members.
- Standard body support brackets must be used at the end of the frame.
- The interval between the body support brackets must not exceed 500 mm.
- If the frame overhang is extended, the permissible trailer load specified in the vehicle registration document must be checked and, if necessary, be reduced or even omitted.
- The frame overhang must be reinforced accordingly.
- Make sure that you do not exceed the permissible axle loads.

- Ensure that you maintain the position of the centre of gravity within the permissible limits.
- The minimum front axle load must be complied with in all load states (▷ page 44).

You can obtain more information from the department responsible (▷ page 17).

Maximum overhang lengths

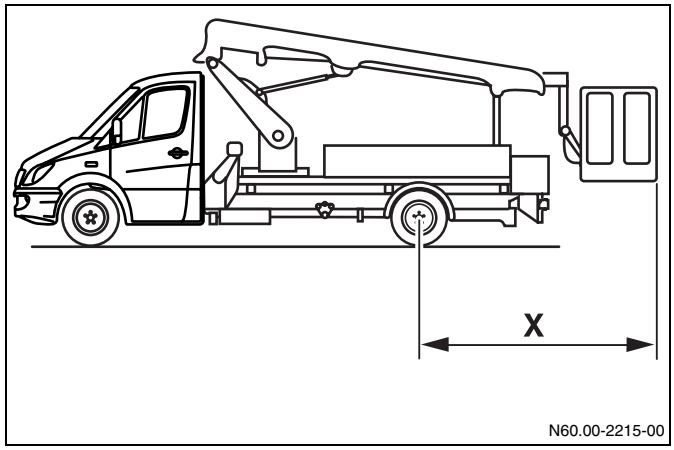
If you stay within the limits of the following overhang lengths and the maximum rear axle load, the original trailer load still applies and ESP operation is not affected.

Wheelbase l [mm]	Overhang length x [mm]
3,250	1,650
3,665	1,850
4,325	2,200

For vehicles with low frame, observe the maximum overhangs under 8.6.2 "Low frame bodyshell" (▷ page 213).

The vehicle overhang length is part of the total overhang from the rear axle, including the frame overhang extension as well as the body and attachments.

For information on the section dimensions of the longitudinal frame member (▷ page 119).



Maximum overhang lengths (using a lifting work platform as illustration)

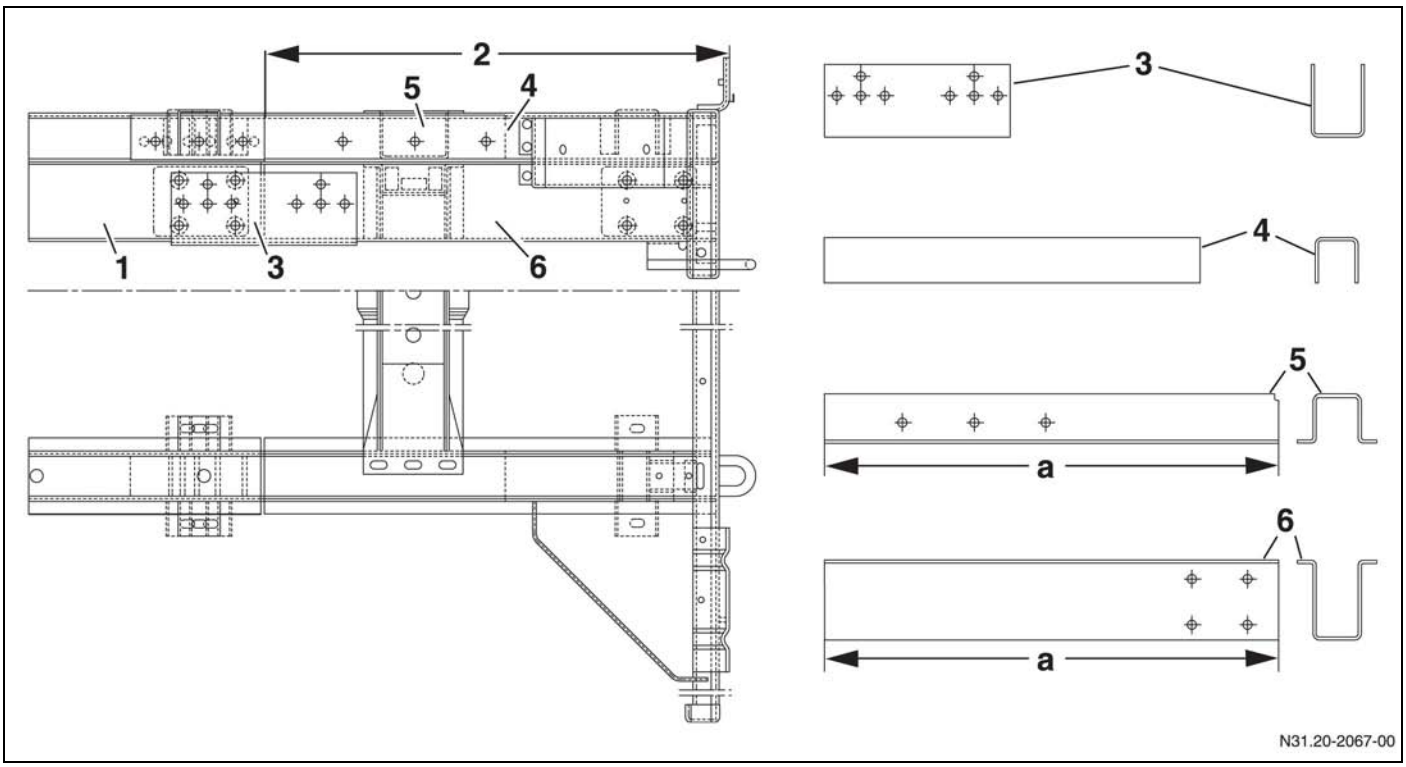
x Vehicle overhang

If the underride guard needs to be repositioned due to the overhang extension, the attachment must be the same as that of the original vehicle (▷ page 197).

The illustration above depicts the implementation of a frame extension for an overhang extension.

3.0 t and 3.5 t vehicles

On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (▷ page 64).

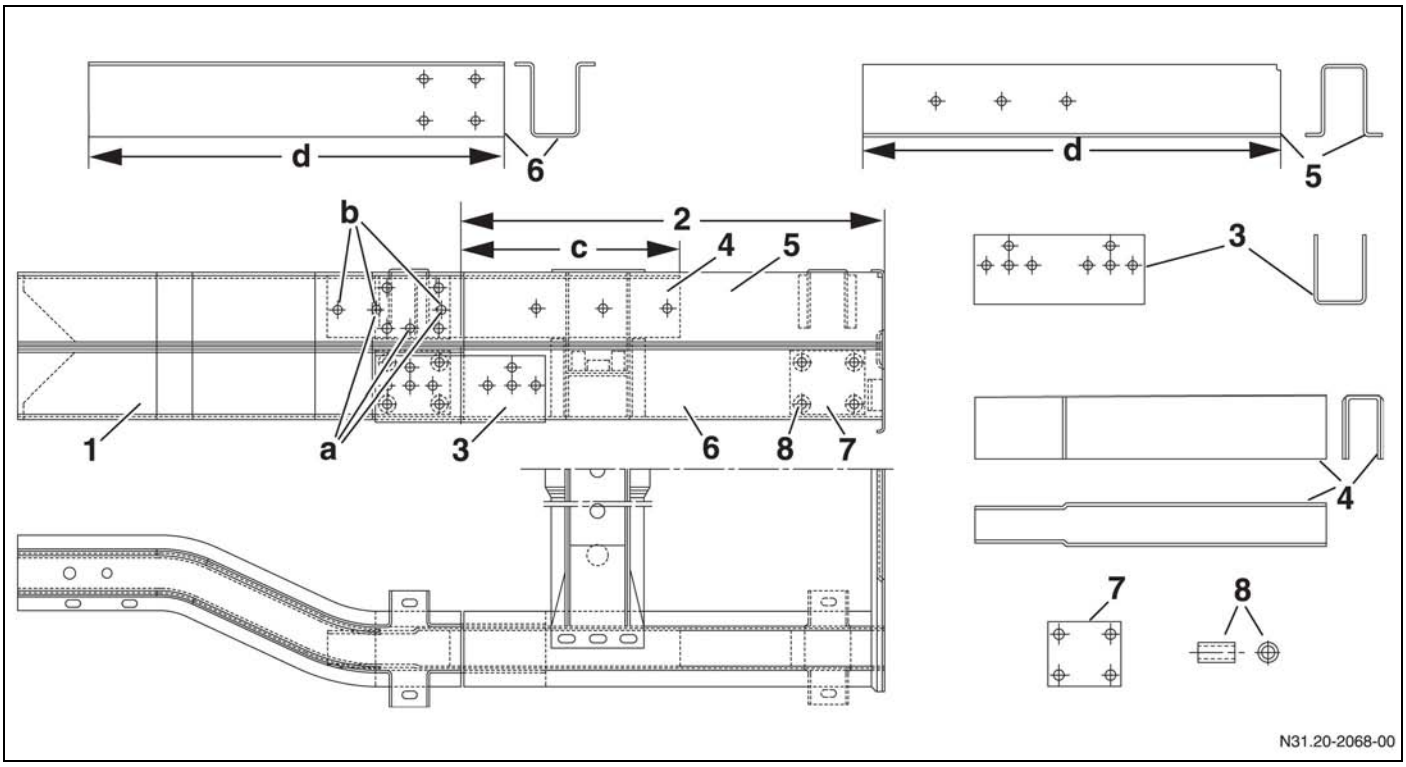


Frame extension with overhang extension

1 Longitudinal chassis frame member
2 Frame extension
3 Outer reinforcement
4 Inner reinforcement
5 Body support extension (wall thickness 3.5 t: 2 mm)
6 Chassis frame extension (wall thickness 3.5 t: 2 mm)
a Dimension defined by body manufacturer

Comply with all national guidelines and regulations.

4.6 t and 5.0 t vehicles



Frame extension with overhang extension

1 Longitudinal chassis frame member
2 Frame extension
3 Outer reinforcement
4 Inner reinforcement
(wall thickness 5 t: 3 mm)
5 Body mounting frame extension
6 Chassis frame extension
(wall thickness 5 t: 3 mm)
7 Reinforcement plate minimum 2 mm
8 Spacer bush, tube 24 x 4 M steel or ST 35 NBK

a Bore holes, 3,665 mm wheelbase
b Bore holes, 4,325 mm wheelbase
c 350 mm (3,665 mm wheelbase),
300 mm (4,325 mm wheelbase)
d Dimension defined by body manufacturer

Comply with all national guidelines and regulations.

7.2.5 Modifications to the wheelbase

Risk of accident

Wheelbase modifications on vehicles with Electronic Stability Program ESP may only be made to lengthen the wheelbase to one of the standard wheelbases and only in the range between 4,700 mm and 5,100 mm. Wheelbase modifications outside this range on vehicles with ESP may result in the system failing to function correctly. The driver could lose control of the vehicle and cause an accident. (▷ page 97).

In the case of vehicles with ESP and a modified wheelbase, the ESP system must be reprogrammed or deactivated using STAR DIAGNOSIS. In the case of wheelbase modifications in the range between 4700 mm and 5100 mm, the ESP system, which is adapted for the standard wheelbases, must be programmed for the new wheelbase using STAR DIAGNOSIS (Code 003). Your Mercedes-Benz Service Centre or the department responsible (▷ page 17) will be happy to answer any questions.

A chassis with the next shorter standard wheelbase must be used if the wheelbase is to be extended.

An additional frame cross member must be fitted if the frame extension exceeds 350 mm.

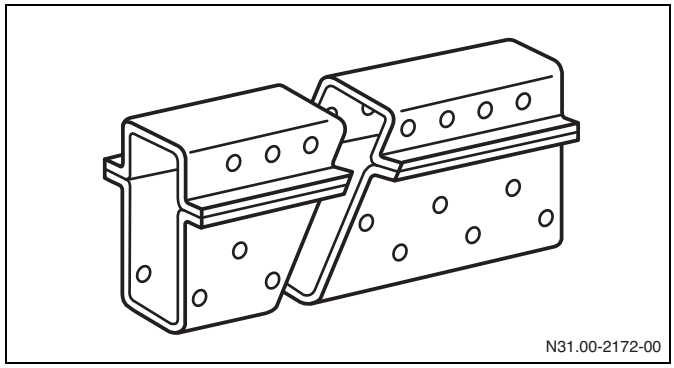
Any additional frame cross members must have the same functionality as standard cross members. The drive shaft clearance must be taken into consideration.

On no account should modifications be made to the wheelbase by moving the position of the rear axle.

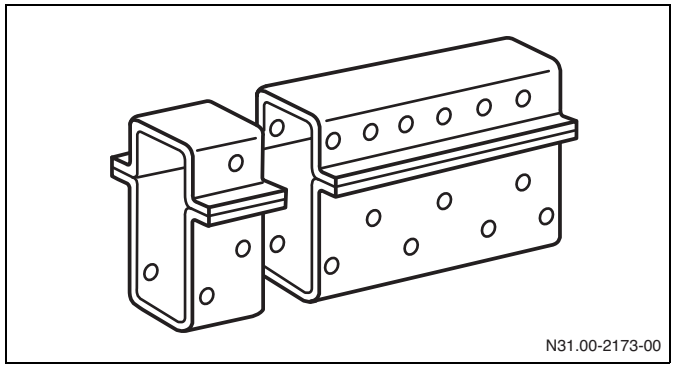
- Before cutting frame longitudinal members, the chassis must be in a perfectly horizontal position.
- Position the cutting points so that the cut does not pass through any existing holes in the longitudinal frame member.
- Support the frame. Perform wheelbase extensions from the next standard wheelbase down (example: target wheelbase 4,700 mm, then select standard wheelbase 4,325 mm).
- Take account of changes to the chassis weight and turning circle.

Also observe 6.4.3 "Lengthening of cables" (▷ page 74), 7.1.3 "Brake system" (▷ page 113) and 7.3.6 "Propeller shafts" (▷ page 147).

Cuts in the frame



"Diagonal" frame cut



"Straight" frame cut

On no account should the frame be cut at the following points:

- load application points (e.g. spring supports)
- axle guide, axle suspension
- areas of sectional change (frame drop, frame taper)
- holes

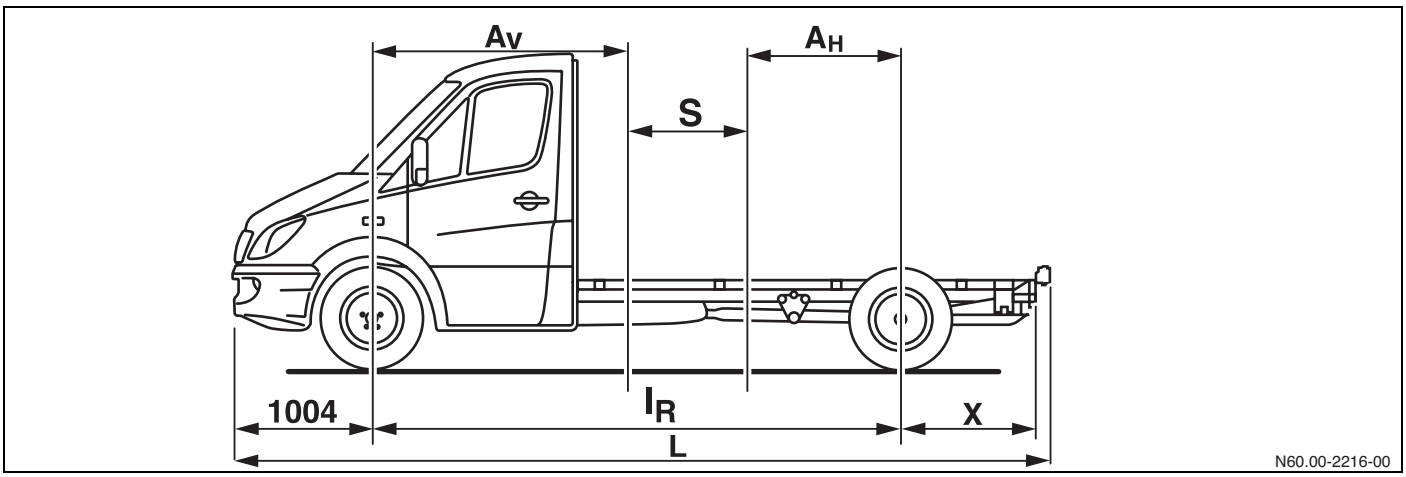
Recommended cutting areas on the frame

Avoid making cuts in the area of frame inserts when extending the wheelbase. We recommend the areas specified for the particular wheelbases (see table, see illustration).

Wheelbase [mm]	Permissible gross vehicle weight [t]	A_V [mm]	A_H [mm]
3,665	3.5 / 3.88	2,285	1,305
4,325	3.5 / 3.88	2,285	1,305
3,665	4.6 / 5.0	2,205	1,420
4,325	4.6 / 5.0	2,205	1,420

Values refer to a chassis with cab

A_V... Distance to centre of front axle A_H... Distance to centre of rear axle



Cutting area on the frame

L Total vehicle length

l_R Wheelbase length

X Standard vehicle overhang

S Recommended cutting area

A_H Distance from rear axle to cutting area

A_V Distance from front axle to cutting area

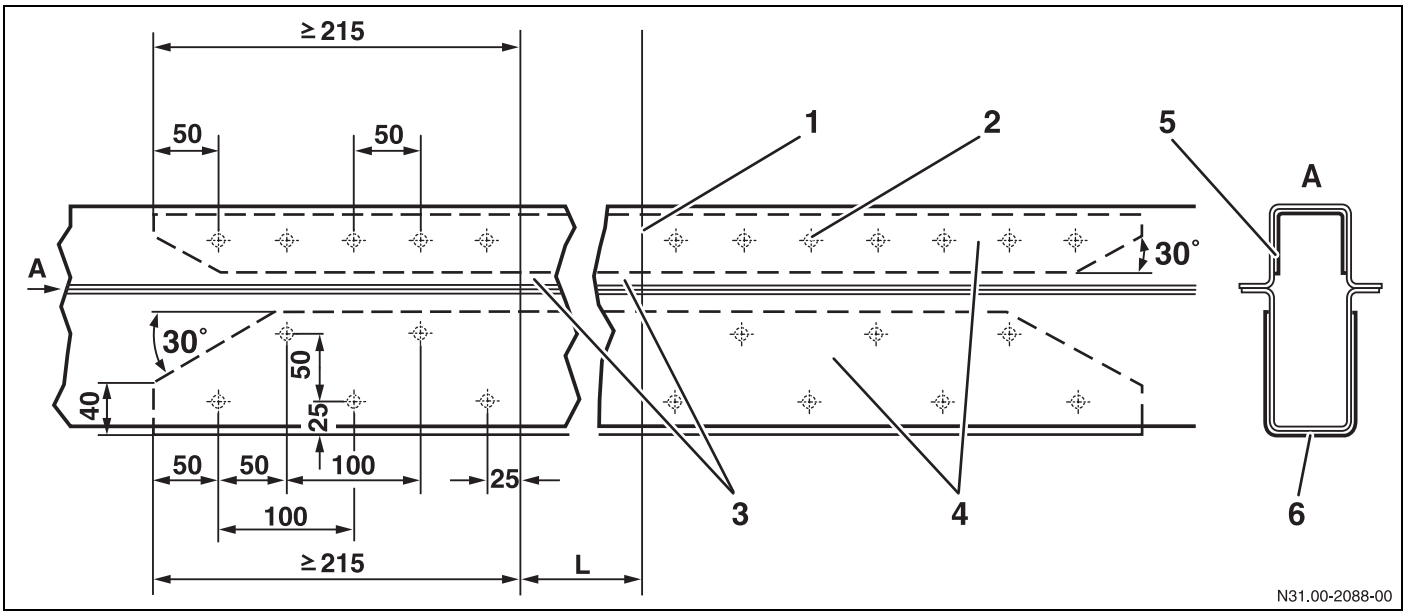
!

On 5 t vehicles with wheelbase 4,325 mm and code BR9 "Retarder preinstallation" the cut must be made at A_V = 2,205 mm. Otherwise, the retarder preinstallation cannot be used properly.

Reinforcement in areas of cuts in the frame

If the vehicle frame is extended, the cutting areas must be reinforced by frame inserts. The specified overlap and the material properties of the frame inserts must be observed.

Wheelbase extensions must be carried out as follows:



Specification of frame inserts

1 Weld kerfs all round

2 Plug weld, plug hole diameter 12 mm

3 Material grade of hat profile used must be the same as the standard vehicle

4 Inserts, material min. ST 12.03, material thickness 2 to 3 mm

5 Insert, upper chord (inside)

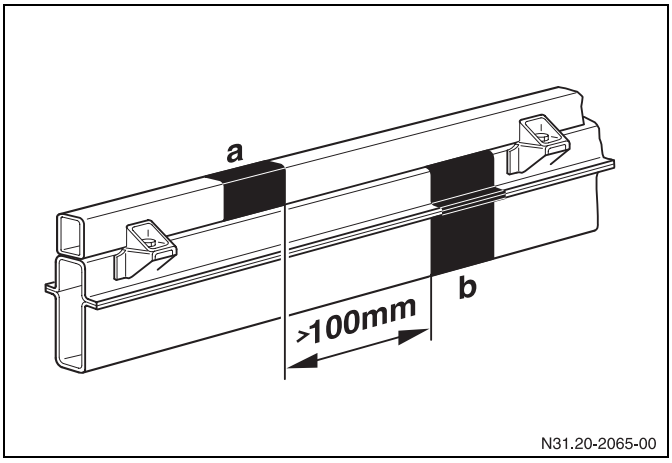
6 Insert, lower chord (outside)

L Wheelbase extension

With wheelbase modifications, make sure that the end of the exhaust pipe is not directed at a tyre.

After wheelbase modifications, the chassis must be reinforced by a continuous mounting frame (▷ page 200).

If the mounting frame is also lengthened when extending the overhang, the welds must be positioned at least 100 mm apart (see illustration).



Extending the overhang on frames with mounting frame

a Mounting frame extension element

b Frame extension

On vehicles with ESP the wheelbase may be modified in the range between 4,700 mm and 5,100 mm. The ESP system, which is adapted for the standard wheelbases, must be programmed for the new wheelbase using STAR DIAGNOSIS (Code O03).
Your Mercedes-Benz Service Centre or the department responsible (▷ page 17) will be happy to answer any questions.

If the vehicle wheelbase is modified, the length of the propeller shafts must be adapted to the vehicle. The extension must be carried out by a company qualified in propeller shaft engineering.

On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (▷ page 64).

Certificate of endorsement for wheelbase modifications

You can obtain more information on wheelbase modifications and, if necessary, request the certificates of endorsement from the department responsible (▷ page 18).

Please send two drawings of the conversion or body and the following information together with the request:

- Position of cut
- Reinforcement measure
- Propeller shaft train
- Conditions of use

7.2.6 Modifications to the cab

All modifications to the cab must be approved by a certificate of endorsement issued by the department responsible (▷ page 18). Rigidly installed equipment or conversions must satisfy the requirements of legislation relating to head impact as specified in ECE-R21 and FMVSS 201.

Risk of accident and injury

Modifications to the cab must not impair the function of any components relevant to safety (e.g. airbag units, sensors, pedals, gear lever, lines or others). This may lead to the failure of components or parts relevant to safety.

If the fuel filler cap is removed or parts are attached to the fuel filler cap, blocking may occur in the event of an accident. Because of this, the protrusion space in the B-pillar may no longer function correctly. On no account should the cap be covered with panelling parts, and "blocking" parts must never be mounted on the B-pillar.

The strength and rigidity of the cab structure must not be impaired.

The intake of air into the engine must not be hindered.

Modifications to the cab will cause a change in the centre of gravity. The permissible centre of gravity limits and axle loads must be maintained.

On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (▷ page 64).

Changes to cab roof, general

Risk of accident

On no account should any subsequent modifications be made to the roof lining or the roof skin between the A-pillar and the B-pillar if the vehicle is equipped with windowbags. Otherwise, the windowbag may no longer be able to work correctly (e.g. windowbag deployment is delayed or incomplete).

Modifications to the cab roof (e.g. lowering the roof height) may only be undertaken after consulting the department responsible(▷ page 18) or as described under 7.2.12 "Cutting the cab roof and B-pillar roof arch" (▷ page 141).

The "electric sliding sunroof", Code D27, is available from the factory as special equipment (▷ page 43).

Plastic roofs are suitable for the installation of roof hatches only to a limited extent.

The roof load-bearing capacity is limited (▷ page 54).

Roof arches or supporting parts may not be removed or modified without being replaced.

You will find information on over-cab attachments and wind deflectors in the "Attachments" section (▷ page 178).

Observe the permissible centre of gravity and the permissible axle loads must be maintained.

Modifying the cab rear panel

If it is necessary to cut through the cab rear panel, it is possible to do this in connection with a continuous surrounding frame. The equivalent rigidity of the frame must be at least equal to the original rigidity.

Partitions may be totally or partially removed. Also observe 8.4 "Modifications to closed panel vans" (▷ page 209).

⚠ **Risk of accident**

On no account should any subsequent modifications be made to the roof lining or the roof skin between the A-pillar and the B-pillar if the vehicle is equipped with windowbags. Otherwise, the windowbag may no longer be able to work correctly (e.g. windowbag deployment is delayed or incomplete).

7.2.7 Side wall, windows, doors and flaps

Side wall

If modifications are made to the side wall of the panel van or the passenger van, the rigidity of the modified body must be equal to that of the basic vehicle.

The roof frame must be retained and its function may not impaired in any way.

A certificate of endorsement is required from the department responsible (▷ page 18).

❗

On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (▷ page 64).

ℹ

Additional information on modifications to the side wall can be found under 7.6.4 "Shelf system / interior installations" (▷ page 179).

Windows

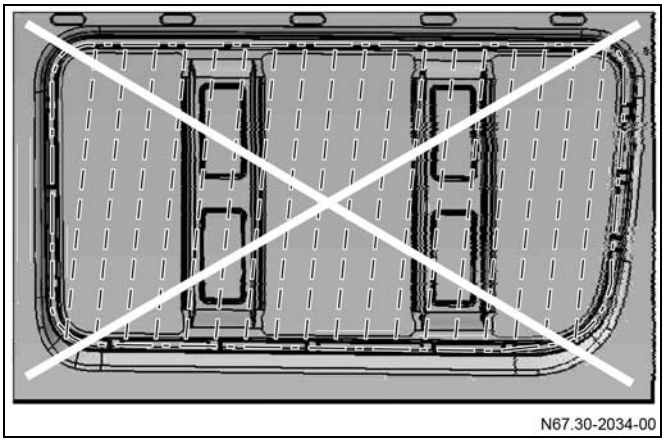
Windows must be inserted with a stable frame. The frame must then be joined by a non-positive attachment to other body elements.

If modifications need to be carried out to the supporting structure of the basic vehicle (pillars, reinforcements, attachment of roof arches) in order to retrofit windows (panorama glazing), the rigidity of the modified body must be equal to that of the basic vehicle.

If the body manufacturer is going to install his own windows, Code W94 "No windows in bus version" is available from the factory.

❗

It is not permissible to install panorama glazing on a panel van basic vehicle by cutting out the stamped window shape (without code W78) without ensuring equivalent rigidity. Otherwise, there is a risk of damage to the side wall.



For modifications which involve cutting out the stamped window shape and adding reinforcements, a certificate of endorsement must be obtained from the department responsible (▷ page 17).

A design proposal with reinforcement measures can be provided by the department responsible (▷ page 17).

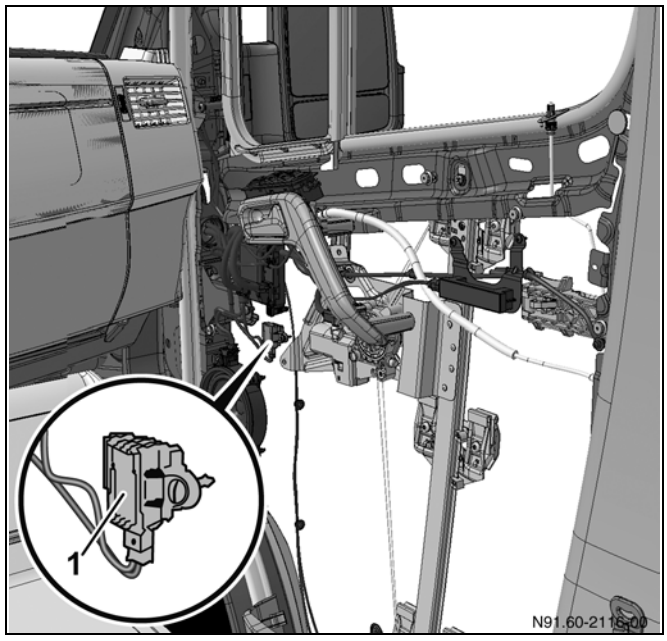
If the body manufacturer is going to install its own windows in the hinged rear doors, the following should be noted in connection with Code W78 "Window wiper on hinged rear door":

- To guarantee proper functioning of the rear window wipers, the geometry of the windows supplied by the body manufacturer must match that of the windows available as standard equipment.
- The wiper blades of the rear window wipers must make contact with the windows across the entire swept area.
- The rear windows must be 3 mm thick.
- The rear windows must not protrude above the door panelling.

Doors and flaps

If modifications need to be carried out to the supporting structure of the basic vehicle (frame cross members, pillars, reinforcements, attachment of roof arches) in order to retrofit doors, the rigidity of the modified body must be equal to that of the basic vehicle.

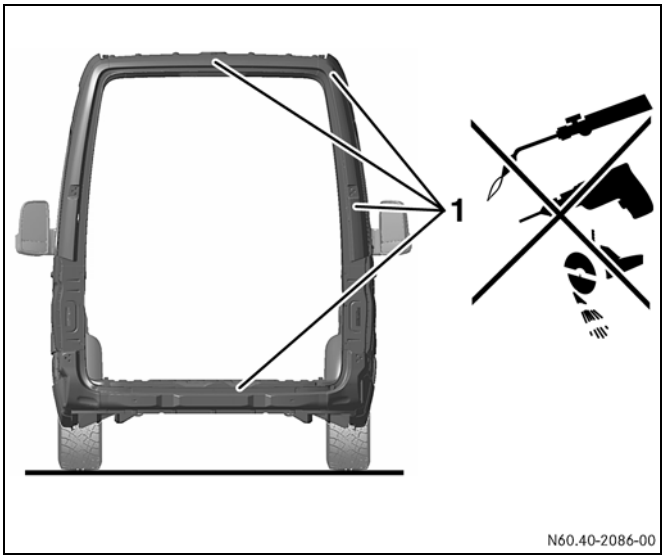
The trigger sensor of the occupant protection systems is located in the door body on vehicles with window or thorax bag. On no account should modifications be made to the door body (see illustration).



Door, showing sensor system

1 Pressure sensor
(trigger sensor of the occupant protection systems)

Any modifications to the rear door opening including the roof area are only permitted in exceptional cases and require a certificate of endorsement from the department responsible (▷ page 18).



Rear door opening and roof area

1 Areas in which modifications are not permitted (certificate of endorsement required)

- Seats in the passenger compartment or cabin must be directly accessible from the outside by a door or from the cab.
- It must be possible to open locked doors quickly and easily from the inside.
- The doors must open wide enough and the door entrances must be shaped in such a way as to enable persons to get in and out of the vehicle safely and comfortably.
- The maximum permitted height of the bottom step above the road surface is 400 mm.
- Fittings must allow sufficient clearance to the interior door handles regardless of door position (trap guard).
- On no account should modifications be made to the central locking system or to the immediate area around the door or in the area of the pillars or cross members.

On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (▷ page 64).

7.2.8 Mudguards and wheel arches

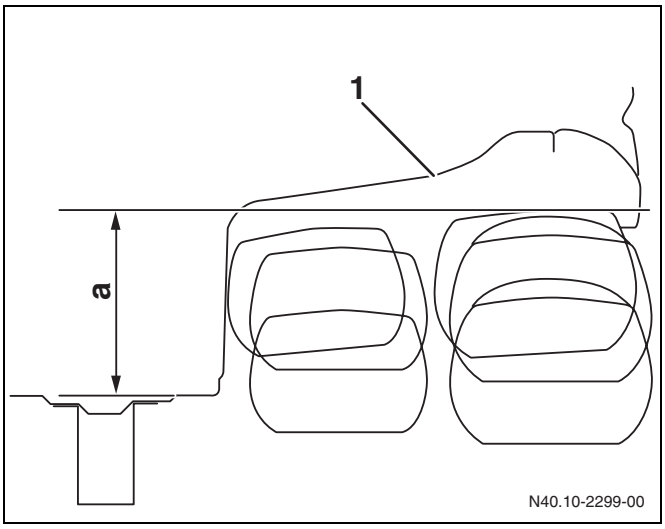
Ensure that there is sufficient space between the tyre and the mudguard or wheel arch even with snow or anti-skid chains fitted and the suspension completely compressed (allowing for axle twist). Comply with the dimensional data in the tender drawings.

Wheel arch lowering (panel van)

It is possible to lower the wheel arches as long as the following preconditions and limits are complied with:

- No components or sharp edges (e.g. folded seams or edges) may protrude into the wheel housing.
- The maximum permitted lowering dimension may not be exceeded by any component in the wheel arch.
- Unrestricted use of snow chains is not possible: The entry "Use of snow chains subject to limitations" must be entered in the vehicle documents.

Maximum wheel arch lowering



Maximum wheel arch lowering

1 Contour of standard panel van wheel arch

a Maximum possible extent of lowering

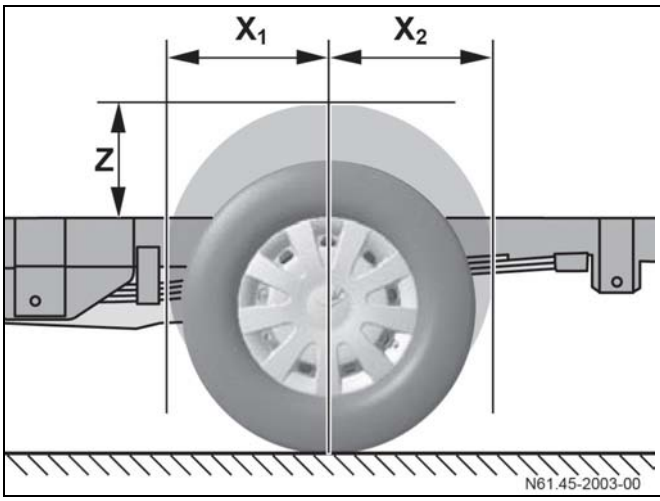
The minimum required wheel clearance is measured from the floor in the panel van or the flange between the upper and lower chord of the longitudinal frame member on chassis vehicles.

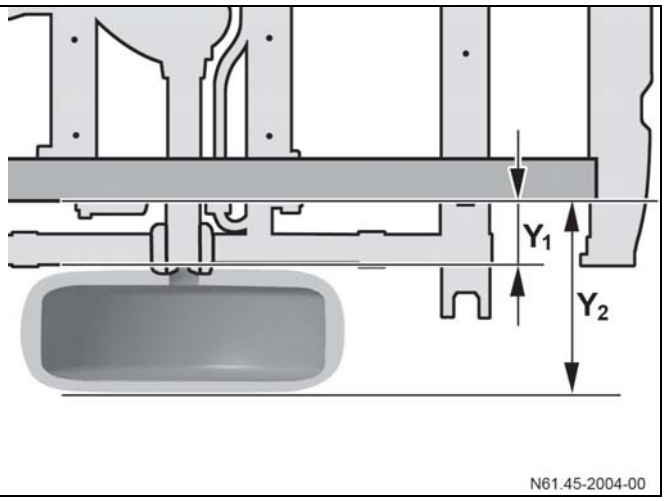
Permissible gross vehicle weight [t]	Tyres	Dimension a [mm]
3.5 (longitudinal frame member, straight)	205 / 75R16	260
	235 / 65 R16	260
4.6 – 5 (longitudinal frame member, tapered)	285 / 65 R16	260
	2 x 195 / 75R16	225
	2 x 205 / 75R16	235
3.5 (all-wheel drive)	225 / 75R16	200
5.0 (all-wheel drive)	205 / 75R16	190

Wheel arches of body manufacturer (chassis)

The following limits must be complied with for the design of wheel arches on chassis (e.g. for box bodies) by the body manufacturer:

- No components or sharp edges (e.g. folded seams or edges) may protrude into the wheel housing.
- The maximum permitted lowering dimension may not be exceeded by any component in the wheel arch.
- Unrestricted use of snow chains is not possible: The entry "Use of snow chains subject to limitations" must be entered in the vehicle documents.





Chassis wheel arch limits

Permissible gross vehicle weight [t]	Tyres	Dimensions [mm]				
		X_1	X_2	Y_1	Y_{2**}	Z
3.0	205 / 75R16	410	410	195	520	260
3.5	235 / 65 R16	410	410	195	520	260
4.6	285 / 65 R16	445	445	245	635	260
4.6 – 5.0*	2 x 195 / 75R16	405	405	120	630	225
	2 x 205 / 75R16	410	410	115	635	235
3.5 (all-wheel drive)	225 / 75R16	430	430	195	510	200
5.0 (all-wheel drive)*	2 x 205 / 75R16	410	410	115	638	190

* On vehicles with twin tires, the inside of the inner wheel was used for Y_1 and the outside of the outer wheel for Y_2.

** With maximum wheel arch trim to wheel centre.

⚠ Risk of accident

On no account may seats be mounted on the wheel arches. This also applies for lowered wheel arches. Otherwise, the vehicle could be damaged (e.g. wheel arches and tyres), resulting in accidents.

!

On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (▷ page 64).

!

Reductions in the width of the wheel arches are not permitted.

7.2.9 End frame cross member

If special-purpose bodies are mounted, the end panel cross member acting as an underride guard may be omitted at the factory (Code Q72) (▷ page 43).

You will find more information on the underride guard in the "Attachments" section (▷ page 197).

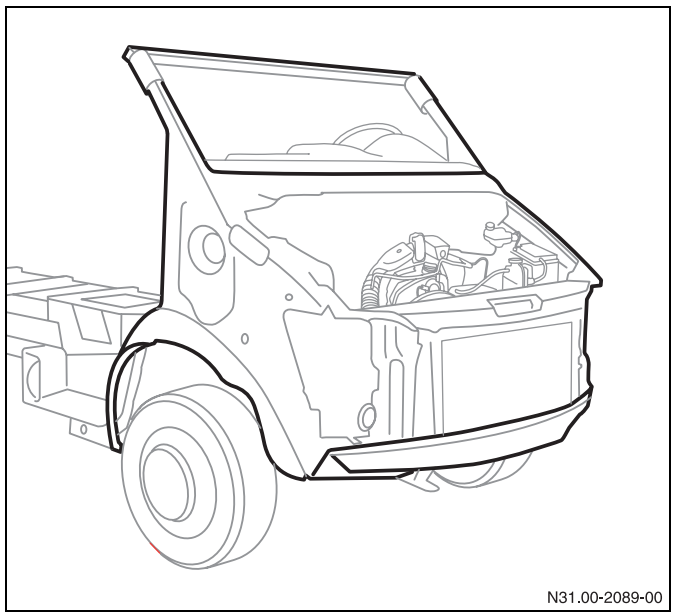
!

On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (▷ page 64).

Comply with all national guidelines and regulations.

7.2.10 Windscreen support structure

The windscreen support structure (chassis platform) offers body manufacturers a base for producing fully integrated bodies (e.g. motor caravans) or special-purpose bodies. It is available from the factory under Code F50 "Support base (low-frame chassis)" (▷ page 43).



Windscreen support structure chassis

The specifications on setting up windscreen support structure chassis in 8.5 "Bodies on chassis with supporting base (F28, F50)" (▷ page 210) must be followed.

!

On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (▷ page 64).

7.2.11 Panel van / passenger van roof

If modifications are made to the roof structure of panel vans / passenger vans, the following points must be observed:

- Fit an anti-roll bar to the front axle to reduce the tendency to roll.
- If the roof skin and roof arches are removed and if no continuous sectional frame is possible, additional roof arches must be fitted. The overall design must be retained, and sufficient rigidity of the modified parts must be guaranteed.
- So that the function of the rain / light sensor is not impaired, the body must not protrude beyond the limit shown in the "Rain / light sensor" section (▷ page 108).

The rigidity of the new roof structure must be equal to that of the original standard roof.

On no account should modifications be made to the rear door opening including the roof area.

On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (▷ page 64).

Attachment to the roof

Securing elements similar to roof racks are possible for retrofitting attachments (▷ page 179).
Attachments to the roof skin require a certificate of endorsement from the department responsible (▷ page 17) (except for rotating beacons and working-area lamps).
Attachments to roof arches require a certificate of endorsement from the department responsible.

Risk of injury

On no account should any subsequent modifications be made to the roof lining or the roof skin between the A-pillar and the B-pillar if the vehicle is equipped with windowbags. Otherwise, the windowbag may no longer be able to work correctly (e.g. windowbag deployment is delayed or incomplete).

Increasing the height of the roof

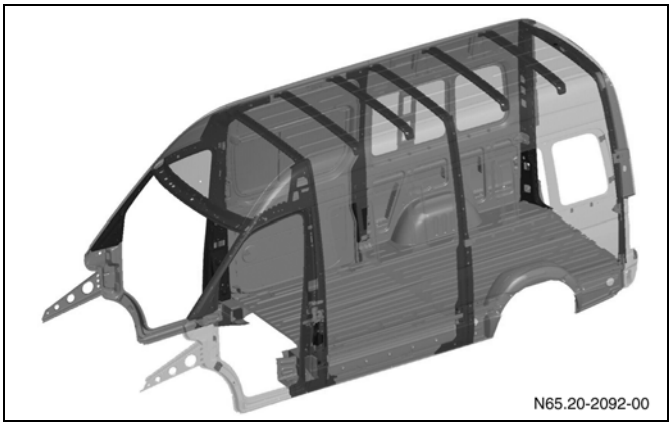
The height of the roof may only be increased in conjunction with integrated arches and reinforcement frames.

The rigidity of the new roof structure must be equal to that of the original standard roof.

Number of roof arches

Wheelbase	Quantity required
3,250 mm	≥ 4 roof arches
3,665 mm	≥ 5 roof arches
4,325 mm	≥ 6 roof arches

Location of roof arches



Panel van roof arches

The arches must be secured to the side panels in such a way that a non-positive connection is guaranteed (bend-resistant connection of arch and roof frame).

The roof arches must be reinforced in the event of any increase in the height of the roof.

The minimum moment of inertia required I_x per roof arch can be seen in the table below:

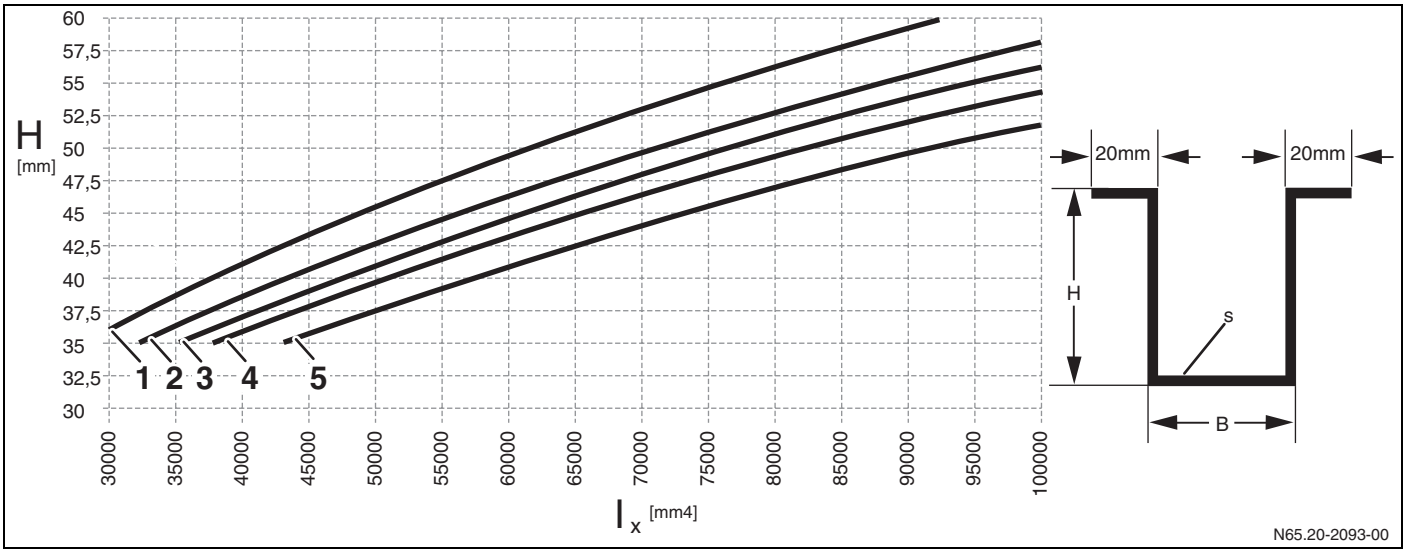
Roof height [mm]	Moment of inertia I_x per roof arch [mm^4]
250	≥ 40,000
400	≥ 65,000
550	≥ 86,000

A minimum required moment of inertia of L_x = 33,000 mm^4 must be maintained if the roof height is either reduced or not modified.

The maximum roof load of the high panel roof is 150 kg if the load is evenly distributed over the entire roof surface (▷ page 179).

Risk of accident

The maximum permissible height for the centre of gravity must not be exceeded. Otherwise, if the vehicle is fitted with ESP, this system may no longer work correctly and could ultimately fail. The driver could lose control of the vehicle and cause an accident (▷ page 97).



Required moments of inertia for roof arches with 20 mm flange with the roof skin

1 B: 50 x s: 0.8

2 B: 40 x s: 1.0

3 B: 50 x s: 1.0

4 B: 60 x s: 1.0

5 B: 50 x s: 1.2

Retrofitting a raised roof

Risk of injury

On no account should any subsequent modifications be made to the roof lining or the roof skin between the A-pillar and the B-pillar if the vehicle is equipped with windowbags and thorax bags. Otherwise, the windowbag and thorax bag may no longer work correctly (e.g. windowbag and thorax bag deployment may be delayed or incomplete).

Plastic roofs are suitable for the installation of roof hatches only to a limited extent.

The roof load-bearing capacity is limited (see table).

If a raised roof is fitted, at least two-thirds of the original roof area must be retained.

Roof arches or supporting parts may not be removed or damaged without being replaced (▷ page 139).

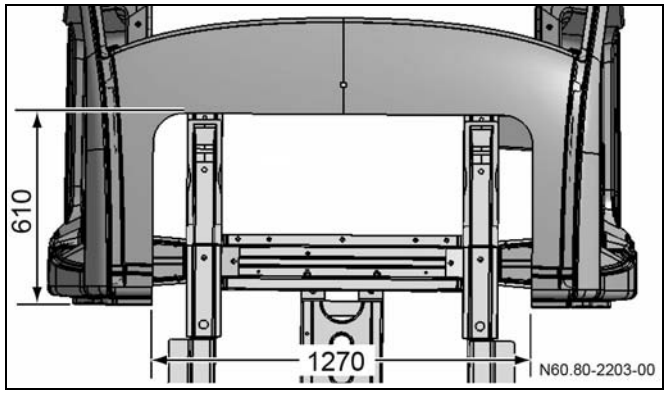
Maximum roof loads

Panel van [kg] LH1	High roof panel van [kg] LH2	Extra-high roof panel van [kg] LH3	Cab crewcab [kg]
300	150	0	100

The threshold value of the vehicle's maximum centre of gravity must not be exceeded.

7.2.12 Cutting the cab roof and B-pillar roof arch

For partially integrated bodies, e.g. motor caravans or integral box bodies, the cab roof including B-pillar roof arch can be cut out in the indicated area (see illustration) where necessary.



Permissible roof cut

When cutting the B-pillar roof arch, it is essential to ensure equivalent rigidity in one of the ways listed below.
For alternative methods of ensuring equivalent rigidity developed by the body manufacturer, a detailed evaluation by the department responsible (▷ page 17) and a certificate of endorsement is required.

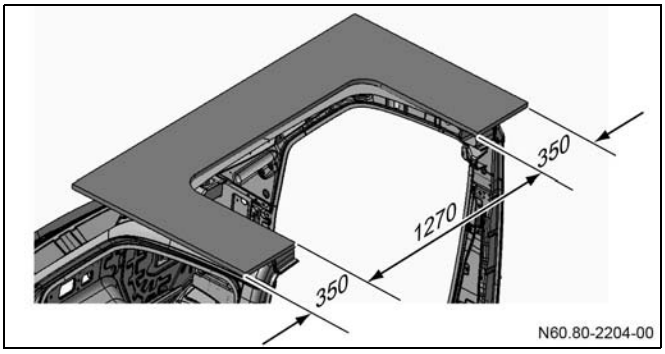
Equivalent rigidity when cutting B-pillar roof arch

The following variants can be certified as safe by the department responsible (▷ page 17):

Variant 1: Sandwich construction / wooden board

When the B-pillar roof arch is cut, the equivalent rigidity requirements can be met by means of a wooden board or sandwich construction bonded to the basic vehicle over its entire surface (e.g. with Sikaflex 221). The arched roof contour must be adapted to form a non-positive fit with the sandwich construction or wooden board by means of an auxiliary construction.

Required bending resistance of sandwich construction / wooden board	
y-axis	$EI_2 = 7 \times 10^8$ N / mm²
z-axis	$EI_1 = 2 \times 10^{11}$ N / mm²



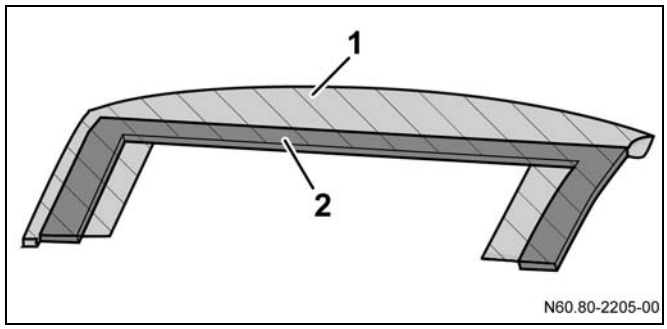
Simulating structure (sandwich construction / wooden board) bonded to cut roof structure over entire surface

Material characteristics	
Sandwich construction	**Wooden board**
Structure: 2.0 mm GRP 26.0 mm foam 2.0 mm GRP	Structure: 20.0 mm wood
E_{GRP}=12,000 N / mm² E_{Foam} = 80 N / mm²	E_{Wood} = 3,000 N / mm²

Variant 2: Welded structure under cab roof

When the B-pillar roof arch is cut, the equivalent rigidity requirements can be met by means of a welded structure installed in the basic vehicle under the cut cab roof.

Required bending resistance of welded structure	
y-axis	$EI_2 = 8.35 \times 10^9$ N / mm²
z-axis	$EI_1 = 2.36 \times 10^{11}$ N / mm²

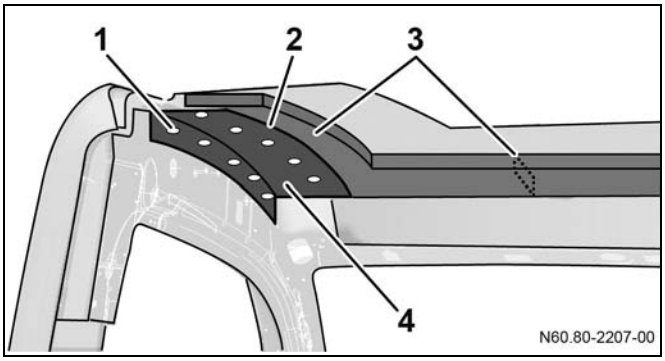


Welded structure

1 Roof panelling

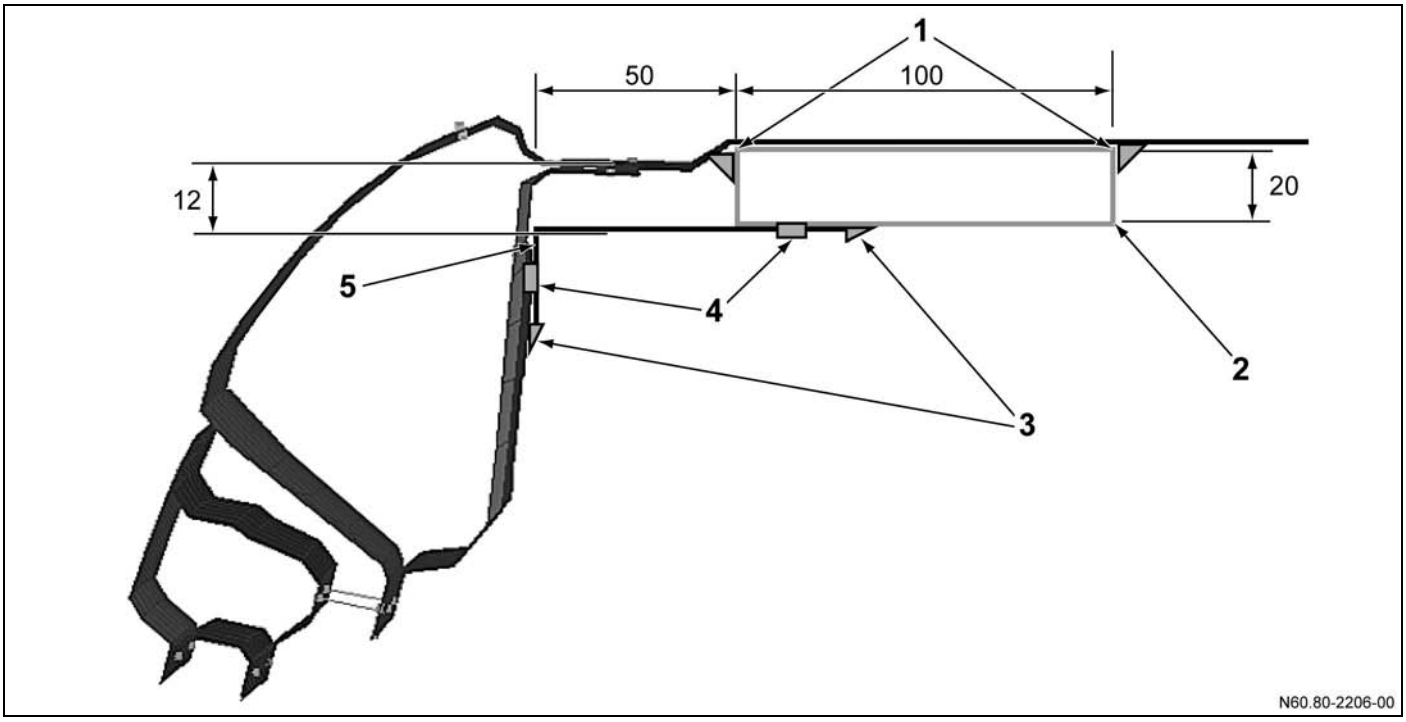
2 Rectangular profile

Material characteristics of auxiliary frame
Material: at least DC01 or S235JRG2
Height = 20 mm
Width = 100 mm
Wall thickness = 1.5 mm
E = 210,000 N / mm²



Welded structure

1 Plug welding
2 Overlap seam
3 Rectangular profile
4 End plate



Cross section of welded structure

1 Fillet weld
2 Rectangular profile (2 mm wall thickness)
3 Overlap seam
4 Plug welding
5 End plate

7.3 Engine peripherals / drivetrain

Maintenance and repair of the vehicle must not be hindered by the body (▷ page 40).

7.3.1 Fuel system (petrol, diesel, gas)

General

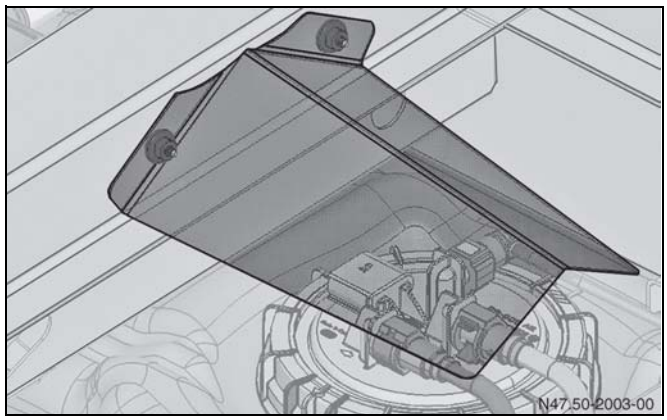
Modifications to the fuel system may only be carried out with the approval of the department responsible (▷ page 17).

Non-approved modifications to the fuel system (fuel tank, lines, etc.) may lead to impaired performance and trigger engine emergency running mode.

The following must be observed for all work on the fuel system:

- The activated charcoal container is located on the rear end of the fuel tank on vehicles with petrol engine. On no account should modifications be made to the position or connection of the activated charcoal container.
- The installation of heat-conducting components, or of components that restrict the installation space, is not permitted.
- On no account should modifications be made to the fuel pump, fuel line length or fuel line routing. Modifications to these components could impair engine operation because these components are matched to each other.
- Modifications and attachments (e.g. additional eyelets) are not permitted in the vicinity of the fuel filler neck.
- If bodies are mounted on basic vehicle cabs, a fuel level sensor shield is necessary when the fuel level sensor is not protected by the body. Vehicles with a platform are fitted at the factory with the fuel level sensor shield with part number A906 471 00 87. It is installed by means of the standard weld screws with two captive M6-8 nuts (MBN10104).

If bodies are mounted on basic vehicle cabs, the fuel level sensor may have to be protected against any falling cargo, depending on the body type. Otherwise, damage could occur, rendering the vehicle defective.



Fuel level sensor shield

The following must be observed if fuel-fired heater boosters are retrofitted:

- No sharp edges permitted
- The fuel tank must not be subjected to load in the event of an impact. Deflection plates must be fitted if necessary
- Fuel lines must be secured
- Exhaust fumes must not be directed into the vehicle interior

For connections supplying fuel to the auxiliary heating, the procedure for design approval must be observed.

Code KL1 is available as special equipment.

Environmental note

Modifications carried out incorrectly to the fuel system may have a detrimental effect on the environment.

CNG natural gas

See 7.3.9 "NGT Sprinter natural gas system" (▷ page 150).

LPG liquefied petroleum gas

It is not possible to convert petrol engines M271 and M272 to liquefied petroleum gas after delivery. Otherwise, the engine can no longer operate properly and may be damaged.

7.3.2 Exhaust system

If modifications are made to the exhaust system, we recommend the use of genuine Mercedes-Benz parts.

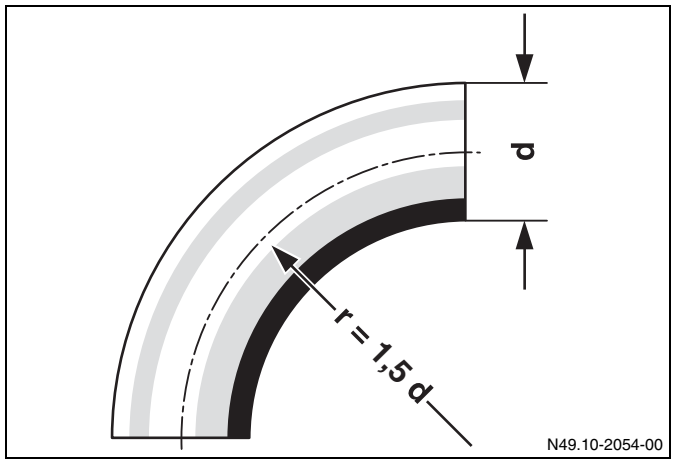
Comply with all national guidelines and regulations.

The length and installation position of the flexible metal hose between the exhaust manifold and the exhaust pipe must not be modified.

The free cross-section of the exhaust pipe behind the silencer must not be reduced.

Under extreme loads, the temperature between the exhaust system (diesel particle filter, catalytic converter or main silencer) and the floor panel may rise above 80 °C. For this reason, shields or insulation must be mounted on the substructure to reduce the effects of radiated heat; refer also to 8.6.9 "Low frame fuel tank shield" (▷ page 227).

- Pipe bend, maximum 90°
- Avoid the use of additional pipe bends
- Bending radii >1.5 d



Example of a pipe bend design

Minimum distance to plastic lines, electrical cables and spare wheels:

- 200 mm for exhaust systems without shielding
- 80 mm with sheet metal shielding
- 40 mm with sheet metal shielding and additional insulation

On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (▷ page 64).

Additional shielding is required

- Near control panels
- Near assemblies, attachments and equipment, unless they are made of heat-resistant material

Risk of fire

Modifications to the exhaust system as far as the main silencer are not permitted.

The lengths and routings, e.g. between the diesel particle filter and the main silencer, are optimised with regards to temperature characteristics. Modifications could lead to higher or extreme temperatures in the exhaust system and surrounding components (propeller shafts, fuel tank, floor panel, etc.).

The following exhaust system versions are available from the factory as special equipment:

Code	Description
K 60	Exhaust, straight to the rear
K 63	Exhaust, to the side behind the rear axle
KA 3	Exhaust, to the side in front of the rear axle

Additional information on special equipment can be obtained from your Mercedes-Benz Service Centre, the relevant department (▷ page 17) or under 3.10 "Special equipment" (▷ page 43).

7.3.3 Engine cooling system

It is not permissible to modify the cooling system (radiator, radiator grille, air ducts, coolant circuit, etc.) because a sufficient flow of cooling air must be guaranteed.

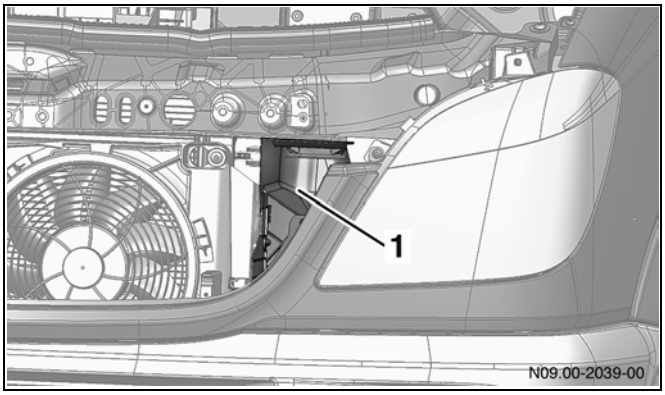
The complete cross-section of the cooling air intake surfaces must remain unobstructed. This means:

- at least 11 dm² for the front grille (radiator and condenser)
- at least 7 dm² for the opening in the bumper (charge-air cooler flow)

Do not affix warning signs, labels or decorative objects in the area in front of the radiator.

Provision for additional cooling equipment for assemblies shall be made for when the vehicle is stationary and if a high continuous output is demanded.

7.3.4 Engine air intake



Engine air intake opening

1 Area of engine air intake

On no account should modifications be made in the area of engine air intake (see illustration).

The air filter is secured by two rubber mounted brackets in the front module.

The design of the attachment of the air filter must be retained in the event of any modification to the front module.

Warm air

The intake of warm air will lead to a loss of engine power.

A bulkhead between the intake point and the engine compartment is therefore essential.

The intake temperature should not exceed the outside temperature by more than 10 °C.

Water

Water running down the body, spray water or water from washing the vehicle must not flow directly past the intake points.

Make sure that water cannot reach the intake points through any fresh-air inlets.

The flow rate at the intake points must not be increased by modifications to the opening of the intake points.

Dust / dirt

Increased dust intake will lead to shorter maintenance intervals for the air filter.

7.3.5 Clearance for assemblies

Adequate clearances must be maintained in order to ensure the function and operating safety of assemblies (particularly of electrical lines, brake lines and fuel lines).

The dimensional data in the tender drawings must be observed (▷ page 20).

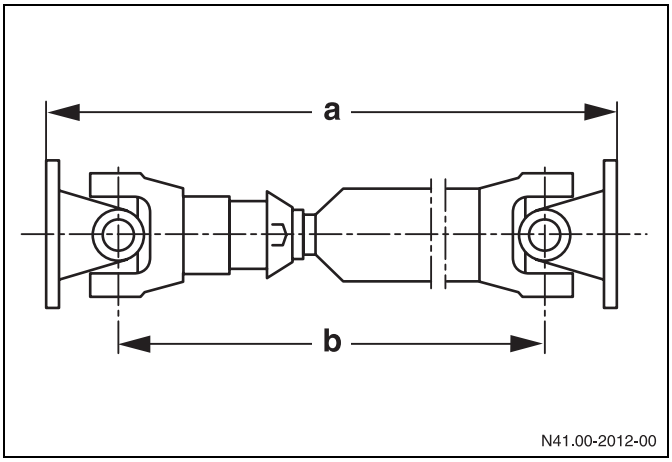
The distance between the cab and the body must be at least 50 mm (▷ page 52).

7.3.6 Propeller shafts

The correct design of the propeller shaft train prevents noise and the development of vibrations. We recommend the use of genuine Mercedes-Benz parts.

If the vehicle wheelbase is modified, the length of the propeller shafts must be adapted to the vehicle. The modifications must be carried out by a company qualified in propeller shaft engineering.

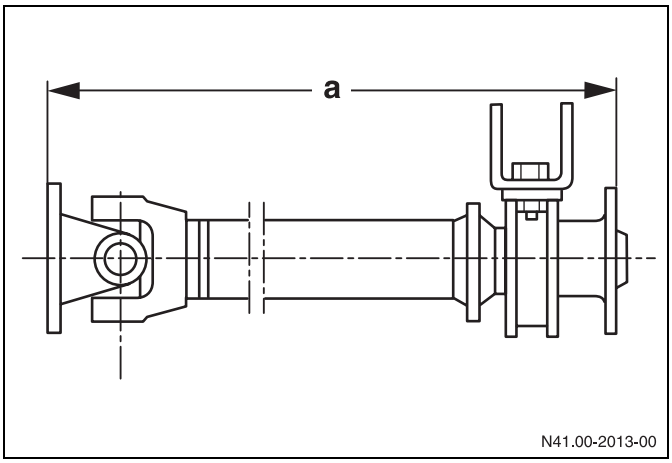
The propeller shaft intermediate bearings must be equally as rigid. They must also be designed in such a way that no vibrations are transmitted to the vehicle structure.



Propeller shaft

a Operating length

b Permissible shaft length



Intermediate shaft

a Operating length

If modifications are made to the wheelbase, the propeller shaft location and length must be the same as a comparable standard vehicle (same model and identical or similar wheelbase).

The diameter and wall thickness of the propeller shaft tube must be the same as for a standard propeller shaft.

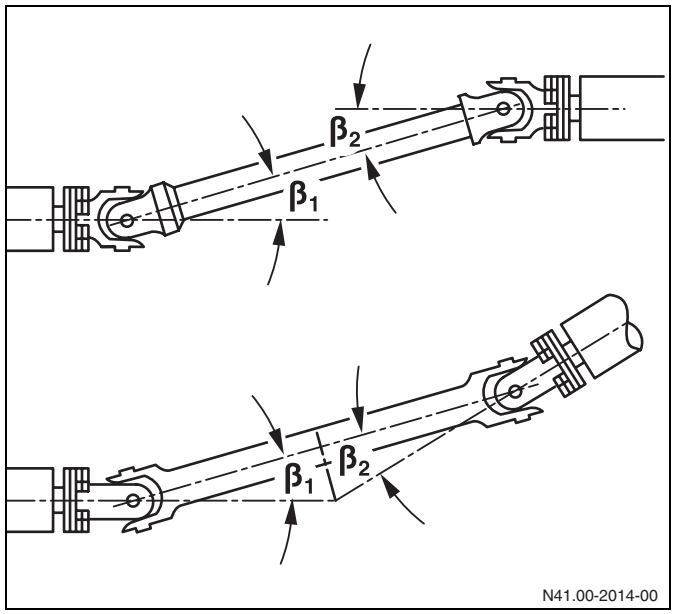
The check straps fitted to the substructure are for passive safety and protect the fuel tank in the event of an impact. It is not permissible to modify the check straps.

Angular offset

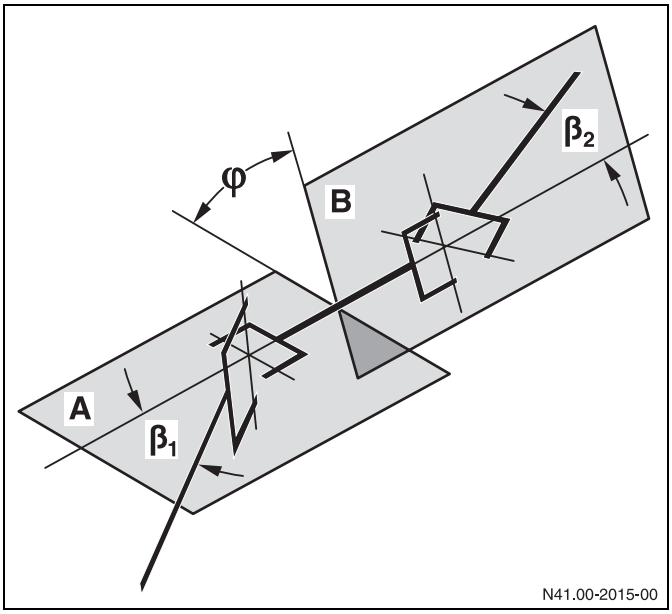
If necessary, fit several propeller shafts with intermediate bearings.

The angular offsets must be identical on both universal joints (ß1 = ß2). The angular offsets must not be greater than 6° or less than 1°.

Angular offsets greater than 6° and flange angle errors (ß1 <> ß2) cause vibrations in the drivetrain. They shorten the service life of assemblies and may cause damage.



Types of angular offset



$ß_1 = ß_2$

Angle in one plane (two-dimensional offset):

W- or Z-type offset

Angles in two planes (three-dimensional offset):

With three-dimensional offset, the input and output shafts intersect in different planes (combined W- and Z-offset).

In order to compensate for any irregularities, the inner joint fork must be offset.

Balance propeller shafts before installing them.

On no account should modifications exceed the threshold values.
Daimler AG may issue a certificate of endorsement at their discretion for possible exceptions (▷ page 18). Drawings must then be submitted containing the planned propeller shaft modifications with precise dimensional data (shaft length and angular offset).

7.3.7 Retarder

The "Preinstallation for retrofitting a retarder" special equipment (Code BR9) is available from the factory. This special equipment comprises:

- the modified cross member structure in the sub-structure
- the wiring down to under the vehicle
- the wiring for the service switch, for an indicator lamp and for the hand switch in the cockpit

The service switch and hand switch are read in by the parameterizable special module (PSM). The PSM forwards the signals to the junction under the vehicle to enable communication with the retarder control unit.

The indicator lamp is controlled directly by the retarder.

The power supply of the retarder is via a connection on the underbody (terminal 30).

The body manufacturer is responsible for the remaining wiring under the vehicle that is still required (from the control unit to the retarder) and for the positioning of components.

For information on electrical connection, see 6.14 "Retarder preinstallation" (▷ page 105).

If vehicles (with wheelbase 3665 mm) are equipped with a retarder, the gearing unit for the hand brake must be relocated for reasons of space. You can obtain more information from the department responsible (▷ page 17).

7.3.8 Engine speed regulation

The engine must run at a specific speed in order to drive power take-off equipment (e.g. pumps, compressors, etc.).

The "constant engine speed" optional extra, Code M53 and MT4 (variable), is available for some engine combinations. Further advice can be obtained from the ordering offices at the factories (▷ page 17).

The speed is freely adjustable across a speed range of from 900 to 3,800 rpm, independently of the load.

The speed can be increased by depressing the accelerator pedal.

Constant engine speed is not suitable for driving a generator if a constant frequency is required, as in the 220-V electricity supply network.

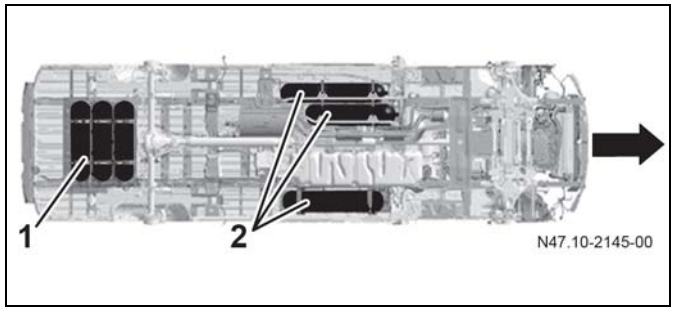
!

Retrofit solutions for regulating the engine speed are only possible with the "parameterizable special module" (PSM) special equipment (apart from those retrofit solutions available as special equipment (Code M53)). This special equipment makes it possible to have the working engine speed regulation controlled externally (▷ page 98). There is otherwise a risk of malfunctions and the engine could enter emergency running mode.

7.3.9 NGT Sprinter natural gas system

The NGT Sprinter (code MZ2) with natural gas engine M271 E18 ML and with an output of 115kW (156hp) is available ex factory as the 316 NGT and 516 NGT.

The vehicle has a bivalent drive system and is equipped with a 100 l petrol tank, code KB0, along with three compressed-gas tanks installed under the vehicle floor. Optionally, three additional compressed-gas tanks under the rear vehicle overhang are available for the 3.5t Sprinter with code KQ3:

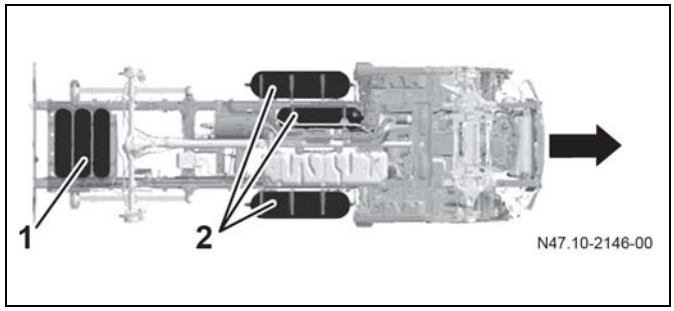


Panel van / passenger van 3.5 t, wheelbase R2 and R3

1 Additional tanks (code KQ3)

2 Standard NGT Sprinter

Arrow Front of vehicle

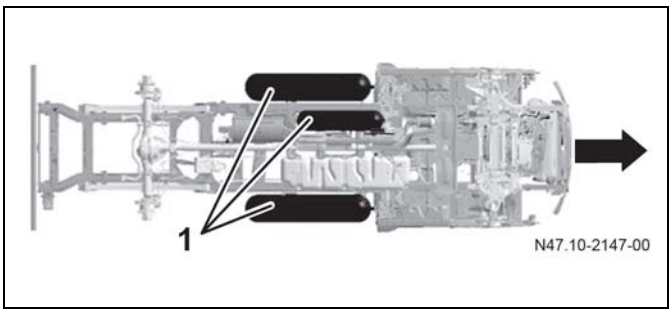


Cab 3.5 t, wheelbase R2 and R3

1 Additional tanks (code KQ3)

2 Standard NGT Sprinter

Arrow Front of vehicle



Cab 5.0 t, wheelbase R2 and R3

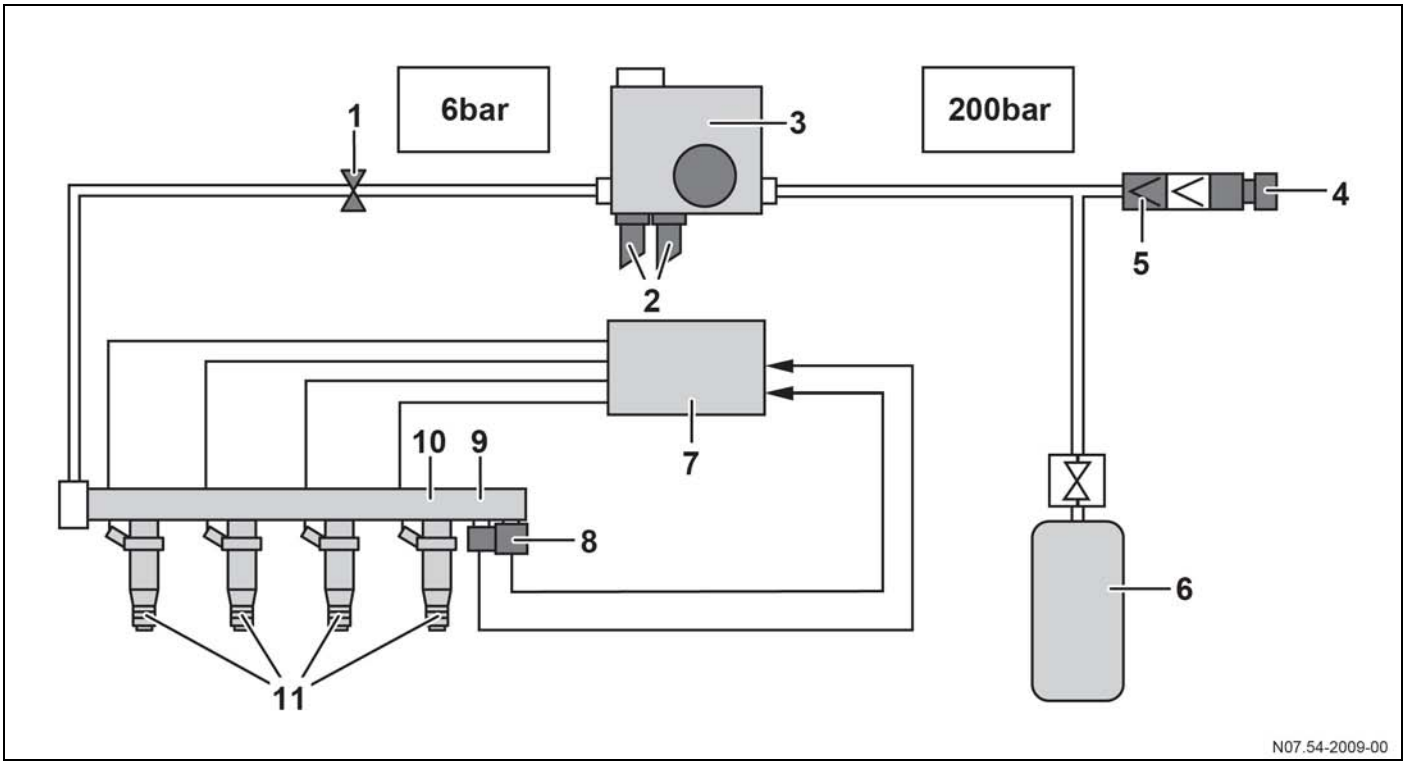
1 Standard NGT Sprinter

Arrow Front of vehicle

Body manufacturers are able to obtain all of the specifications of the NGT system in the form of original 3D data (e.g. for installation space assessments).
You can obtain more information from the department responsible (▷ page 18).

When planning bodies with a natural gas system (NGT Sprinter), note that the natural gas system increases the kerb weight of the basic vehicle.

Vehicle type	Weight of compressed-gas system
Passenger van / panel van (316 NGT and 516 NGT)	approx. 165 kg
Platform vehicle (316 NGT)	approx. 268 kg
Platform vehicle (516 NGT)	approx. 296 kg



Function schematic of gas system

1 Electromagnetic shutoff valve (low pressure)
2 Coolant connection
3 Pressure regulator unit
4 Filler connection
5 Check valve
6 Gas cylinder
7 Control unit (CNG)
8 Pressure sensor (low pressure)
9 Temperature sensor
10 Gas distributor
11 Gas injection valves

Safety regulations for natural gas system

⚠ General information on hazards

The following points must always be observed whenever work is performed on gaseous fuel vehicles:

- Tampering with the compressed-gas system and compressed-gas tanks can cause natural gas to escape. This can result in an explosion, injuries or frostbite.
- All components of the gas system are safety-relevant. The components of the gas system fulfil ECE R110.
- The supplementary instructions for the Sprinter NGT must be observed (especially the safety regulations).
- Work on the gas system may only be performed by trained staff. They must have completed a gas system inspection course (GAP).
- Do not perform any modifications or adjustments to the compressed-gas system and compressed-gas tanks which are not described in these instructions.
- Always have maintenance and repair work on the compressed-gas system carried out at a qualified specialist workshop which has the necessary expertise and tools to carry out the work required. Mercedes-Benz recommends that you use a Mercedes-Benz Service Centre for this purpose.
- After performing work on the high-pressure and low-pressure sections of the compressed-gas system, the gas system must be checked for leaks and proper operation. Comply with the respective national and international legal requirements in force. In Germany, the gas system inspection (GAP) regulations apply as per §41a of the German vehicle licensing regulations (StVZO). For countries without national regulations, we recommend testing the gas system as per the German gas system inspection (GAP) procedures.

⚠ Risk of fire and explosion

- Natural gas is highly flammable and forms an explosive mixture with air. Fire, open flames, the formation of sparks and smoking are therefore forbidden when handling natural gas.
- When refuelling, observe the safety information and regulations of the natural gas filling station.
- Switch off the auxiliary heater when refuelling so that natural gas cannot ignite on the exhaust system of the auxiliary heater.
- Avoid fire, open flames, formation of sparks and smoking, particularly in the vicinity of the vehicle and in the following areas:
  - Engine compartment
  - Compressed-gas tank
  - Natural gas filling station
  - Vehicle parking areas
  - Workshop
- A scent is added to natural gas to allow escaping natural gas to be detected. If you notice an unpleasant odour, the compressed-gas tanks or feed lines may be leaky. In this case, ensure there is adequate ventilation and avoid fire, open flames, the formation of sparks and smoking.
- Do not drive into enclosed spaces if natural gas is escaping and do not park the vehicle in enclosed spaces. Have the cause eliminated without delay at a qualified specialist workshop possessing the required expertise and tools in order to perform the necessary work. Mercedes-Benz recommends that you use a Mercedes-Benz Service Centre for this purpose.

⚠ Risk of accident and injury

- The compressed-gas system is under high pressure. The pressure is maintained in the line system of the compressed-gas system even with the engine off.
- In high concentrations, natural gas has an anaesthetising or suffocating effect due to its displacement of oxygen. Ensure that there is adequate ventilation in enclosed spaces.
- Immediately remove clothing which has been exposed to gas and air it out. Otherwise you could cause an accident, seriously or even fatally injuring yourself or others.

Contact persons for natural gas system components

The components of the natural gas system such as fasteners, lines etc. are manufactured by Swagelok. If you have any questions about these components, please contact:

Postal address:	B.E.S.T. Fluidsysteme GmbH Mr. Alexander Grund Heinrich-Hertz-Strasse 5a D-76694 Forst
Telephone:	+49 (0) 72 51 97 22-25
E-mail:	alexander.grund@best-ka.de
Homepage:	http://www.swagelok.com

Working on the gas system

⚠ Risk of accident and explosion

- Work on the gas system may only be performed by trained staff. They must have completed a gas system inspection course (GAP).

1. Before working on the gas system, manually close compressed-gas tanks.
2. Before working on the gas system, empty gas lines.
3. Remove and reinstall components.
4. Perform leak test (GAP inspection).
5. Document the installation as per GAP

Working on the gas system in enclosed workshop spaces

There are no special measures to observe when performing general servicing and maintenance work (on non-gas carrying parts).

Special gas working areas must be available for working on the gas system. There must be adequate ventilation in the ceiling area of the special gas working area. This can be achieved by:

- Window (or roof hatch) with fan directly above the gas working area at the highest point of the ceiling. It must be possible to open the window (or roof hatch) from the gas working area.
- Technical ventilation with an air exchange rate of $\geq$ 3 / h.

The respective country-specific legal requirements must be observed.

Attachments, bodies, equipment and modifications in the area of the gas system

The following minimum distances to additionally installed parts must be maintained in the area of the gas system:

Component	Minimum distance to gas system
Heat-conducting components without heat shield	100 mm
Heat-conducting components with heat shield	50 mm
Other parts	50 mm

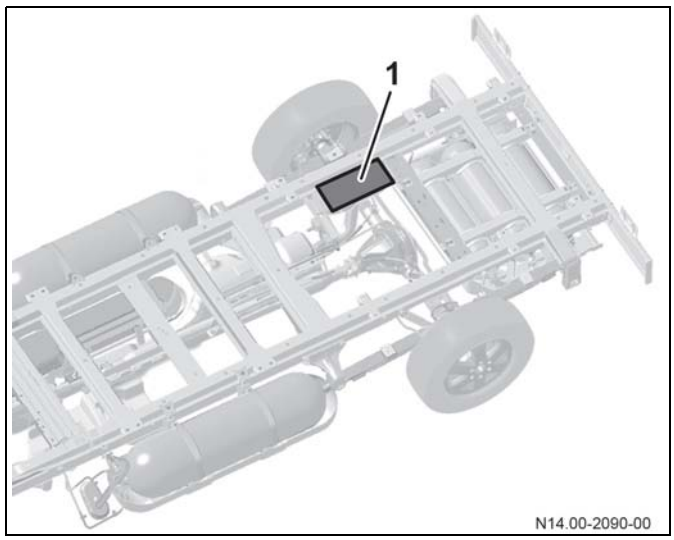
Attaching other components (e.g. electrical lines) to components of the gas system such as gas lines, tanks etc. is not allowed.

Welding / painting work

- When performing repair work / welding in the area of gas-relevant components, these components must be removed or protected against sparking with a fire-resistant covering. Gas cylinders which are damaged by sparking during welding must be replaced.
- The temperature of the spray booth may only briefly exceed 60 °C.
- The drying temperature may be max. 60 °C for a drying period of 30 min.

Heat shields in area of rear axle

In order to protect bodies against heat (box bodies, motor caravans etc.) the body manufacturer must fit a suitable heat shield to the chassis on the exhaust system in the area of the rear axle. We recommend an aluminium shield with a light surface for this purpose.



Installation situation of rear axle heat shield

1	Heat shield
Arrow	Front of vehicle

Relocating compressed-gas tanks

The compressed-gas tanks fitted ex factory may only be relocated after consultation with the relevant department (▷ page 18).

The following requirements must be met:

- A certificate of endorsement is required from the department responsible at Daimler AG (▷ page 18).
- The specifications of ECE R110 must be complied with.
- The gas tanks must be attached to the vehicle frame in the same way as on the series production vehicle.
- Gas lines must be made of stainless steel 1.4571. The specifications of Swagelok must be observed (▷ page 154).
- The fittings of Swagelok are approved as fasteners. Comply with the part manufacturer's installation instructions (▷ page 154).
- After performing any work on the high-pressure and low-pressure sections of the compressed-gas system, the gas system must be checked for leaks and proper operation. Comply with the national and international legal requirements in force. In Germany, the gas system inspection (GAP) regulations apply as per §41a of the German vehicle licensing regulations (StVZO). For countries without national regulations, we recommend testing the gas system as per the German gas system inspection (GAP) procedures.
- Work on the gas system may only be performed by trained staff. They must have completed a gas system inspection course (GAP).

⚠ Risk of injury

The use of non-approved components is not permissible. This could result in natural gas escaping. This may result in injuries and frostbite.

Additional compressed-gas tanks

Depending on the vehicle equipment and vehicle configuration, the NGT Sprinter is equipped with up to 6 compressed-gas tanks. Additional compressed-gas tanks may only be installed after consultation with the relevant department (▷ page 18).

The following requirements must be met:

- A certificate of endorsement is required from the department responsible at Daimler AG (▷ page 18).
- The specifications of ECE R110 must be complied with.
- The gas tanks must be attached to the vehicle frame in the same way as on the series production vehicle.
- Gas lines must be made of stainless steel 1.4571. The specifications of Swagelok must be observed (▷ page 154).
- The fittings of Swagelok are approved as fasteners. Comply with the part manufacturer's installation instructions (▷ page 154).
- After performing any work on the high-pressure and low-pressure sections of the compressed-gas system, the gas system must be checked for leaks and proper operation. Comply with the national and international legal requirements in force. In Germany, the gas system inspection (GAP) regulations apply as per §41a of the German vehicle licensing regulations (StVZO). For countries without national regulations, we recommend testing the gas system as per the German gas system inspection (GAP) procedures.
- Work on the gas system may only be performed by trained staff. They must have completed a gas system inspection course (GAP).

⚠ Risk of injury

The use of non-approved components is not permissible. This could result in natural gas escaping. This may result in injuries and frostbite.

Removing gas from the low-pressure section

⚠

Removing gas from the low-pressure section of the natural gas system is not permissible. This could impair the proper operation of the natural gas system and the engine.

Removing gas from the high-pressure section

⚠

Removing gas from the high-pressure section of the natural gas system is not permissible. This could impair the proper operation of the natural gas system.

7.4 Interior

7.4.1 General information

The driver's and front passenger's airbag units, the windowbags and thorax bags and the belt tensioners are pyrotechnic components.

Handling, transportation and storage are subject to legislation concerning potentially explosive substances (for example, the "Gesetz über explosionsgefährliche Stoffe" in Germany) and must therefore be reported to the relevant trades inspectorate.

The purchase, transportation, storage, fitting, removal and disposal of potentially explosive substances may only be carried out by trained personnel and in accordance with the relevant safety regulations.

Modifications in the area of the dashboard and above the vehicle body waistline must satisfy the criteria of the head impact tests specified in ECE R4 or FMVSS 201.

This applies in particular to the deployment areas of the airbags (wooden trim, additional fittings, mobile phone holders, bottle holders, etc.). See the illustrations of the airbag deployment areas for more information (▷ page 163).

Paint or surface treatment is not permissible on the instrument panel, steering wheel impact absorber or airbag tear seams.

⚠ Risk of injury

Paint or surface treatment is not permissible on the instrument panel, steering wheel impact absorber or airbag tear seams. Otherwise, chemical reactions may occur on the treated surfaces. This could weaken or damage the materials meaning that the restraint systems no longer operate properly.

The permissible centre of gravity and maximum permissible axle loads must not be exceeded.

Information on converting motor caravans can be found under 8.14 "Motor caravans" (▷ page 236).

For the conversion of vehicles in Germany, appropriate information sheets can be requested from the relevant technical inspection authorities for motor vehicles (e.g. TÜV, DEKRA).

The interior must be designed with soft edges and surfaces.

Fittings must be made of flame-resistant materials and be fitted securely.

Unimpeded access to the seats must be ensured. There must not be any protruding parts, edges or corners which could cause injury in the area of the seats.

!

Attachments with rigid connections to the front, side and rear of the vehicle at the height of possible accident zones could modify the characteristics of the vehicle's passive safety.

⚠ Risk of injury

On no account may any modifications be made to the airbag system or the belt tensioner system.

Modifications to or work incorrectly carried out on a restraint system (seat belt and seat belt anchorages, belt tensioner or airbag) or its wiring, can cause the restraint systems to stop functioning correctly, e.g. the airbags or belt tensioners could be triggered inadvertently or could fail in accidents.

Risk of injury

If modifications are made to the vehicle structure by the body manufacturer, such as:

- modifications to the seats and thus changes in the kinematics of the occupants in the event of an impact
- modifications to the frame front end
- installation of parts in the vicinity of airbag inflation points or in airbag deployment areas
- installation of non-MB seats
- modifications to the A-pillar and B-pillar, the roof frame and its lining
- modifications to the doors

reliable operation of the front airbag, windowbag and thorax bag and belt tensioners is no longer guaranteed. This could otherwise result in personal injury.

7.4.2 Safety equipment

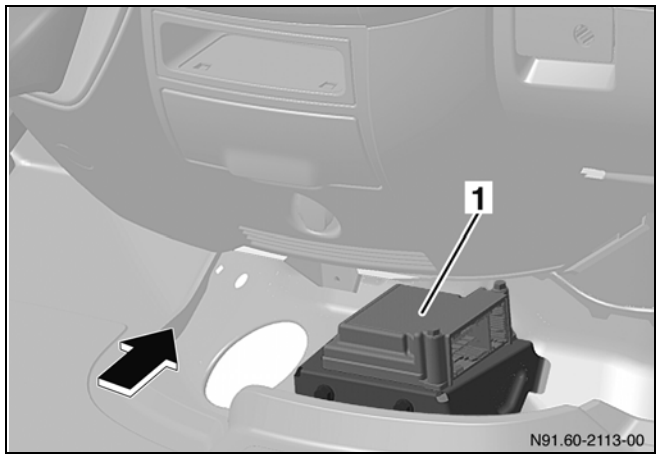
Airbag control unit and sensors

It is not permitted to modify the installation location, installation position and attachment of occupant-safety airbag control units and satellite sensors by comparison with the standard vehicle on vehicles equipped with windowbags and thorax bags. Other vehicle components must not be secured to the airbag control unit, the satellite sensors or the securing points.

Danger

Vehicle parts that create vibrations must not be secured in the proximity of the airbag control unit or sensor installation locations, nor may modifications be made to the floor structure in the proximity of the airbag control unit or the satellite sensors. Reliable operation of the front airbag, windowbag and thorax bag and belt tensioners is otherwise no longer guaranteed and there is consequently a risk of injury.

The airbag control unit is located on the transmission tunnel under the centre console.

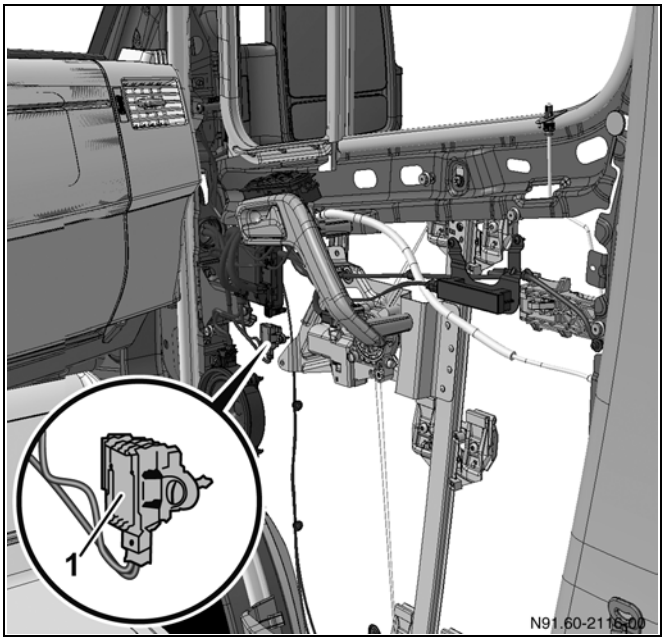


Location of airbag control unit

1 Airbag control unit

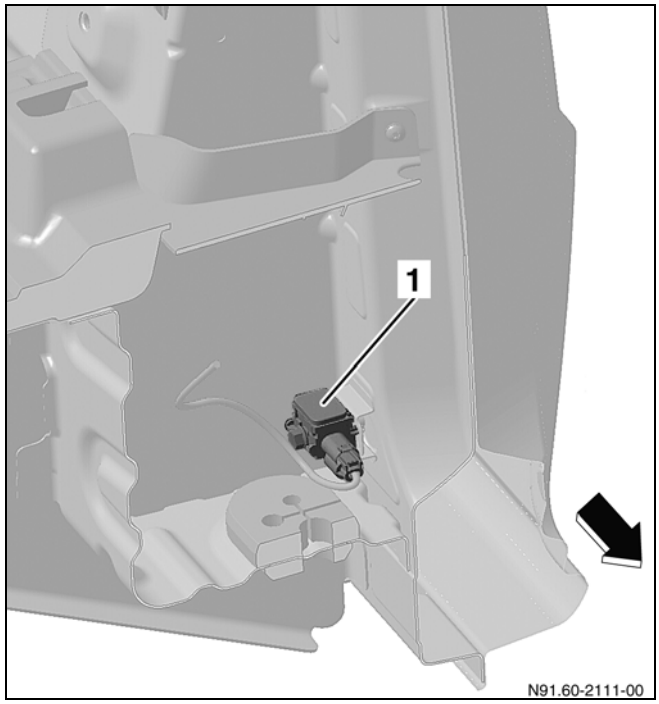
Arrow Front of vehicle

The satellite sensors are located towards the bottom of the B-pillar behind the entrance trim in the driver's and front passenger's doorway compartment. The additional pressure sensors for vehicles equipped with windowbags and / or thorax bags are fitted inside the doors.



Front pressure sensor

1 Pressure sensor
(trigger sensor of the occupant protection systems)



Sectional view of left-hand doorway area, B-pillar

1 Satellite sensor
(triggering sensor of the occupant protection systems)

Arrow Front of vehicle

Seat belts and belt tensioners

Risk of injury

Parts relevant to safety such as seat belts or belt anchorages and tensioners must not be damaged or soiled when work is carried out on the vehicle. Otherwise, these restraint systems may no longer function properly and may not provide adequate protection in the event of an accident.

Only the original seat belts may be fitted, otherwise the general operating permit of the vehicle would be invalidated.

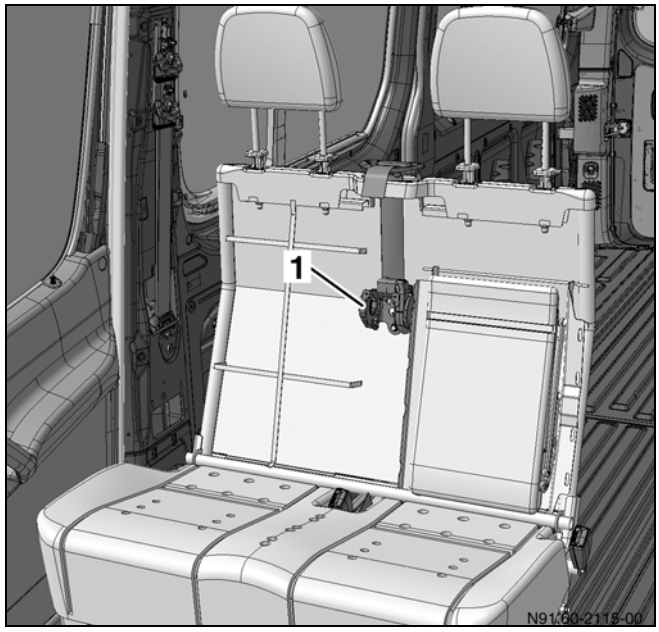
Vehicles designed to travel at a maximum speed of over 25 km / h must be equipped with seat belts (see minimum seat belt requirements, EC Directive 77 / 541 / EEC).

Seat belt anchorages must be tested in accordance with EC Directive 76 / 115 / EEC.

All vehicles are equipped with pyrotechnic belt tensioners in the retractors at the front seats. The retractors are located in the B-pillars. There is an additional retractor in the backrest of the bench seat on vehicles with two-seater front passenger's bench seat.

Retractor with pyrotechnic belt tensioner

1 Connector

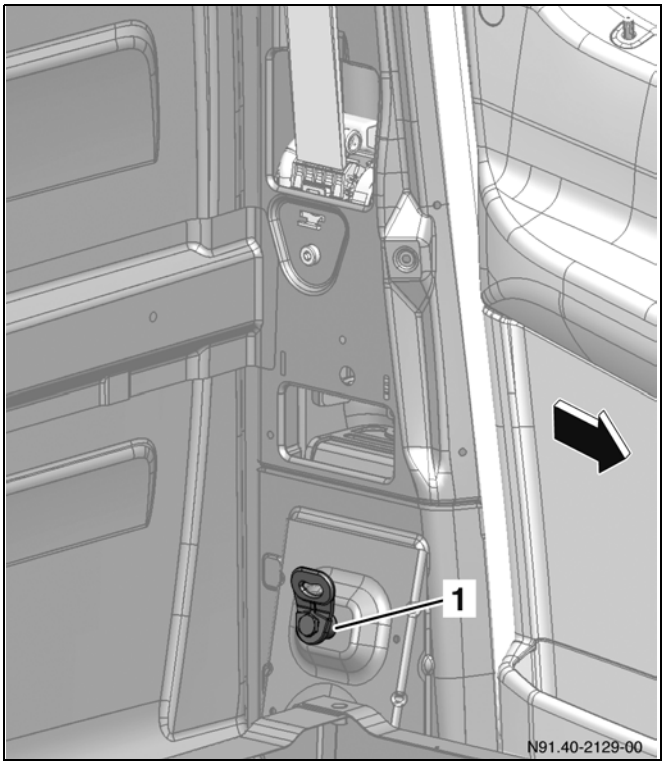


Front passenger's bench seat with retractors

1 Retractor

The legal requirements detailed in this section relate to current legislation in Germany. The relevant national legislation must be observed in all other countries.

There is also a securing point for a seat belt end locking fixture at the bottom of the B-pillar, which has been tested in accordance with 76 / 115 / EEC using a folding seat rigidly connected to the bodyshell.



Securing point for the seat belt end locking fixture in the B-pillar

1 Seat belt end locking fixture

Arrow Front of vehicle

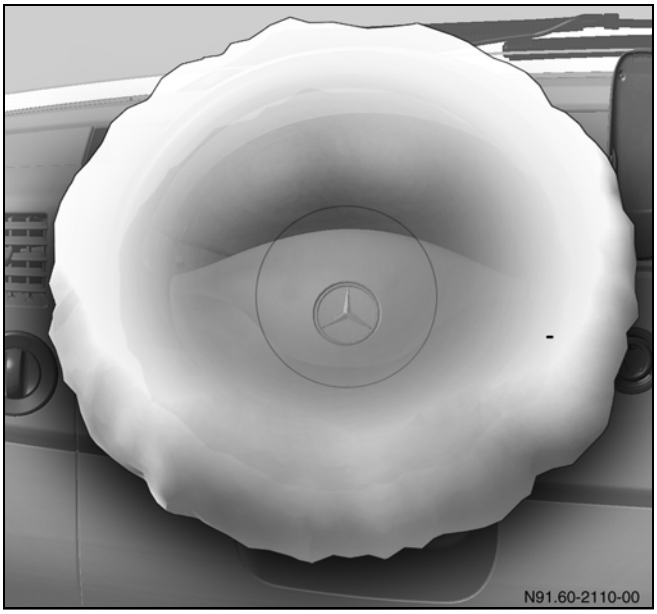
Front airbag

All airbag units are labelled "Airbag":

- The driver's airbag unit is identified by the "Airbag" inscription on the steering wheel boss.
- If the vehicle is equipped with a front passenger's airbag, this unit is also identified by the "Airbag" inscription.
- If the vehicle is equipped with windowbags, they are identified by the "Airbag" inscription on the cover.
- If the vehicle is equipped with thorax bags, these are identified by the "SRS Airbag" inscription on the backrest.

Another identification feature is the red "SRS" indicator lamp in the instrument cluster.

The following illustrations show the location and deployment areas of the driver's and front passenger's airbags as well as that of windowbag and thorax bag. The deployment areas shown are greater than the actual volume of the airbag because space is required for airbag rebound as it deploys.

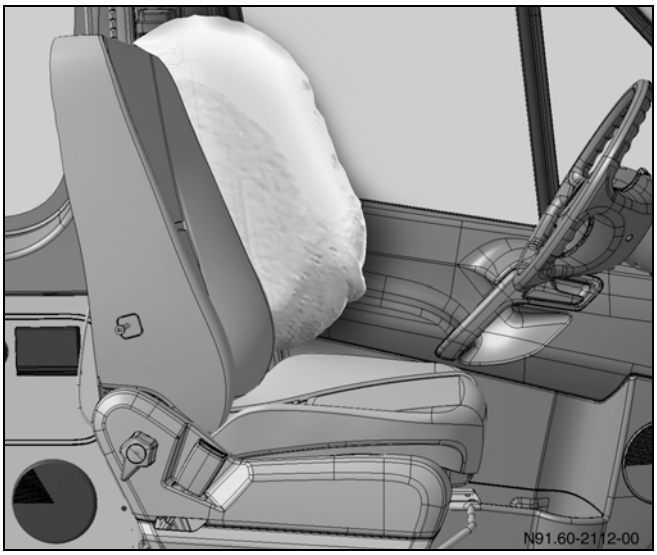


Deployment area of driver's airbag

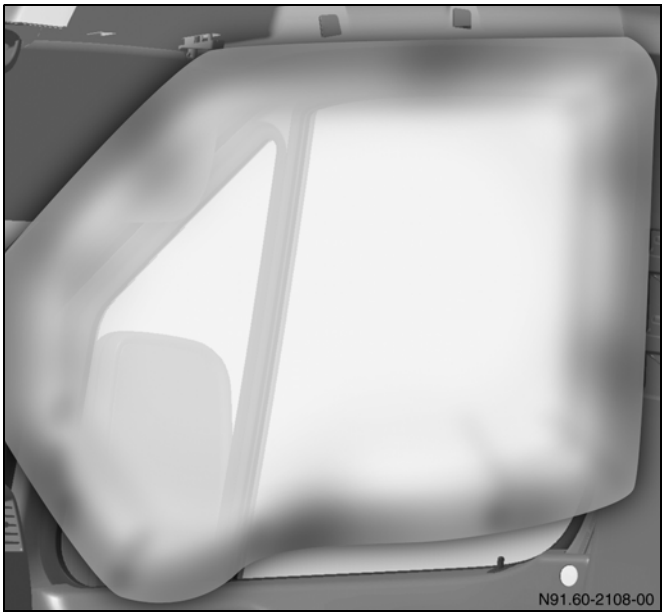
Deployment area of front passenger's airbag

Side-impact airbags

On no account should modifications be made to the B-pillar, door bodies, trim and seat upholstery.



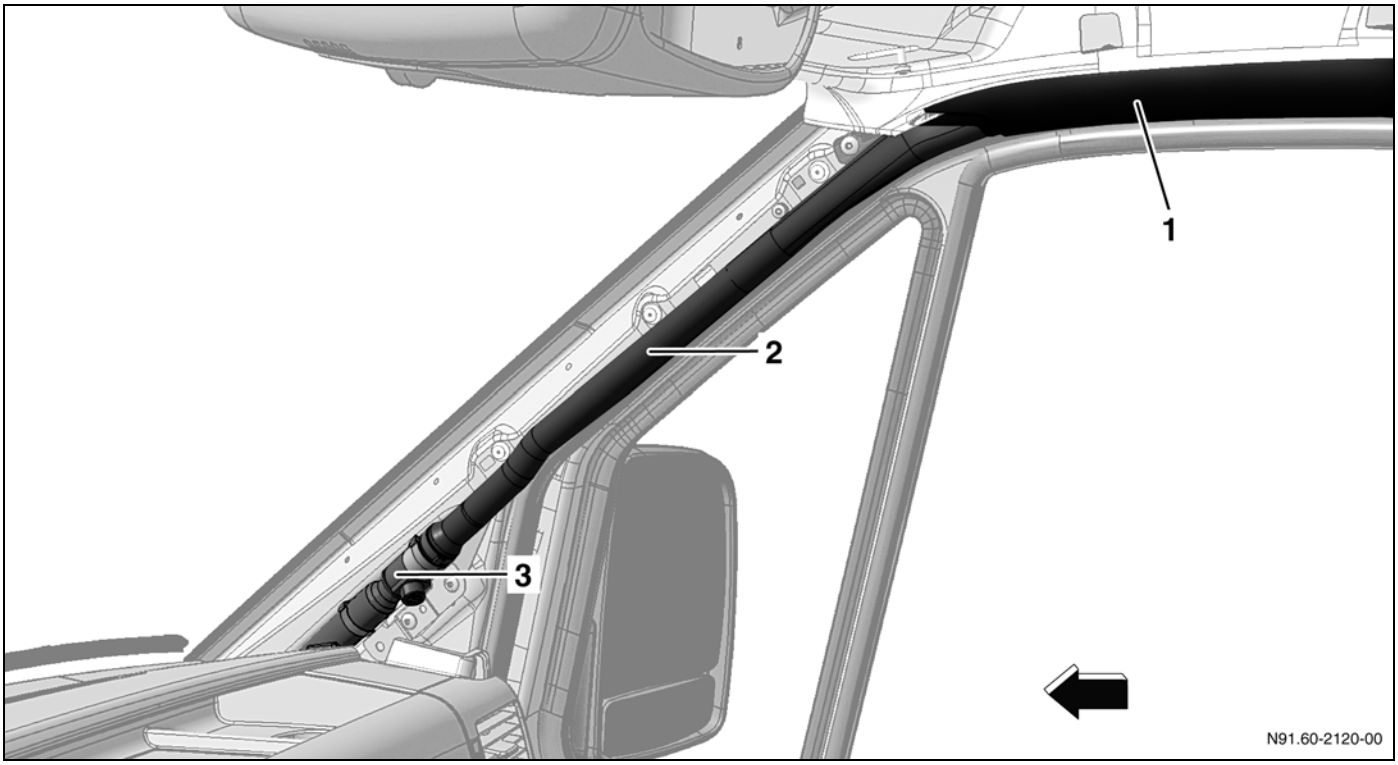
Deployment area of left-hand side thorax bag



Deployment area of right-hand side windowbag

Warning

Working on the A-pillar can cause damage to the windowbag. This can mean that the windowbag no longer operates properly.



Windowbag installation location

1	Cover
2	Windowbag in protective sleeve
3	Gas generator in windowbag
Arrow	Front of vehicle

Working with airbag and belt tensioner units

Risk of injury

Removed airbag units must always be stored in such a way that the upholstered side faces upwards. If the upholstered side faces downwards, the airbag unit will be catapulted through the air if it is triggered accidentally.

The airbag units fitted to the Sprinter model series 906 include the driver's and front passenger's airbags as well as the windowbag and thorax bag.

- Work involving removed airbag and belt tensioner units, and testing and installation work, may only be carried out by skilled personnel.
- The airbag and belt tensioner units and the airbag control unit must be fitted without delay and immediately on removal from storage. The vehicle battery must have been disconnected, the negative pole or negative terminal covered and the test coupling / connection disconnected.
- If work is interrupted, the airbag and belt tensioner units must be locked away again.
- The airbag and belt tensioner units may not be treated with grease, cleaning agents or other similar products.
- The airbag and belt tensioner units may not be exposed to temperatures above 100 °C, even for a short period of time.

Airbag and belt tensioner units, and the sensors and control unit, must be replaced if they are dropped from a height of more than 0.5 m. Airbag and belt tensioner units may only be subjected to electrical tests using the specified testers when the airbag and tensioner units have been fitted. For safety reasons, the test should only be performed at a Mercedes-Benz Service Centre or at a specialist workshop that has been specially trained to service these safety systems.

The vehicle battery must be disconnected, the negative terminal covered and the test coupling / connection disconnected before the airbag and belt tensioner unit are removed.

Transporting and storing airbag units and belt tensioner units

Internal transport should always be carried out using the spare parts packaging and utilising the vehicle luggage compartment or load compartment.

Transporting airbag units in the passenger compartment in any way is prohibited.

The airbag units fitted to the Sprinter – model series 906 include the driver's and front passenger's airbags as well as the windowbag and thorax bag.

Airbag and belt tensioner units must be stored in accordance with the second ordinance of the German Explosives Law (Zweite Verordnung zum Sprengstoffgesetz) dated 17.04.86.

This ordinance allows small amounts of substances and materials to be stored in secure areas as specified in the Explosives Law without requiring special storage permission.

Class T1 pyrotechnic materials may only be stored in limited quantities on premises used for commercial purposes.

Annex 6 of the Appendix to the 2nd ordinance of the German Explosives Law specifies that the following maximum storage quantities are permissible without obtaining special approval from the relevant authority, where materials are stored on premises used for commercial purposes and certain conditions are fulfilled (e.g. steel cabinet).

- General storage space: 20 kg gross
- The gross mass of the component which has been approved in accordance with the act concerning explosives is used to calculate the actual stored mass.

The weights of the individual components are:

Driver's airbag	1.5 kg
Front passenger's airbag	3.3 kg
Windowbag	2.1 kg
Thorax bag	0.7 kg
Seat belt	1.3 kg

Disposing of airbag and belt tensioner units

The airbag units fitted to the Sprinter model series 906 include the driver's and front passenger's airbags as well as the windowbag and thorax bag.

In Germany, airbag and belt tensioner units must be electrically detonated as specified in accident prevention regulations to render them unusable prior to disposal.

- If belt tensioners that have not been triggered require detonation for disposal purposes, place them in the footwell of a vehicle which has been sent for scrapping, and connect them directly using a 2-pin plug.
- If the upholstery pads on the airbag units have not been destroyed, the airbag units must be detonated using the 2-pin plug.

These safety measures are necessary because pyrotechnic materials could cause injury if activated incorrectly.

⚠ Risk of injury

Airbag and belt tensioner units must be disposed of by personnel who have undergone special training for this task. Accident prevention regulations must be observed.

Hazards arise from disposal using cutting torches, by smelting, or if primed parts are disposed of on open fires or smouldering fires on waste disposal sites.

In order to avoid any additional workload arising from these safety precautions, we recommend that you entrust the disposal of pyrotechnic components to an external waste disposal company who will implement all the necessary safety precautions (including 10 m safe distance, special detonator).

When the materials are handed over, the waste disposal company must sign a declaration containing the obligation to dispose of the pyrotechnic materials in accordance with accident prevention regulations. Agreements of this kind must ensure that it is not possible to extract pyrotechnic materials after disposal and to pass them on for repairs.

7.4.3 Standard seats

Daimler AG will issue a certificate of endorsement at its discretion for modifications to the seat attachments (including seat bases) and seat belt anchorages or for the installation of seats other than those available from the factory (▷ page 18).

Proof of the strength of the seats delivered from the factory is only valid if the seats are secured in original mountings (seat subframe, detents, seat base, etc.).

When seat belts and seats (including seat bases) are reinstalled, the specified bolts must be tightened to the specified torque.

Retrofitting standard seats (e.g. front passenger seat) to the body shell is not possible because no reinforcements or suitable attachment points are present.

ⓘ

Information on retrofitting seats can be found under 8.3.1 "Retrofitting additional seats" (▷ page 208).

Risk of accident

On no account may seats be mounted on the wheel arches. This also applies for lowered wheel arches. Otherwise, the vehicle could be damaged (e.g. wheel arches and tyres), resulting in accidents.

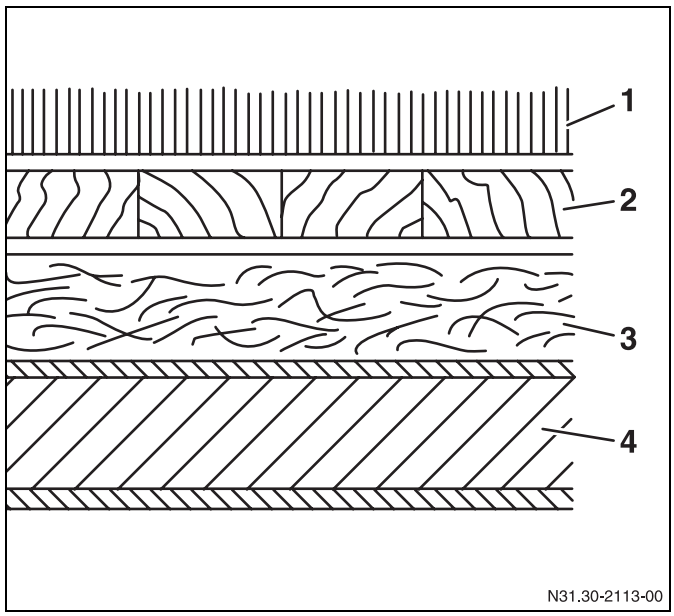
7.4.4 Reducing noise in the vehicle interior

To reduce the noise level in the vehicle interior, flame-retardant noise-insulating materials may be installed.

Floor area

A structure as shown in the illustration is advisable for insulation and soundproofing. An additional covering with heavy-duty insulating foil may be provided in the area of the wheel arches.

Insulating foils, e.g. bituminous felt, have limited temperature resistance. They should therefore not be installed in the immediate vicinity of the engine or exhaust system.



1 Carpet (bonded underside)
2 Wooden floor (12 mm plywood)
3 Heavy-duty insulating foil (8 to 10 kg / m^2 surface-to-weight ratio)
4 Supporting construction

Roof and side panels

Rock wool, glass wool, fibrous web or soft, open-pore PE- or PU-based foam are effective insulation materials.

The inside must be covered with a sound-transmitting material (perforated card, plastic, fabric cover).

Risk of injury

On no account should any subsequent modifications be made to the roof lining or the roof skin between the A-pillar and the B-pillar if the vehicle is equipped with windowbags. Otherwise, the windowbag may no longer be able to work correctly (e.g. windowbag deployment is delayed or incomplete).

Seals

Openings, gaps and slots between the engine compartment, the underside of the vehicle, the front bulkhead and the vehicle interior must be carefully sealed with anti-corrosion protection or a permanently flexible material following treatment (▷ page 64). Air vents must not be fitted in the immediate vicinity of sources of noise or exhaust fumes.

In addition, manufacturers or suppliers of soundproofing materials should be consulted.

They will be able to provide you with suggestions on how to design optimum noise insulation for your particular body.

7.4.5 Ventilation

The passenger compartment and the driver's seat must have adequate ventilation with provision for air to enter and exit.

The windscreen and side window demisting function must remain operational, especially if the driver's area forms part of the passenger compartment or if the layout and design of the interior does not correspond to that of the standard equipment.

New vehicles can be supplied from the factory with the special equipment "Controlled air conditioning / in addition in rear compartment" under Codes HH9 and HH7 (▷ page 43).

Observe 7.5 "Additional equipment" (▷ page 169) when retrofitting major assemblies.

7.5 Additional equipment

If additional equipment is fitted, factory-fitted power take-offs must be used (▷ page 170).

7.5.1 Retrofitting an air-conditioning system

All electrical equipment fitted must be tested in accordance with EC Directive 72 / 245 / EEC and must bear the "e" mark.

When retrofitting air-conditioning systems, we recommend the "Controlled air-conditioning system" Code HH9 or the "Rear-compartment air-conditioning system" Code HH7 which can be obtained from the factory as special equipment.

The requirements of the equipment manufacturer concerned must be observed if you intend to retrofit any other air-conditioning system. The following points must be observed to ensure compatibility with the basic vehicle:

- On no account should the installation of an air-conditioning system impair vehicle parts or their function.
- The battery must have sufficient capacity and the alternator (▷ page 75) must generate sufficient power.
- Additional fuse protection for the air-conditioning power circuit (▷ page 74).
- Air-conditioning compressors must be attached using the equipment carrier provided (▷ page 176).
- The additional pulley for driving air-conditioning compressors is available from the factory as special equipment under Code N63 (maximum output 8 kW) (▷ page 176).
- Ensure that wires (▷ page 62) and electrical lines (▷ page 74) are routed correctly.
- There should be no impairment of the accessibility or easy maintenance of installed equipment.
- The operating instructions and the maintenance manual for the additional equipment must be supplied on handing over the vehicle.
- There should be no impairment of the required engine air supply and cooling (▷ page 146).
- If compact systems are mounted on the cab roof (evaporator, condenser and blower), the permissible roof loads must not be exceeded (▷ page 141).
- Attachments to the roof require a certificate of endorsement from the department responsible (▷ page 18).

7.5.2 Auxiliary heating

The floor of the vehicle must be airtight if exhaust gases are routed out under the vehicle.

Openings in the vehicle floor provided for control elements must be sealed with rubber sleeves.

The following auxiliary heating systems are available from the factory as special equipment:

Description	Code
Auxiliary warm-air heater	H11
Hot water auxiliary heater	H12
Auxiliary heat exchanger in the load compartment / chassis	H13

Additional information can be found under 3.10 "Special equipment" (▷ page 43).

7.5.3 Liquefied-petroleum gas (LPG) system

National regulations and laws must be observed when retrofitting liquefied-petroleum gas systems.

Comply with the manufacturer's installation instructions.

The body manufacturer is responsible for the proper functioning and maintenance of the systems fitted.

There should be no impairment of the functions of the basic vehicle when additional equipment is retrofitted.

7.5.4 Power take-offs

General

Power take-off versions available from the factory:

- Transmission-driven power take-off (OM 642, OM 646, OM 651)
- Front engine power take-off (OM 642, OM 646, OM 651)

The power take-off version and selection of the gear ratio are dependent on the power and speed of the PTO equipment to be driven.

Transmission-driven power take-offs may only be engaged and disengaged when the vehicle is stationary.

The maximum transferable torques for each of the power take-offs are guide values for shock-free and vibration-free operation.

These figures are based on a highly durable gearing design and a service life calculated in compliance with the German standard DIN 622. The additional mass forces of the driven PTO assemblies are not taken into account.

The ratio chosen should ensure that a minimum engine speed of 1,200 rpm at P = 28 kW or 1,500 rpm at P = 40 kW (in conjunction with transmission oil cooling) can be maintained. The power output should be within the range of the maximum engine torque.

Exposed propeller shafts, fan impellers or pulleys must be covered.

No belts or chain drives may be fitted to the drive shaft or drive flange of a power take-off.

Transmission-driven power take-off

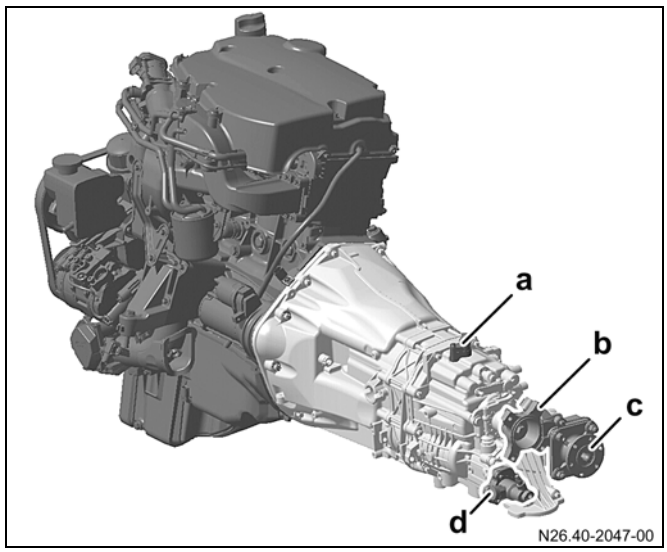


Illustration showing transmission-driven power take-off

a Neutral gate switch

b Transmission shaft flange

c PTO flange

d Selector cylinder for PTO (activated by a switch on the dashboard)

The side-mounted PTO available for Mercedes-Benz manual transmissions is obtainable from the factory as special equipment.

Code N05	without flange
Code N07	with flange

Technical data

The maximum weight moment at the power take-off transmission flange is 15 Nm for the direct flange-mounted PTO with Code N05.

$n_{PTO} = 0.687 \times n_{engine}$ (NSG370)

$n_{PTO} = 0.704 \times n_{engine}$ (NSG400)

$n_{PTO} = 0.756 \times n_{engine}$ (TSG360 / TSG480)

Max. continuous output NSG370	28 kW at 2,780 rpm (engine speed)
Max. continuous output NSG400	28 kW at 2,713 rpm (engine speed)
Max. continuous output TSG360 / TSG480	28 kW at 2,526 rpm (engine speed)
Max. torque	140 Nm at 1,200 rpm (engine speed)

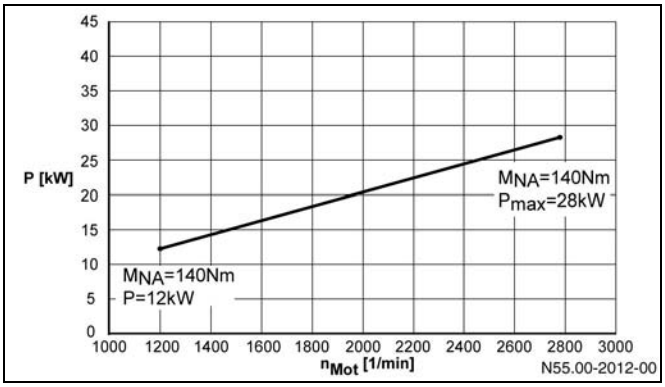
The direction of rotation is clockwise when viewed in the direction of travel.

If transmission oil cooling is retrofitted

Max. continuous output NSG370	40 kW at 2,780 rpm (engine speed)
Max. continuous output NSG400	40 kW at 2,713 rpm (engine speed)
Max. continuous output TSG360 / TSG480	40 kW at 2,526 rpm (engine speed)
Max. torque	200 Nm at 1,500 rpm (engine speed)

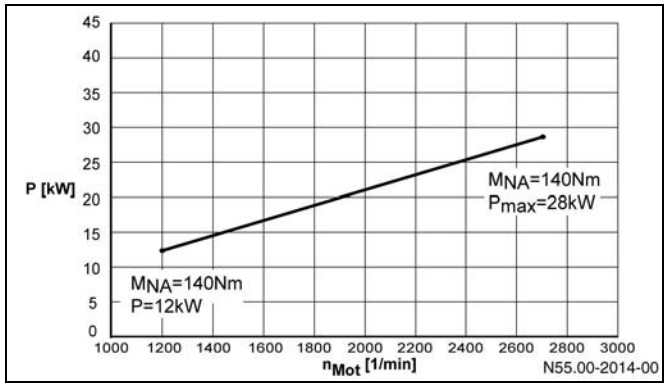
Avoid continuous excessive torque take-off since this can lead to transmission damage.

NSG370 without cooling,
PTO ratio: 0.687



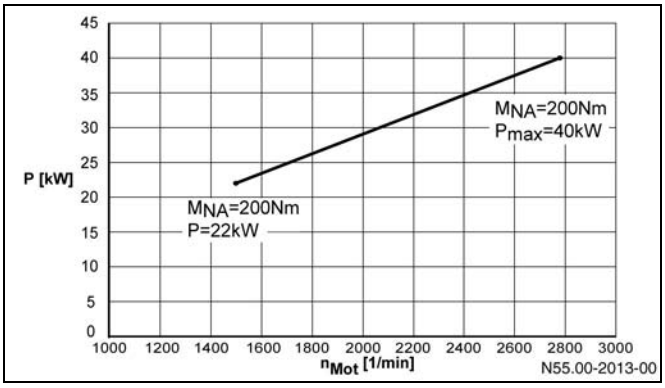
	Min.	Max.
P [kW]	12	28
n_{engine}* [rpm]	1,200	2,780
n_{PTO}* [rpm]	824	1,909

NSG400 without cooling,
PTO ratio: 0.704



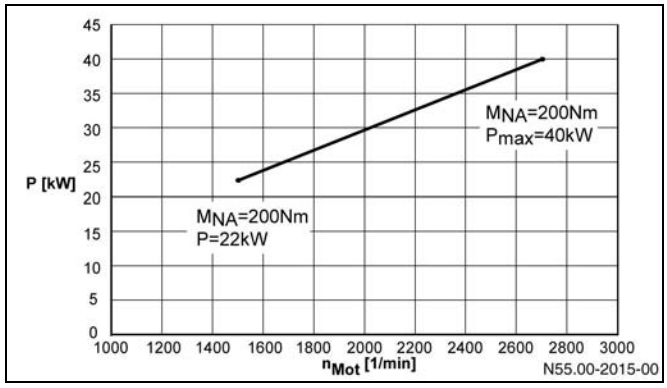
	Min.	Max.
P [kW]	12	28
n_{engine}* [rpm]	1,200	2,713
n_{PTO}* [rpm]	844	1909

NSG370 with cooling,
PTO ratio: 0.687



	Min.	Max.
P [kW]	22	40
n_{engine}* [rpm]	1,500	2,780
n_{PTO}* [rpm]	1,030	1,909

NSG400 with cooling,
PTO ratio: 0.704

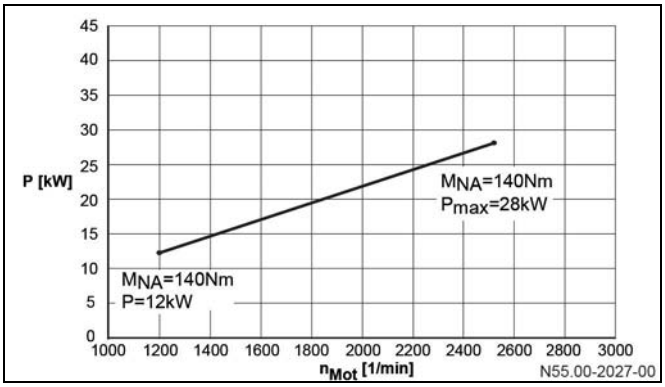


	Min.	Max.
P [kW]	22	40
n_{engine}* [rpm]	1,500	2,713
n_{PTO}* [rpm]	1,056	1,909

* **n_{engine} = engine speed**

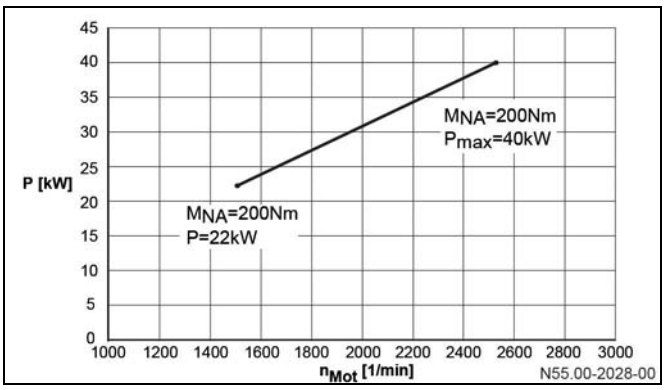
* **n_{PTO} = power take-off speed**

TSG360 / TSG480 without cooling, PTO ratio: 0.756



	Min.	Max.
P [kW]	12	28
n_{engine}* [rpm]	1,200	2,780
n_{PTO}* [rpm]	908	2,526

TSG360 / TSG480 with cooling, PTO ratio: 0.756

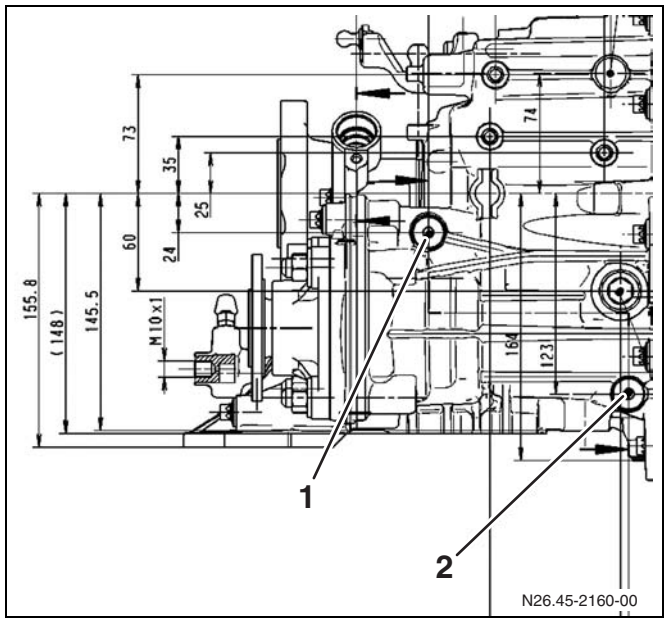


	Min.	Max.
P [kW]	22	40
n_{engine}* [rpm]	1,500	2,526
n_{PTO}* [rpm]	1,134	1,909

* **n_{engine} = engine speed**

* **n_{PTO} = power take-off speed**

All transmissions NSG370 / NSG400 PTO and TSG380 / TSG480 with power take-off (code N05 or N07) are provided with attachment points for connecting up a separate oil cooler.



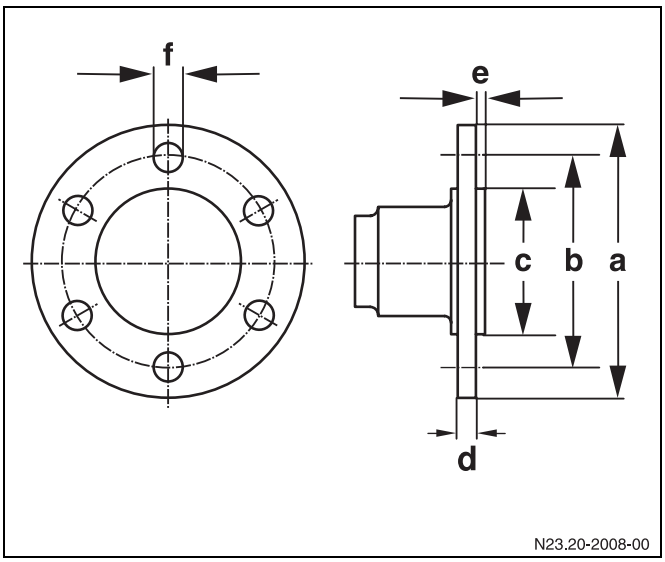
Position of the oil cooler connections

1 Optional oil cooler connection "in" DIN 908-M14x1.5x12

2 Optional oil cooler connection "out" DIN 908-M14x1.5x12

The "Provision for transmission oil cooling" option is available from the factory under Code GK4.
Under this option, a radiator with an integral oil cooler (New Automatic Transmission radiator) is installed. The routing lines between radiator and transmission as well as the oil pump required are not supplied and will need to be provided by the body manufacturer.
When connecting a transmission oil cooling system, the additional volume of oil in the oil cooler and oil pump lines must be taken into account so that the oil circuit remains constant. Top up with an appropriate amount of transmission oil, depending on the routing lines and the type of oil cooling system used.

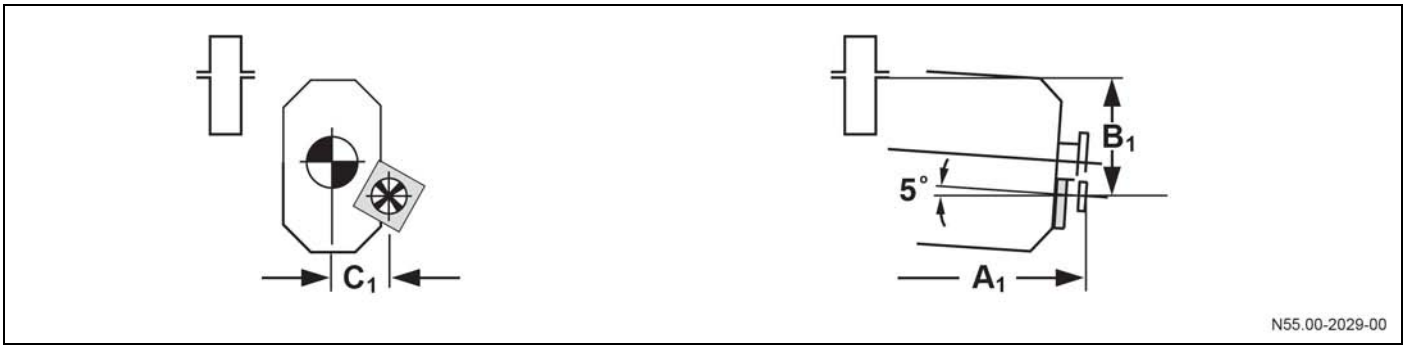
Additional information can be found under 3.10 "Special equipment" (▷ page 43).



Flange

Dimensions – coupling flange – power take-off

Engine:	OM 642 / OM 646 / OM 651
a Ø	90
b Ø	74.5
c Ø	47^{e8}
d	6
e	2.1
f Ø	8^{A12}
Number of holes	6



Power take-off dimensions

I	OM 642		OM 642		OM 646		OM 646		OM 651	
II	NSG400-6 PTO		TSG480 PTO		NSG370-6 PTO		NSG400-6 PTO		TSG360 PTO	
III	N07	N05	N07	N05	N07	N05	N07	N05	N07	N05
IV	0.704		0.756		0.687		0.704		0.756	
V	28 / 2713	28 / 2713	28 / 2526	28 / 2526	28 / 2780	28 / 2780	28 / 2713	28 / 2713	28 / 2526	28 / 2526
	40* / 2713	40* / 2713	40* / 2526	40* / 2526	40* / 2780	40* / 2780	40* / 2713	40* / 2713	40* / 2526	40* / 2526
VI	140 / 200*	140 / 200*	140 / 200*	140 / 200*	140 / 200*	140 / 200*	140 / 200*	140 / 200*	140 / 200*	140 / 200*
VII	b	b	b	b	b	b	b	b	b	b
A1	653	605	660	612	586	537	653	605	610	563
B1	137	134	138	134	133	129	137	134	139	136
C1	126	126	126	126	126	126	126	126	126	126

* with transmission cooler

Key to PTO table:

I Engine

II Transmission

III Power take-off designation (special equipment code)

IV Gear ratio i_{PTO}; drive speed at power take-off $n_{PTO} = i_{PTO} \times N_{Engine}$

V PTO continuous output in kW at engine speed (rpm)

VI Maximum transferable torque at PTO in Nm

VII Rotation direction viewed in direction of travel

a) anti-clockwise

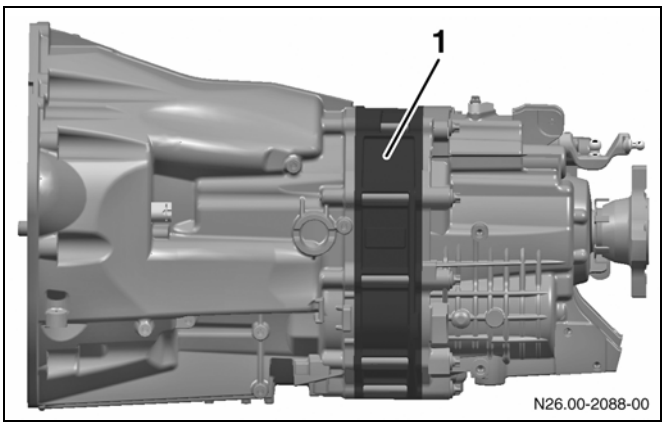
b) clockwise

A1 Distance from rear edge of coupling flange to centre of front axle measured in mm

B1 Dimension from centre of coupling flange to lower edge of longitudinal frame member flange in mm

C1 Distance from centre of coupling flange to centre of transmission flange in mm

The transmission fluid temperature in continuous operation (over 30 minutes) must not exceed 120 °C. On the PTO 2b, the maximum permissible weight moment at the transmission flange due to the intrinsic weight of a hydraulic pump is 15 Nm.



NSG400 transmission with intermediate flange for the OM 646

1 Intermediate flange

An additional intermediate flange is inserted on vehicles with OM 646 and NSG400; this alters the position of the coupling flange.

Front engine power take-off (OM 642 / OM 646 / OM 651)

Additional equipment (e.g. a refrigerant compressor or an extra alternator) can be driven by an additional pulley on the front of the crankshaft, also see 7.5 "Additional equipment" (▷ page 169).

The following codes are available for power take-offs:

Code N62	Additional alternator
Code N63	Refrigerant compressor

These power take-offs can be obtained from the factory as special equipment.

The maximum power output is:

Code N62	8.5 kW
Code N63	8.0 kW

The additional pulley is located in the second belt plane. (belt width 12.7 mm, effective diameter 128.2 mm).

Diameters of the additional equipment pulleys

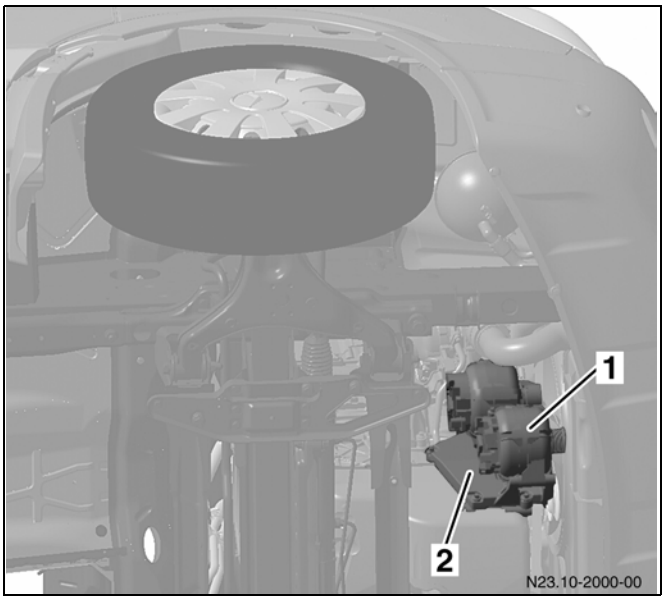
OM 642	
Code N62	Poly-V-belt pulley, 50 mm external diameter, 6 grooves
Code N63	Poly-V-belt pulley, 120 mm external diameter, 6 grooves
OM 646	
Code N62	Poly-V-belt pulley, 50 mm external diameter, 6 grooves
Code N63	V-belt pulley, AV13 section, 133 mm external diameter
OM 651	
Code N62	Poly-V-belt pulley, 50 mm external diameter, 6 grooves
Code N63	Poly-V-belt pulley, 119 mm external diameter, 6 grooves

We recommend using the following genuine Mercedes-Benz belts

OM 642	
Code N62	A001 993 47 96
Code N63	A001 993 37 96
OM 646	
Code N62	Elastobelt 6PK*
Code N63	V-belt AV13*
OM 651	
Code N62	A001 993 95 96 Stretchfit
Code N63	A002 993 28 96 Stretchfit

* The length of the belt must be defined by the body manufacturer according to the position of the equipment and the diameter of the pulley.

Additional equipment can be mounted on an equipment carrier fixed to the engine.



Additional equipment on engine-resident equipment carriers

1 Additional equipment

2 Equipment carrier

Maximum weight of additional equipment

OM 642, OM 646, OM 651	
Code N62	7.3 kg
Code N63	6.5 kg

Installing propeller shafts

If a propeller shaft is installed, the following must be observed:

- Installation guidelines of the propeller shaft manufacturer
- If necessary, fit several propeller shafts with intermediate bearings.
- The flanging surfaces must be completely flat.
- The angular offsets must be identical on both universal joints (ß1 = ß2). They must not be greater than 6° or less than 1°.
- Balancing plates must not be removed.
- Make sure that the marks are aligned on the propeller shafts during installation.

For more information on the design of propeller shafts (▷ page 147).

7.5.5 Retrofitting an alternator

The existing power take-offs must be used when retrofitting an additional alternator.

More detailed information on additional alternators can be found under 6.4.7 "Retrofitting an alternator" (▷ page 75).

7.5.6 Auxiliary brakes / retarders

If you intend to retrofit a retarder, you can obtain instructions concerning retarder control on the Sprinter – model series 906 with ABS / ASR or ESP from the department responsible (▷ page 17).

The "Retarder preinstallation" (Code BR9) special equipment is available for retrofitting a retarder. For a description of the scope of electrical parts (▷ page 105).

7.6 Attachments

A certificate of endorsement from the department responsible is required for attachments to the frame (▷ page 18).

Make sure that you adhere to the permissible axle loads in all cases.

Attachments must not impair the function of vehicle parts.

Comply with national legal requirements.

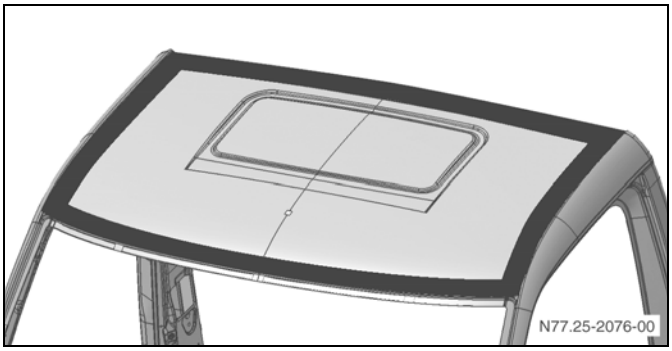
On no account should a winch be attached to the front section of the frame.

Winches behind the cab

If winches are attached behind the cab, they must be mounted on a mounting frame of sufficient size and strength.

7.6.1 Wind deflectors

Wind deflectors may only be fitted onto the cab roof by applying high-strength adhesive to the whole of the area around the lateral roof frame, the front roof frame and the first roof arch (level with the B-pillar).
The load applied by air resistance and contact pressure must be taken into consideration. The deflectors must only be fitted in such a way that the basic vehicle is not damaged.



Adhesive for fitting wind deflectors should be applied in the area shown

No further holes should be drilled in the cab roof for fixing additional attachments.

If other roof attachments are fitted (e.g. air-conditioning system), a certificate of endorsement is required from the department responsible (▷ page 18).

So that the function of the rain / light sensor is not impaired, the body must not protrude beyond the limit shown in the "Rain / light sensor" section (▷ page 108).

7.6.2 Attachment above cab

- The permissible centre of gravity location and the front axle load must be observed (▷ page 44).
- The roof attachment must be designed as per 7.2.11 "Panel van / passenger van roof" (▷ page 138).
- If the conversion causes vibrations or noise, the mounting frame must be extended through the cab rear panel to underneath the seat bases and secured. You can request a design proposal from the department responsible (▷ page 17). With this design, an additional battery under Code E28 (accommodation in the front passenger's seat base) is not possible.

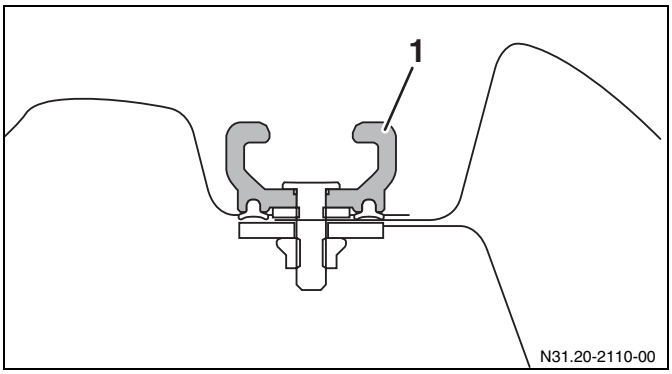
7.6.3 Roof racks

Sprinter – model series 906 panel vans and passenger vans:

- Make sure that the load is distributed evenly across the entire roof area.
- We recommend the use of an anti-roll bar at the front axle.
- Support feet must be spaced at regular intervals. 50 kg per pair of feet and strut is recommended as a basic rule.
- With shorter roof racks, the load must be reduced proportionally.

Roof rack threshold values (laden)		
	Max. roof load [kg]	**Minimum number of support feet pairs**
Low roof	300	6
High roof	150	3
Cab	100	2
Crewcab	100	2

To make it possible to fit roof racks, the Sprinter model series 906 can be equipped with C-rails (special equipment Code D13).



Roof rack mounting

1 C-rail (roof rack)

7.6.4 Shelf system / interior installations

General

Fitted shelving must:

- be sufficiently strong and self-supporting
- rest on the cross and longitudinal members of the vehicle floor
- distribute forces evenly
- be attached to the load rails and tie-down eyes or to the entire contact surface on the body shell in the same way as the standard rails or to the preinstallation for shelf systems (code ZE6)

Attachments which apply force only to the vehicle side wall or to isolated points of the vehicle wall are not permissible. Otherwise, there is a risk of damage to the side wall.

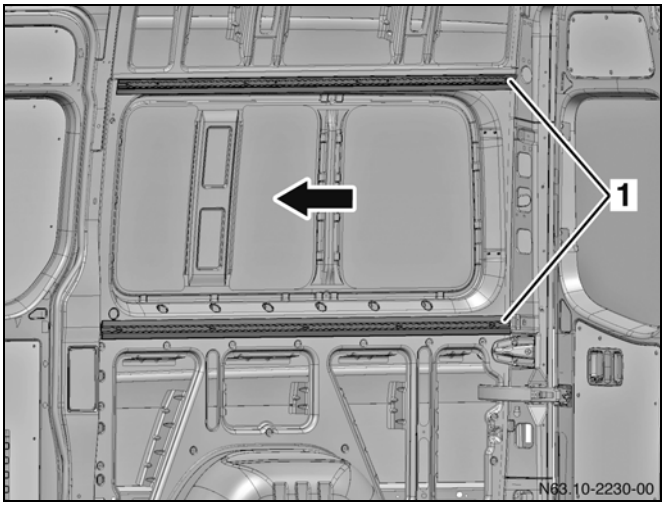
We recommend the load rails available as a special equipment option for mounting and attaching shelves (Code VC4 or Code V42).

For further information about the side wall (▷ page 132).

Load rails ex factory

Load rails are available ex factory in two heights

- Code VC4 – Load rails on roof frame
- Code V42 – Load rails on waist rail (underneath the window stamping)



Load rails in the panel van

1 Load rails

Arrow Front of vehicle

Maximum tensile forces of original Mercedes-Benz load rails

	Permissible rated tensile force [daN]
Upper load rail Code VC4	150
Lower load rail Code V42	250

The stated values only apply if the following conditions are met

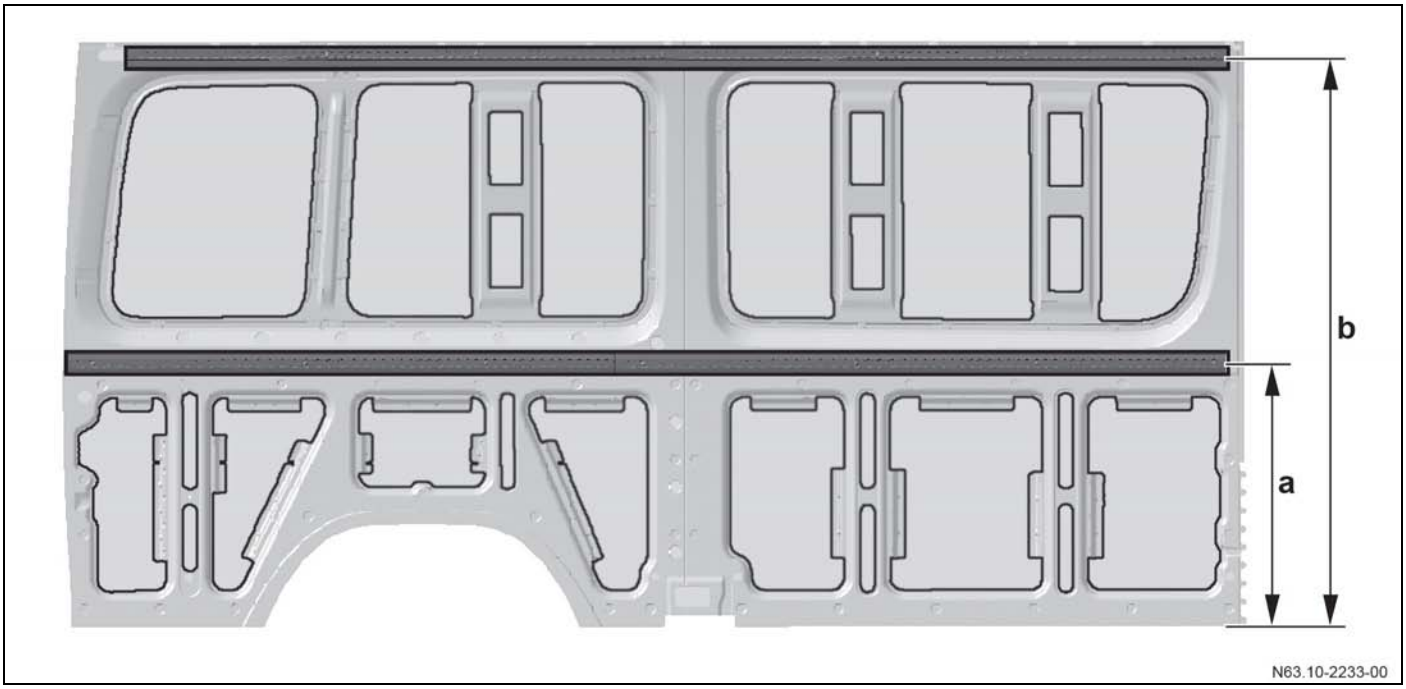
- The load must be standing on the floor
- The load must be secured at two tie-down points of the rail
- The distance to the next load securing point on the same rail may be max. 1 m

Observe the operating instructions supplied with the load rails available ex factory.

Retrofitting load rails / tie-down rails

Load rails or tie-down rails may only be retrofitted to the areas of the vehicle side wall designed for this purpose in the same way as the load rails available ex factory.

The maximum tensile forces (see table) must be complied with in all driving conditions. Otherwise, there is a risk of damage to the side wall.



Position for retrofitting tie-down rails to vehicle side wall

Centre load rail	Dimension in [mm]	
Based on standard wooden floor	a = 718	b = 1,552
Based on vehicle floor (upper ribbing)	a = 729	b = 1,563

The following points must be observed with respect to retrofitting load rails to the vehicle side wall:

- The instructions of the load rail manufacturer must be observed
- The maximum tensile forces (see table) must be clearly indicated in the area of the load rails (e.g. using adhesive labels) and must be enclosed with the operating instructions in the vehicle in suitable form.

Connection to vehicle side wall though riveting plus adhesive bonding

	Permissible rated tensile force [daN]
Upper load rail (in area of roof frame)	120
Lower load rail (in area of waist rail)	200

Connection to vehicle side wall through riveting

	Permissible rated tensile force [daN]
Upper load rail (in area of roof frame)	60
Lower load rail (in area of waist rail)	100

The stated values only apply if the following conditions are met:

- The load must be standing on the floor
- The load must be secured at two tie-down points of the rail
- The distance to the next load securing point on the same rail may be max. 1 m

Requirements of rivets

When retrofitting load rails on the vehicle side walls with rivets, the following values must be complied with:

- Cross-tension strength min. 3,800 N
- Shear strength min. 3,300 N
- Rivet diameter = 4.8 mm
- Head diameter = 9.3 mm
- Clamping range = 3.5 mm to 6.0 mm

Recommended process adhesives

Körapur 140	
Use	Adhesive
Supplier	Kömmerling, Suppl. no. 110 / 75074
Part no.	A 009 989 17 71
Chemical base	1K-PU that hardens in air humidity
Use-by date	6 months, date specified on container
Köracur 110	
Use	Accelerator paste
Supplier	Kömmerling, Suppl. no. 110 / 75074
Part no.	A 009 989 18 71
Chemical base	Water-based gel paste
Use-by date	9 months, date specified on container
Körabond HG81	
Use	Activator
Supplier	Kömmerling, Suppl. no. 110 / 75074
Part no.	A 001 986 90 71
Chemical base	Silane, artificial resin
Use-by date	12 months

Recommended process steps for adhesive bonding

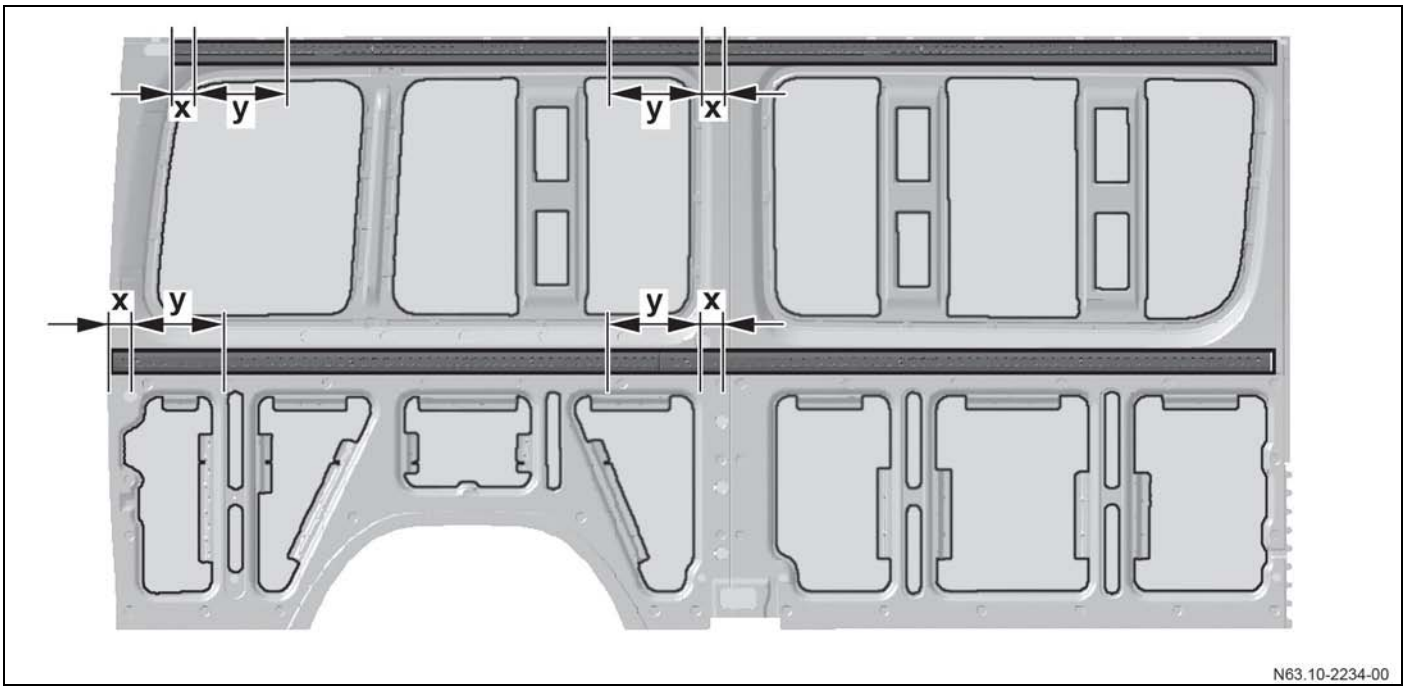
- Roughen load rail
  The entire length of the bonding surface at the rear of the mounting rail must be roughened with a wire brush. Roughened rails must be activated immediately.
- Activate bonding surface
  The entire roughened bonding surface must be activated with a PE bottle with a felt insert. Straight afterwards, the activator that has not yet evaporated must be completely wiped off with a cleaning cloth (wipe on / wipe off procedure).
  - Flash-off time:
    At least 10 minutes
  - Time until application of adhesive:
    Max. 24 hours
  - Replacement cycle for felt insert:
    When no longer functional
  - Replacement cycle of PE bottle:
    At least once daily
- Bonding mounting rail
  The adhesive must be applied to the entire length of the activated bonding surface as a straight, round bead. There must be a gap in the adhesive bead of approx. 10 mm at the rivet holes to prevent adhesive from being squeezed out in the visible area.
- Adhesive application
  - Bead geometry:
    Round bead
  - Bead diameter:
    Approx. 6 mm,
  - Dwell time of adhesive in static mixer:
    Max. 15 minutes
  - Time between adhesive application and bonding:
    Max. 15 minutes
  - Dwell time of adhesive on rail:
    Max. 15 minutes
  - Time until load may be applied (curing time)
    Approx. 7 days

The handling instructions of the adhesive manufacturer must be followed. If the specified bonding instructions are not followed, the bond will not be of the required quality.

The mounting rail with adhesive must be bonded to the inside of the vehicle within 15 minutes. Otherwise, excessive forces may result, causing damage to the side wall.

Rivet distances for load rails retrofitted to vehicle side wall

The maximum rivet distances (see table) must be complied with in all driving conditions. Otherwise, excessive forces may result, causing damage to the side wall.

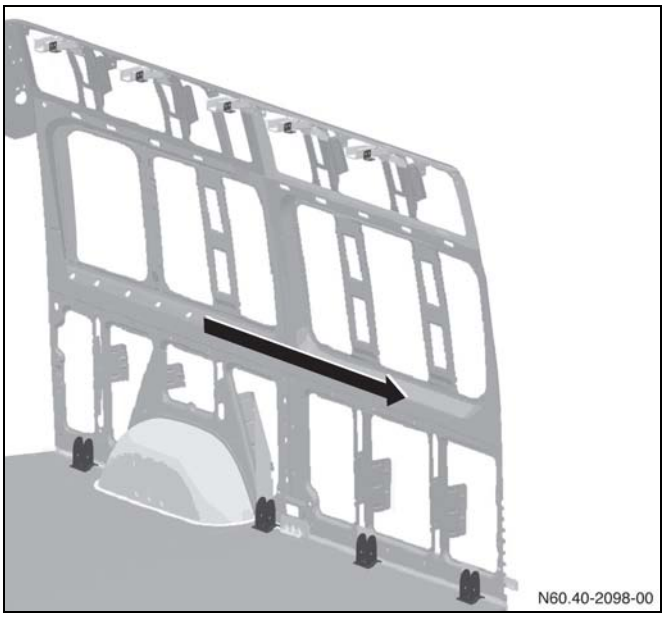


Rivet distances for load rails retrofitted to vehicle side wall

Rivet distance	Dimension X max. in [mm]	Dimension Y max. in [mm]
Riveting plus adhesive bonding	75	450
Riveting (without adhesive bonding)	25	225

Preinstallation for fitted shelving

Code ZE6 "Preinstallation for fitted shelving" is available from the factory to facilitate the retrofitting of shelves. The package includes angles attached to the roof arches and body support brackets mounted on the vehicle floor.

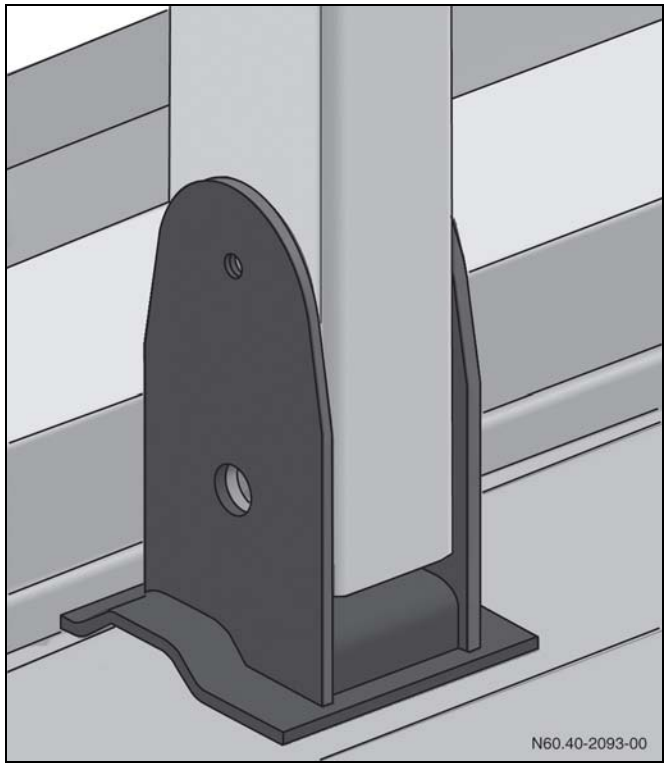


ZE6 package contents in shaded areas

Arrow Front of vehicle

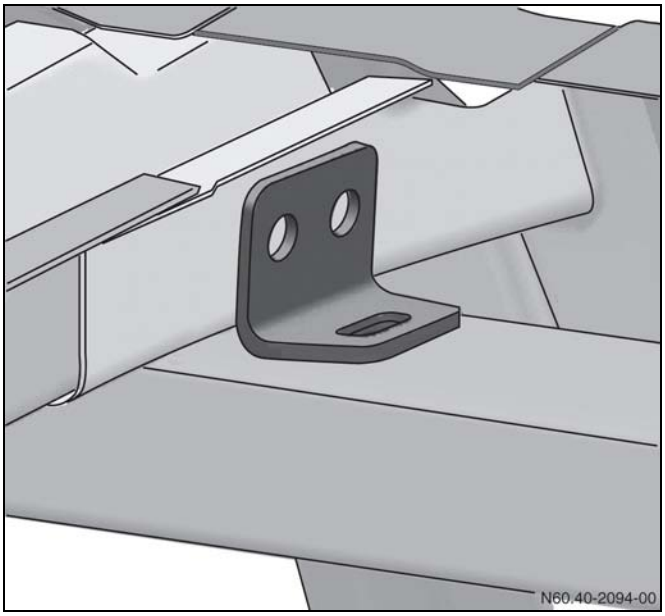
The following must be observed when using the shelf preinstallation:

- Shelves must not be wider than 450 mm.
- The max. load-bearing capacity is 80 kg / m.
- The shelf supports must be made of steel (at least ST235JO according to DIN EN 10025) with a minimum cross-section of 60 mm x 40 mm x 3 mm (length x width x thickness).
- The shelf supports are bolted to the floor with the brackets.

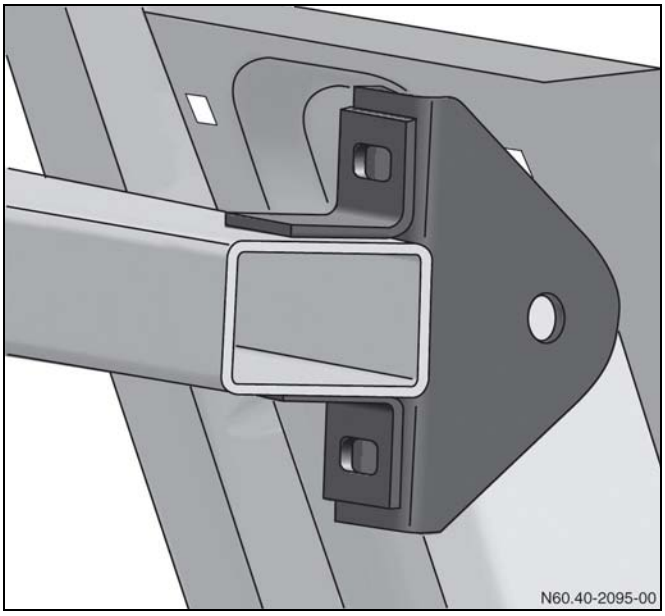


Bolting the brackets to the floor

- To fix the wooden floor, 2 angles per support must be mounted at the bolt connection between the support and the bracket (contact surface per angle at least 1,200 mm², dimensions 60 mm X 20 mm).
- A steel tube with a rectangular profile measuring 60 mm x 40 mm x 3 mm is bolted onto the brackets on the roof arches. The shelf supports are bolted to this rectangular profile at the top.

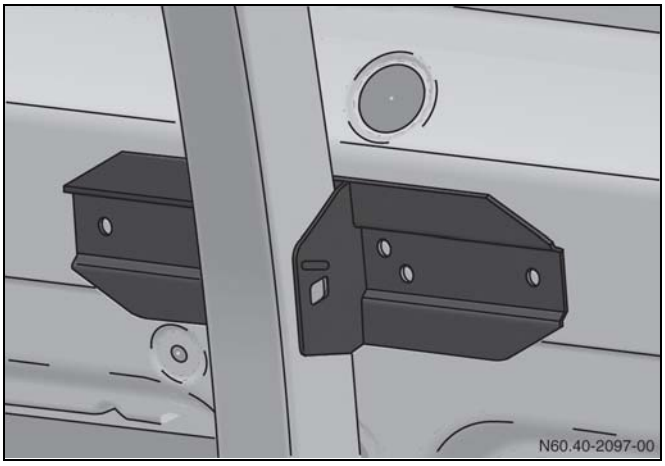


Bolting the longitudinal tube to the roof arch



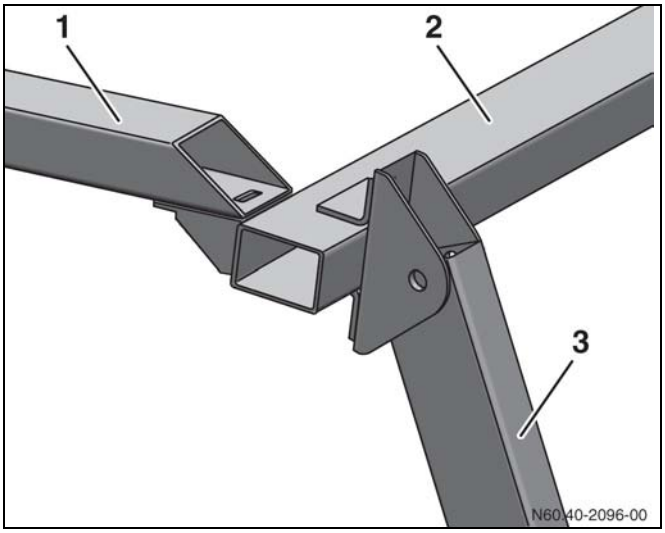
Connecting the longitudinal tube to the support

- The longitudinal tube must not be connected with the partition or the rear door frame.



Suggestion for bracket on the waist rail

- In addition to fixing the shelf supports to the floor and to the roof arches, it is necessary to fix them to the waist rail by means of a bracket. The connection must be made by bonding and riveting. A minimum bonding surface area of 7,000 mm² is required. The minimum bending resistance about the vertical axis must be greater than E x I> 3.6 x 10^8 Nmm².



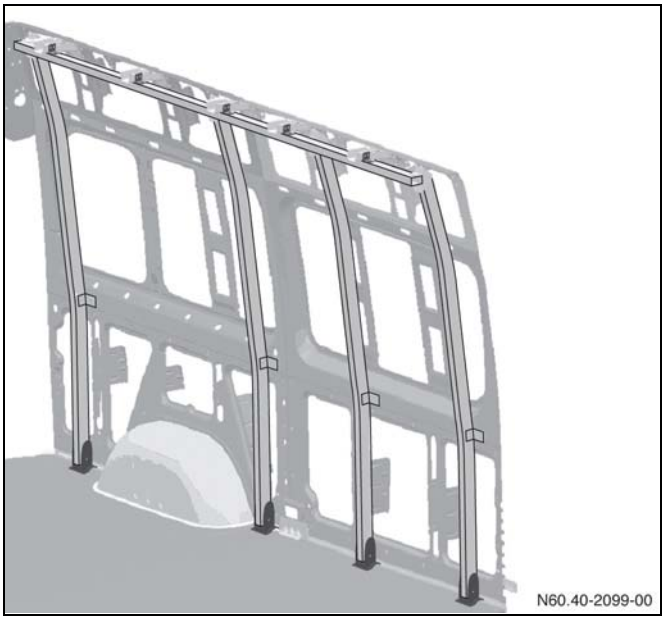
Additional connection of the longitudinal tubes

1 Connecting rail

2 Longitudinal tube

3 Support

- If the first or last support is more than 300 mm away from the roof arch, the longitudinal tubes must be connected together.



Suggested shelf attachment with ZE6

7.6.5 Loading cranes

The size of the crane must be selected in accordance with the chassis size.

Loading cranes must be secured on a mounting frame to relieve the load acting on the frame (▷ page 200).

The permissible axle loads must be verified by calculating a weight balance.

The vehicle's stability must be ensured by the body manufacturer. The slewing range of the crane must be limited accordingly.

Loading cranes mounted on vehicles in Germany must comply with the German accident prevention regulations (UVV).

Comply with national legal requirements.

The mounting instructions of the crane manufacturer must be observed.

If additional platform or tipper bodies are mounted, the dimensions of the mounting frame longitudinal members must be taken from the table for platform bodies (▷ page 228) or tipper bodies (▷ page 231).

Outriggers must be provided for every loading crane. We recommend using hydraulic supports.

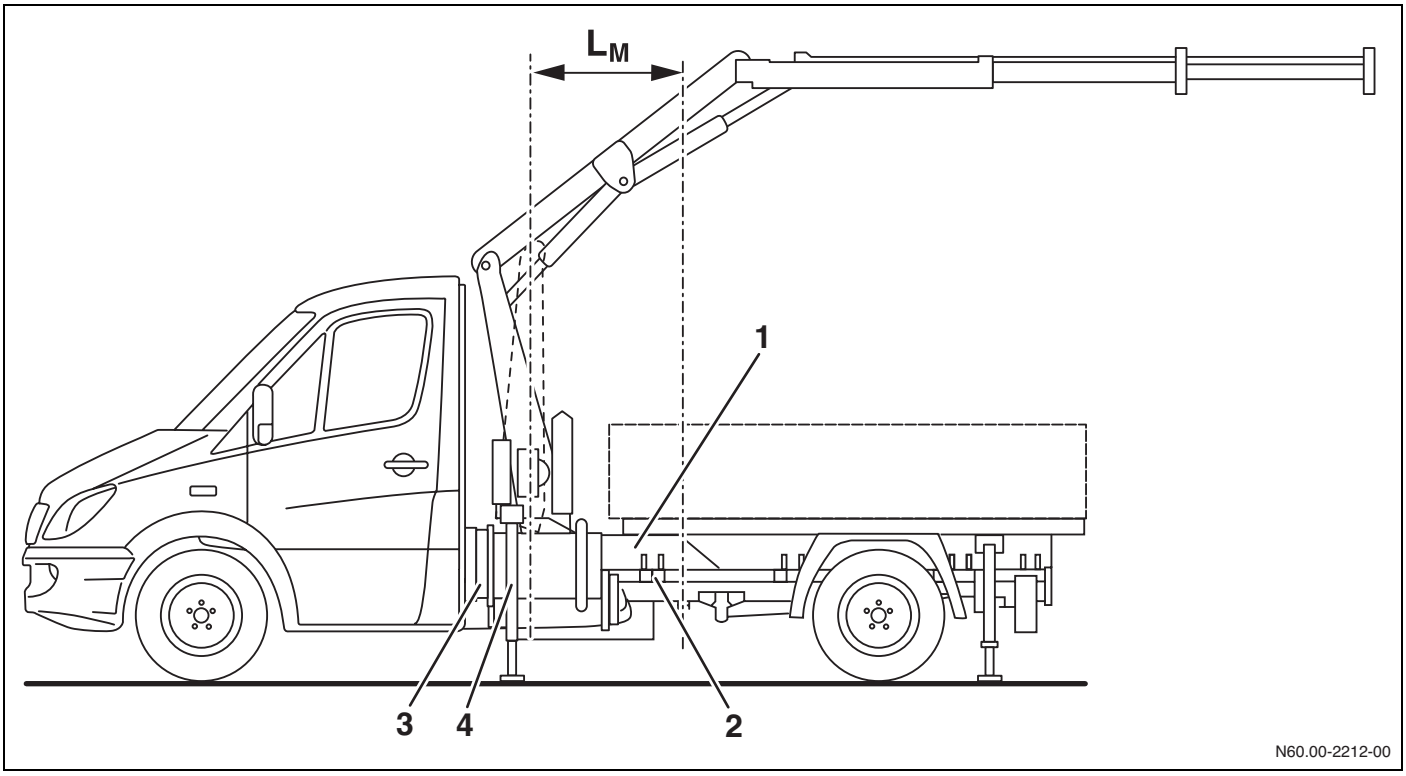
The vehicle must not be raised using the outriggers, as this would damage the frame.

Loading cranes behind the cab

Loading cranes and outriggers must not impair the function of other equipment.

Mounting frame

- Maximum crane load moment (kN x l): 25 kNm
- Moment of resistance (W_x) for mounting frame longitudinal members: 45 cm^3
- For the section dimensions of the mounting frame longitudinal members, see (▷ page 200).
- While the crane is in operation, vehicle stability must be ensured by extending outriggers.
- Outriggers extending beyond the vehicle when stationary must be made easily distinguishable by conspicuous colours, reflectors and warning lights.
- The platform length depends on the position and weight of the loading crane and must take into consideration the permissible axle loads.
- If the crane load moments are exceeded, a certificate of endorsement is required from the department responsible. The crane mounting must be reinforced.
- The vehicle may only be used on flat, paved roads.
- Due to the vehicle's load distribution, a frame extension may be required.
- If a stronger mounting frame is required than for the body when a loading crane is mounted behind the cab, the loading crane can be secured on a shorter mounting frame (see illustration below). The short chamfered mounting frame must have a length of $L_M \geq 35\%$ of the wheelbase.
- This attachment requires a certificate of endorsement from the department responsible (▷ page 18).



Loading crane

1 Loading crane mounting frame

2 Body support brackets

3 Loading crane attachment

4 Outrigger

LM Length of loading crane mounting frame

Loading crane mounted at end of frame

Risk of accident

The minimum front axle load (▷ page 44) must be complied with in all load states. Otherwise, adequate driving stability is no longer guaranteed.

- Loading cranes must be secured to a mounting frame made of steel.
- Maximum crane load moment (kN x l): 25 kNm
- Moment of resistance (W_x) for mounting frame longitudinal members: 45 cm^3
- For the section dimensions of mounting frame longitudinal members, see (▷ page 200).
- While the crane is in operation, vehicle stability must be ensured by extending outriggers.

7.6.6 Loading tailgate (lifting platform)

General

Mounting a lifting platform on open model designations

We recommend the "Lifting platform preinstallation" (Code EV3) special equipment if you intend to retrofit a lifting platform to open models.

Mounting a lifting platform on vehicles with gaseous fuel drive

On vehicles equipped with a gaseous fuel drive / NGT Sprinter code MZ2, the exhaust system code K60 "Exhaust, straight to rear" is installed. Before installing a loading tailgate, the available installation space must be checked by the body manufacturer.

Body manufacturers are able to obtain all of the specifications of the NGT system in the form of original 3D data (e.g. for installation space assessments).
You can obtain more information from the department responsible (▷ page 18).

On vehicles equipped with code KQ3 "Additional compressed-gas tanks" of model designation 906.x3x, the installation of a loading tailgate is not possible for reasons related to installation space.

Mounting a lifting platform on enclosed model designations

Please consult the department responsible if you intend to retrofit a lifting platform to enclosed models (▷ page 18).

Preconditions for mounting a lifting platform

An alternator and a battery with higher capacity as well as an additional battery must be fitted if an electrohydraulic lifting platform is fitted.

- Within the EU, lifting platforms must conform to EU EN 1756-1.
- Lifting platforms in Germany must comply with the German accident prevention regulations (UVV).
- The permissible rear axle load must not be exceeded.
- The minimum front axle load must be complied with in all load states (▷ page 44).
- Vehicle stability must be ensured by the body manufacturer in all operating states.
- Calculate the vehicle's load distribution. This calculation must take all special equipment into consideration.

- If necessary, shorten the body length and the rear chassis overhang accordingly (open model series).
- We recommend the use of only hydraulic supports.
- The legal requirements in various countries relating to "Underride guard" and "Lighting" must be observed when a lifting platform is mounted.
- Maximum load clearance 600 mm, relative to the standard rear portal / standard rear cross member.
- We recommend fitting an anti-roll bar to the front and rear axles.
- Cuts in the rear cross member are only permitted after consultation with the department responsible (▷ page 17).
- Vehicle stability when loading and unloading the vehicle must be ensured by the user.

The maximum lifting force must not be exceeded when the vehicle is unloaded.

Lifting platform attachment

The lifting platform must be attached as per "Attachment to the rear frame section" (▷ page 122).

Additional torque support must be provided by means of at least two bolted connections fitted with spacer bushes (e.g. on the mounting frame).

- Extend the mounting frame as far forwards as possible and attach it with a non-positive connection to the chassis frame.
- No mounting frame is required on vehicles with a standard panel van body.

If modifications are required to the underride guard due to the attachment of a lifting platform, the strength and bending resistance of the underride guard must not be changed (▷ page 197).

The vehicle must not be raised using the outriggers, as this would damage the frame.

Permissible lifting force of lifting platform

Model	Wheelbase [mm]	Maximum lifting force [kN]		Minimum dimension of mounting frame – longitudinal member [mm]
		Open model designations	Enclosed model designations[1]	
209 CDI – 218 CDI	3,250	5	5	none
	3,665	5	5	
309 CDI – 318 CDI	3,250	5	5	none
	3,665	5	5	
	4,325	5	5	
	3,250	7.5[2]	–	120 x 50 x 4 or factory platform Code P02
	3,665	7.5	5	
	4,325	7.5	5	
409 CDI – 418 CDI 509 CDI – 518 CDI	3,665	5	5	none
	4,325	5	5	
	3,665	7.5	5	80 x 45 x 3 or factory platform Code P02
	4,325	7.5	5	
	3,665	10	5	120 x 50 x 4
	4,325	10	5	

[1] Without mounting frame

[2] On version with torque supports on mounting frame

7.6.7 Trailer coupling

- We recommend the use of trailer couplings that have been approved by Mercedes-Benz and attached to the special mounting points on the bodyshell (rear longitudinal member) (▷ page 255).
- Access to the spare wheel must be guaranteed if a trailer coupling with a non-detachable ball neck is fitted (especially with a fully laden vehicle).
- Trailer couplings must be installed in accordance with the regulations of the respective country: in Germany these are DIN 74050.
- If there are any deviations from the German accident prevention regulations (UVV), a certificate of endorsement must be requested in Germany from the Berufsgenossenschaft für Fahrzeughaltung, 22757 Hamburg, Germany (tel. +49 (0)40-381091).
- Technically, there is no problem retrofitting a trailer coupling when special equipment, Code E 57 – "Electrics for trailer power socket" (▷ page 197) is already fitted.

!

Never attach a trailer coupling to the end cross member of the frame.

!

If you retrofit a trailer coupling, a fuel tank shield will be needed for the following vehicles:

- 4-cylinder diesel engine on 4.6 t / 5 t vehicles
- 6-cylinder diesel engine
- 4-cylinder diesel engine on 3.5 t vehicles with low a frame and underbody protection
- 4-cylinder diesel engine on 3.88 t vehicles with low a frame
- 6-cylinder diesel engine on 3.88 t vehicles with low a frame

Information is available from your Mercedes-Benz Service Centre.

Dimensioning the trailer coupling

The size of the trailer coupling is defined by the drawbar ratio.

$$D = g \times \frac{m_k \times m_a}{m_k + m_a} (kN)$$

D = drawbar ratio

mk = permissible gross vehicle weight of the tractor vehicle in t

ma = permissible gross vehicle weight of the trailer in t

g = 9.80665 m / s^2

In order to allow the trailer to be exchanged when used in international transport, the clearance between the centre of the trailer coupling and the end of the tractor vehicle must be no more than 300 mm (in Germany, according to the German standard DIN 74050).

Clearance dimensions, trailer coupling

The country-specific clearance dimensions must be observed: in the EU as per EC 94 / 20 or ECE-R55.

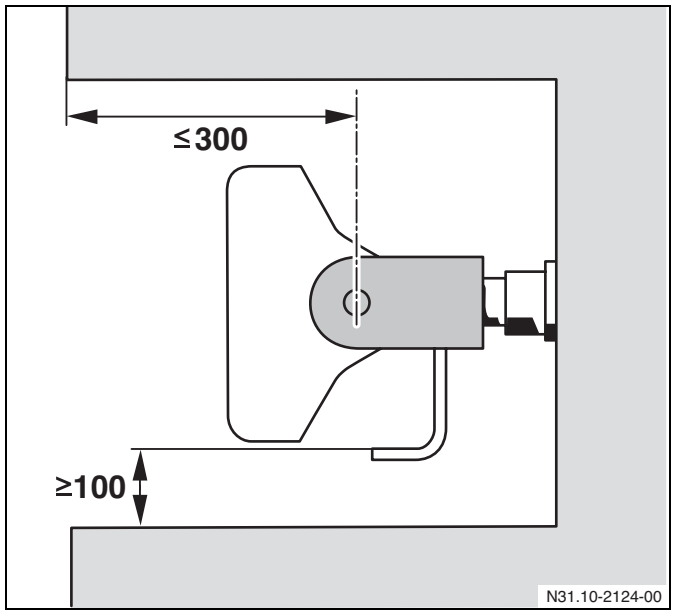
The height of the trailer coupling above the ground must be between 300 mm and 450 mm when the vehicle is laden to the permissible gross vehicle weight.

Open-jaw coupling

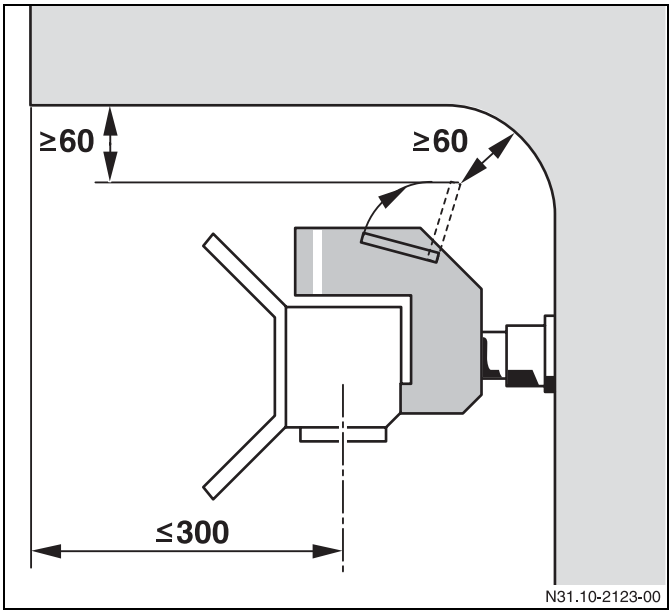
The distance from the centre of the coupling pin of the trailer coupling to the end of the body must not be more than 300 mm. The specified clearances must be maintained.

The reliable operation of the coupling must not be impaired.

On no account should an open-jaw coupling be fitted to the front.



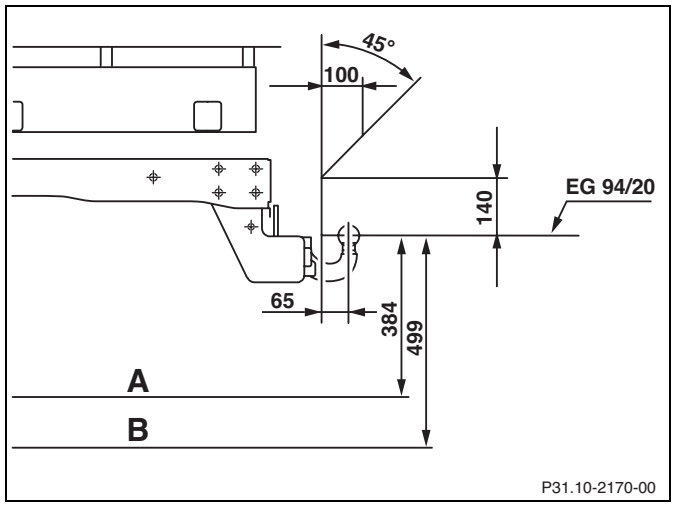
Open-jaw coupling, top view



Open-jaw coupling, side view

Ball coupling

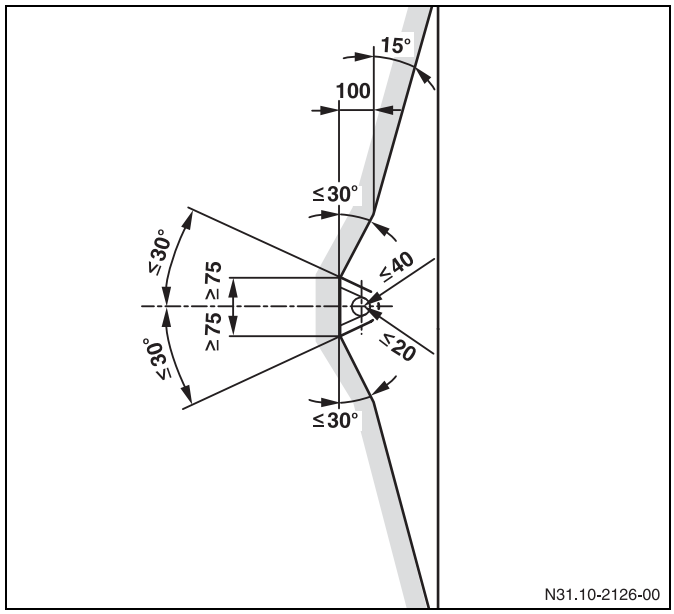
The specified clearances must be maintained.



Ball coupling, side view

A Laden

B Empty



Open-jaw coupling, top view

Risk of accident

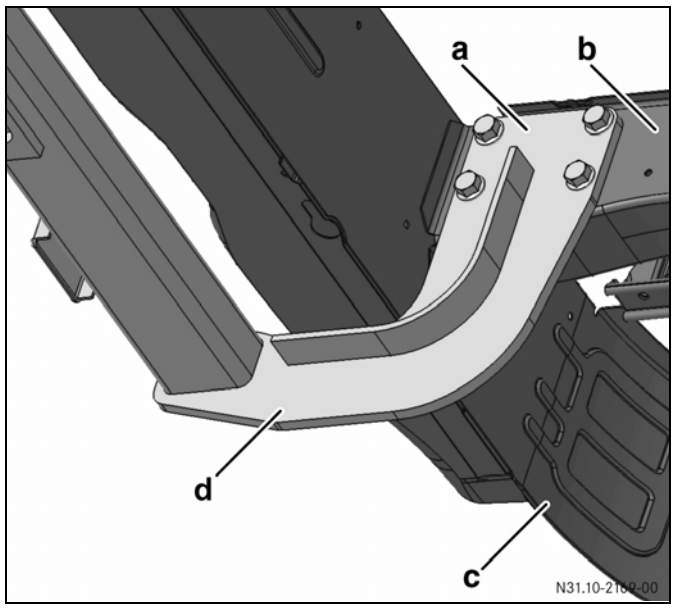
If the tractor vehicle is unladen, only an unladen trailer may be towed. Otherwise, the vehicle may become unstable.

If trailer couplings have removable ball couplings, the operating instructions must be supplied in the vehicle and they must refer to the special features and operation of the coupling.

Attachment of the trailer coupling

Only secure trailer couplings and mounting plates to the special mounting points on the bodyshell (rear longitudinal member) (▷ page 122).

In addition, panel vans require an additional attachment as support on the rear cross member of the vehicle frame.



Interior view

a Attachment of mounting plate to the longitudinal frame member

b Lower chord of the longitudinal frame member

c End frame cross member

d Mounting plate for the trailer coupling

- On no account should any attachment be made to the underride guard.
- Any modifications to the underride guard must be clarified with the technical inspection authority responsible (TÜV). The strength or the bending resistance must not be impaired.
- If the frame needs extending, spacer bushes must be fitted to the frame to attach the mounting plate or the rear cross member (▷ page 120). They may lead to a reduction in the towing weight or the noseweight.

Hole patterns with dimensions for attaching trailer couplings can be found under 10.3 "Trailer coupling hole patterns" (▷ page 255).

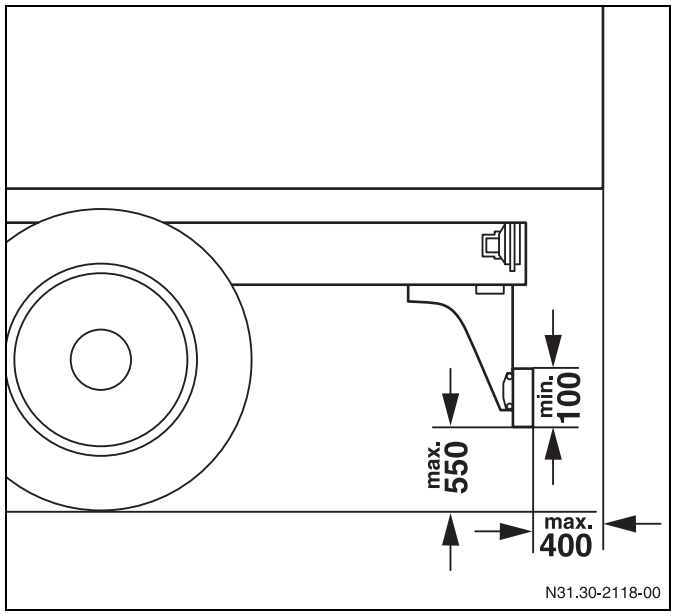
Depending on the model series, the following special equipment is available as an option code from the factory to retrofit trailer couplings:

Code	Description
E 57	**Electrics for trailer power socket** (provides the power supply to the trailer including lighting control)
Q 10	**Trailer coupling cross member** (a special cross member with a retaining plate for mounting a trailer coupling is fitted to the vehicle rear) The design of the cross member is dependent on the vehicle's tonnage.
Q 20	**Trailer coupling** (Open-jaw coupling for towing trailers with drawbars) The design of the open-jaw coupling is dependent on the vehicle's tonnage.
Q 50	**Trailer coupling, removable ball coupling** (Removable ball coupling for towing trailers fitted with a ball coupling)
Q 22	**Trailer coupling, rigid ball coupling** (Rigid ball coupling with an increased height of 50 mm)
QA7	**Trailer coupling for higher towing weights 3.5 t** Attachment of a rigid ball coupling with a maximum permissible, braked towing weight of 3.5 t for the 5 t weight variant.
QA8	**Trailer coupling for higher towing weights 2.8 t / 3.0 t** Attachment of a rigid ball coupling with a maximum permissible, braked towing weight of 2.8 t for the 3.5 t weight variant, and a maximum of 3.0 t for the 5 t weight variant. The permissible nose weight is 120 kg.

7.6.8 Underride guard

Rear underride guard

The rear underride guard fitted at the factory (except on panel vans and passenger van) complies with EC Directive 70 / 221 / EEC.



Side view of the underride guard design

On no account should modifications be made to the underride guard.

If modifications are unavoidable, they must be clarified in advance with the technical inspection authority responsible (TÜV).

In Germany, an underride guard is required by law in accordance with Section 32b StVZO (German Road Traffic Licensing Regulations) if:

- the distance between the rear of the vehicle and the final rear axle is more than 1,000 mm
- the ground clearance of the chassis as well as the main body parts exceeds 550 mm for the unladen vehicle across the entire width.

Exceptions to this regulation are semitrailer tractor vehicles, machines and vehicles whose purpose cannot be fulfilled if an underride guard is fitted.

If an underride guard is required, it must comply with EC Directive 70 / 221 / EEC and its design drawings submitted by the body manufacturer.

The underride guard must be mounted as far back as possible.

Dimensions

- Maximum height of underride guard (unladen vehicle) above road surface: 550 mm.
- Width:
  - ▶ maximum = width of rear axle (outer tyre edge)
  - ▶ minimum = width of rear axle less 100 mm on each side. The decisive factor is the widest axle
- The cross member must have a section height of at least 100 mm.
- Edge radius at least 2.5 mm.

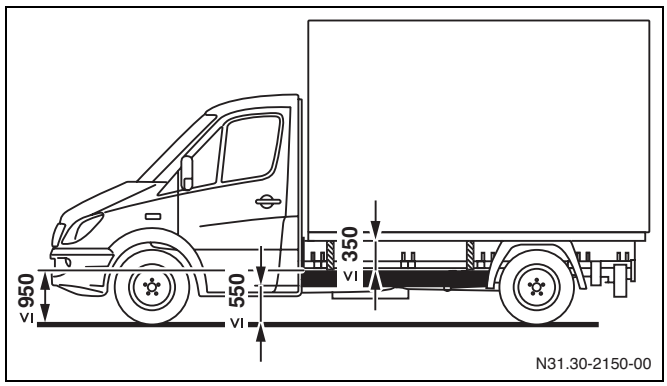
Modifications to the underride guard

If the underride guard needs to be repositioned due to the overhang extension, the attachment must be the same as that of the original vehicle.

If modifications are required to the underride guard (e.g. due to the attachment of a lifting platform), the strength and bending resistance of the underride guard must not be modified.

Any modifications to the underride guard must comply with national regulations and laws.

Side underride guards



Side underride guard design

According to EC Directive 89 / 297 / EEC a side underride guard is specified for vehicles with a permissible gross vehicle weight in excess of 3.5 t.

Exceptions to this regulation are semitrailer tractor vehicles, machines and special-purpose vehicles whose purpose cannot be fulfilled if side underride guards are fitted.

Components may be mounted in the side underride guards, e.g. battery box, air tank, fuel tank, lights, reflectors, spare wheel and tool box, provided that the specified clearances are maintained.

Brake, air and hydraulic lines and other parts may not be secured to side underride guards.

The function and accessibility of all equipment on the vehicle must not be impaired.

The side underride guards are secured to the platform at the factory (Code C57).

If side underride guards are retrofitted:

- The dimensions specified in the illustration may not be exceeded.
- The underride guards must extend continuously from the front to the rear wherever possible.
- Adjacent parts may overlap. The overlapping edge must point to the rear or downwards. The maximum permissible width of any gap between sections is 25 mm, provided the rear part does not protrude significantly beyond the front part.

The side underride guard may be made of a continuous flat surface. The outer surface must be smooth and generally flat. The guard parts must be rigid and permanently fixed. They must be made of metal or another suitable material. The distance between the outer surface of the underride guard and the outer edge of the vehicle must not be more than 120 mm. The edge radius must be at least 2.5 mm.

This section contains information concerning the body to be produced by the body manufacturer.

8.1 Mounting frame

All bodies require a continuous mounting frame or a substructure that assumes the function of a continuous mounting frame to ensure a reliable connection between the chassis and the body (see self-supporting bodies and mounting frames acting as floor assemblies (▷ page 206, 207).

The attachment to the frame must run along the frame using the body support brackets attached to the frame at the factory (▷ page 201). Exception: on vehicles with an offset frame (model designation 906.x5x) (▷ page 11)), the mounting frame longitudinal members can run continuously in a straight line.

8.1.1 Material quality, general

Required moment of resistance[1] of mounting frame:	
Up to maximum standard wheelbase	30 cm^3
Over maximum standard wheelbase	> 34.5 cm^3

[1] Each individual mounting frame longitudinal member must have the moment of resistance specified here.

Observe any deviations in the specifications in this chapter, see 8.7 "Platform bodies" (▷ page 228) and 8.10 "Tipper bodies" (▷ page 231).

Material quality of specified mounting frame made of steel:

- Mounting frame with bracket mounting (non-positive) = H240LA or S235JRG2.
- For H240LA or S235JRG2 steels complying with the DIN EN standard, analogous materials complying with the US SAE / ASTM J403 / J412 / J413 standards, the Japanese JIS G3445 standards or the UK BS 970 standards can be used.

Material	**Tensile strength [N/mm^2]**	**Yield strength [N/mm^2]**
H240LA (DIN EN 10268-1.0480)	350-450	260-340
S235JRG2 (DIN EN 10025-1.0038)	340-510	≥ 235

- If high-strength steel is used for the mounting frames, their strength must be at least equivalent to that of steel mounting frames.
- When using a mounting frame made of aluminium, it must have at least the bending strength (E x I) of a steel mounting frame. Observe the specifications of the aluminium manufacturer.

8.1.2 Design

General

The mounting frame cross members must be located above the chassis frame cross members.

The mounting frame longitudinal members must extend as far towards the front of the vehicle as possible, to reinforce the point behind the cab which is critical with regard to bending stress, as well as to prevent vibration problems.

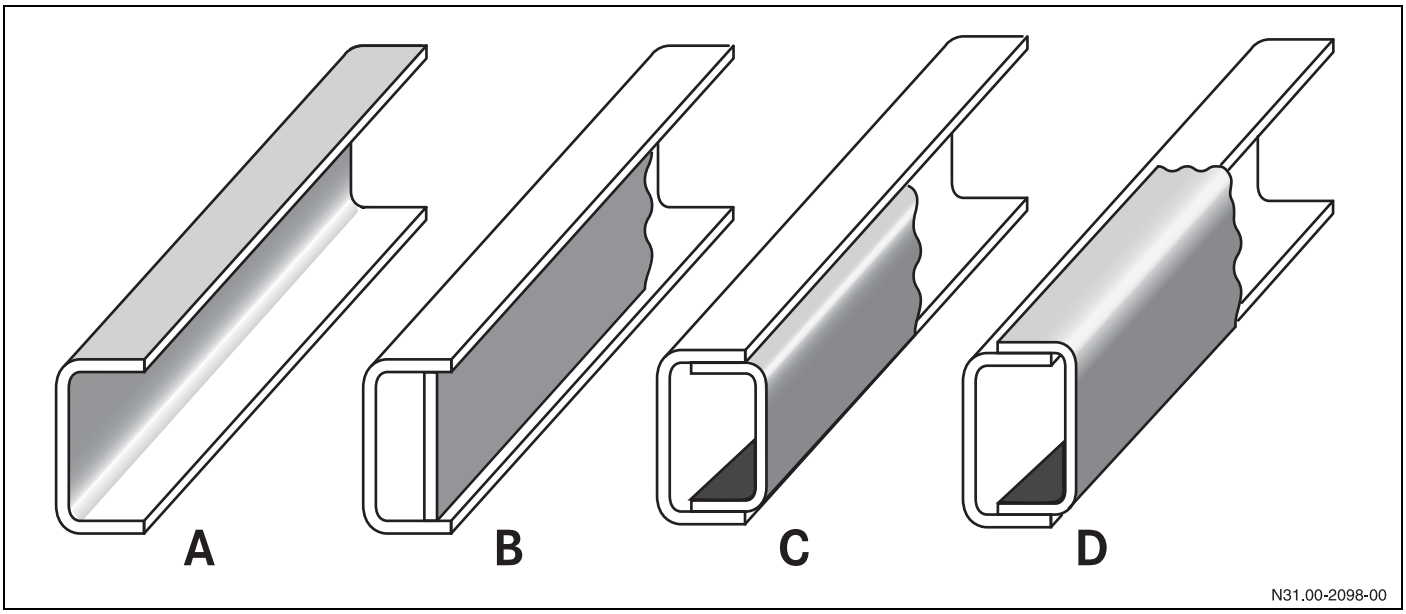
The body must have a torsion-free attachment to the body support brackets on the longitudinal frame member.

Place the vehicle on a flat, horizontal surface before mounting the body.

If very high longitudinal members are required or if the height of the frame needs to be small, the U-section can be designed as follows if the connections are non-positive:

- closed off like a box
- nested (inside overlapping U-section), or
- nested with an overlapping U-section

This increases the moment of resistance and torsional stability.



Frame profile

A Open U-section

B Closed U-section

C Inside overlapping U-section

D Overlapping U-section

Mounting frame with offset frame

On vehicles with an offset frame (permissible gross vehicle weight ≥ 4.6 t), the mounting frame longitudinal members can run continuously in a straight line.

8.1.3 Section dimensions / dimensioning

For the longitudinal members, use flanged U-sections or commercially available U-sections for vehicle construction (not rolled steel sections). Box sections are also permitted as longitudinal member section.

The dimensions of the longitudinal members are a function of the moment of resistance (W_x) required for the body and the chassis (▷ page 200).

The specified moments of resistance and section dimensions refer to longitudinal frame members subjected to identical loads on both sides.

Please refer to the table below for the section dimensions of mounting frame longitudinal members (open section).

The mounting frame and the chassis frame should have approximately the same flange width.

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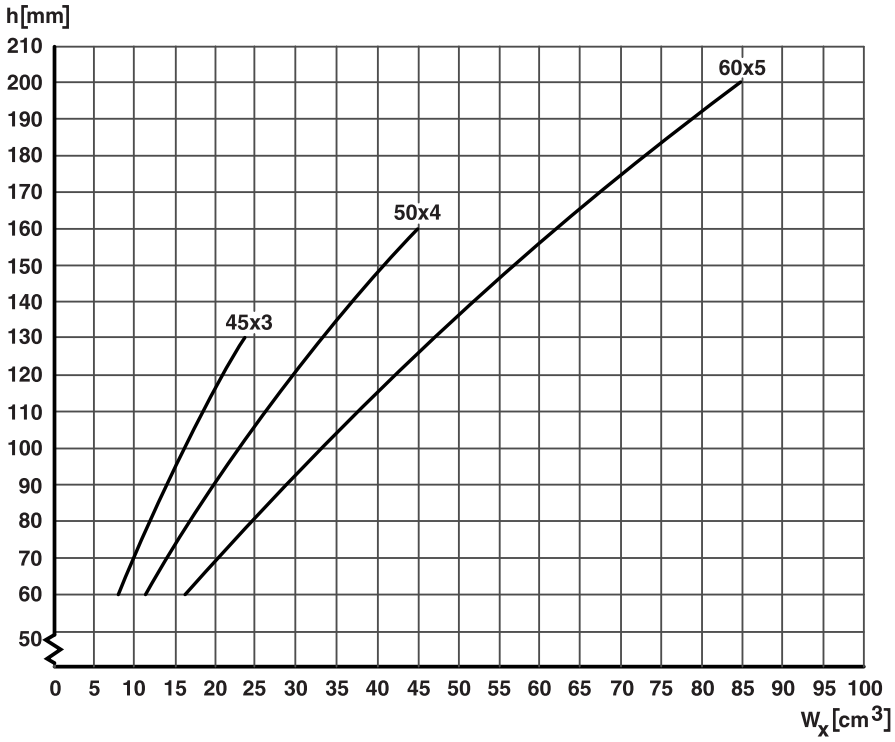
If more than one body is mounted on the same chassis (e.g. platform and lifting platform), the larger of the specified moments of resistance must be taken to determine the mounting frame.



Longitudinal member dimensioning

h:	Section height in mm
Wx:	Moment of resistance in cm^3

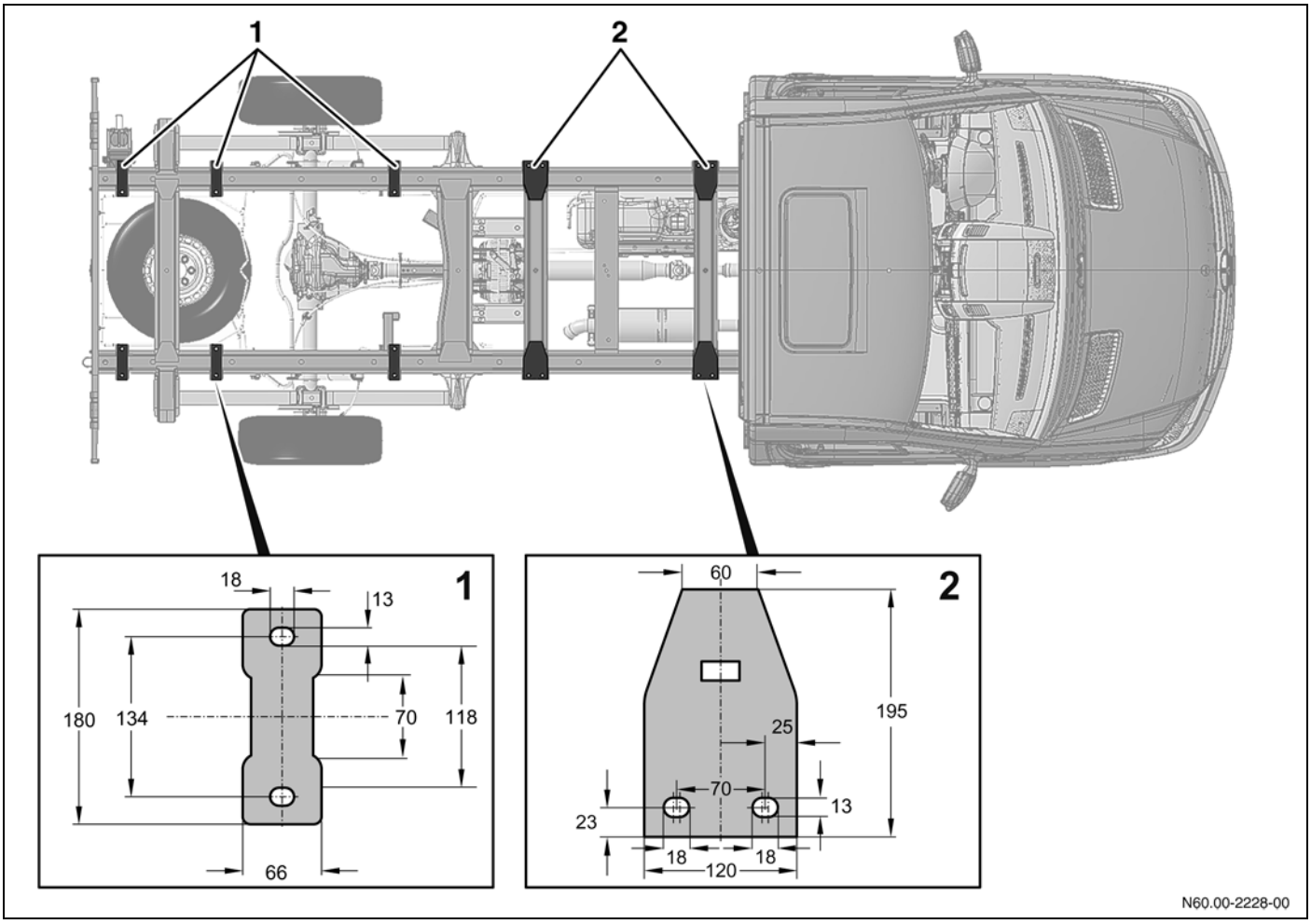
8.1.4 Attachment to the frame

The body support brackets fitted at the factory must be used for attaching bodies to the vehicle frame. The brackets are located on the longitudinal frame members and additional brackets may be fitted as required.

The minimum distance between the body and the cab must be > 50 mm.

If prefabricated mounting frames are used, the production tolerances of the chassis frame width (maximum + 6 / –3 mm) must be taken into consideration.

The positions for the body support brackets are indicated in the tender drawings depending on the model series (▷ page 20).



Types of fastening points on the frame

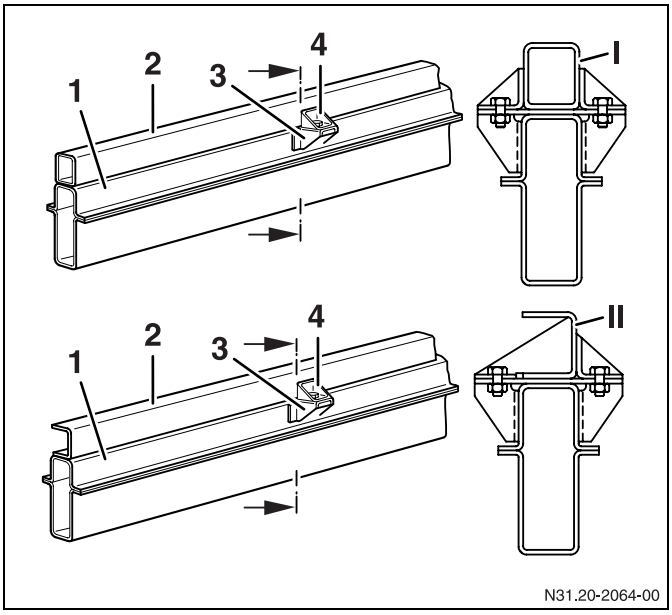
Additional body support brackets

If it is necessary to fit additional body support brackets, make sure that you comply with the welding directives (▷ page 63).

- Plug welding is only permissible in the vertical webs of the longitudinal frame member.
- Do not perform any welding work in bends.

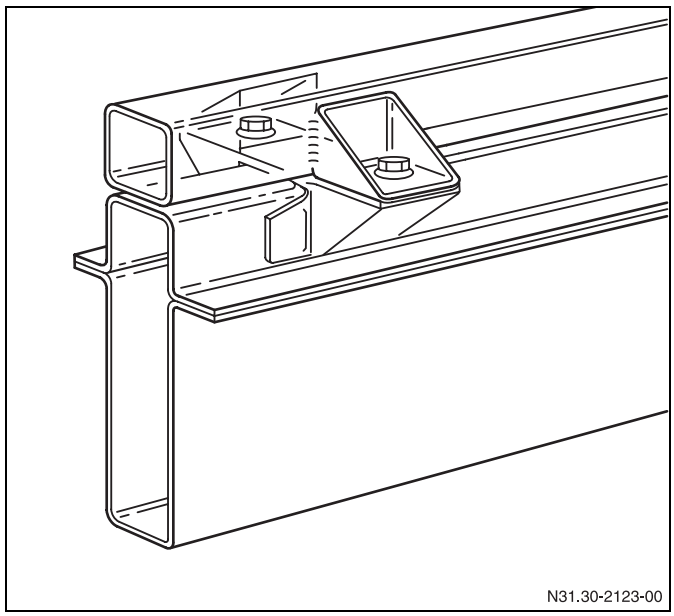
The body support brackets must be attached using two bolts for each body support bracket.

Attachment of the body support brackets

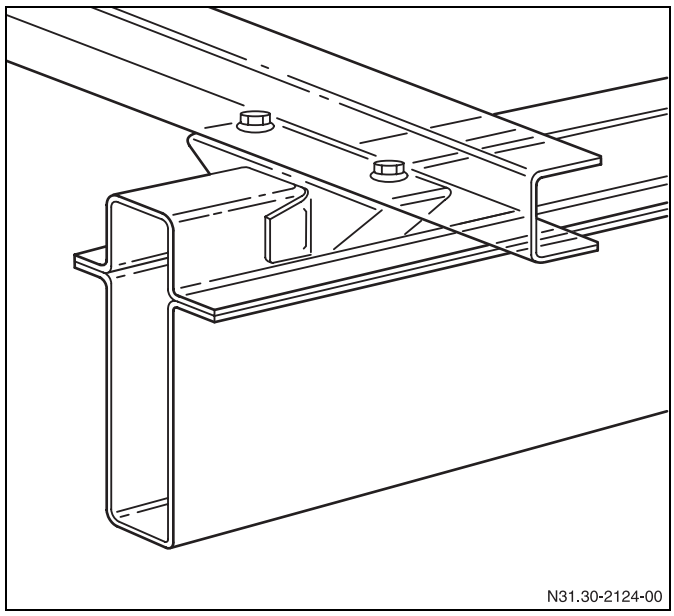


Example of a body bracket design

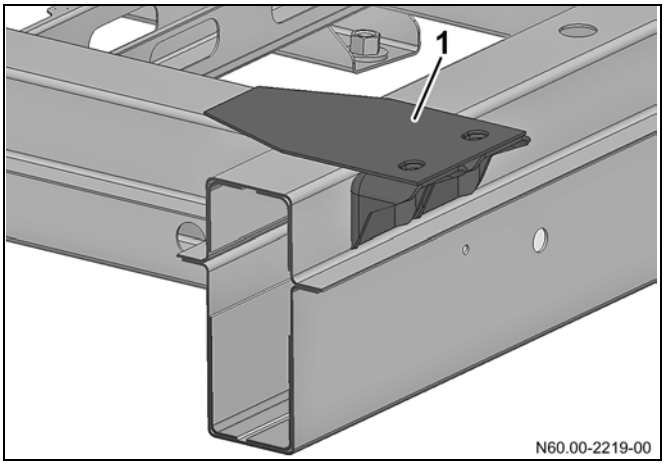
I Box section
II U-section
1 Chassis frame
2 Mounting frame
3 Standard mounting bracket
4 Bracket



Attachment to a longitudinal member



Attachment to a cross member



Body bracket with external bolted connection

1 Body bracket

Select the number of attachments to ensure adequate transfer of all longitudinal and lateral forces.

Correct attachment is a decisive factor for:

- vehicle handling and operating safety
- the service life of the chassis frame and the body

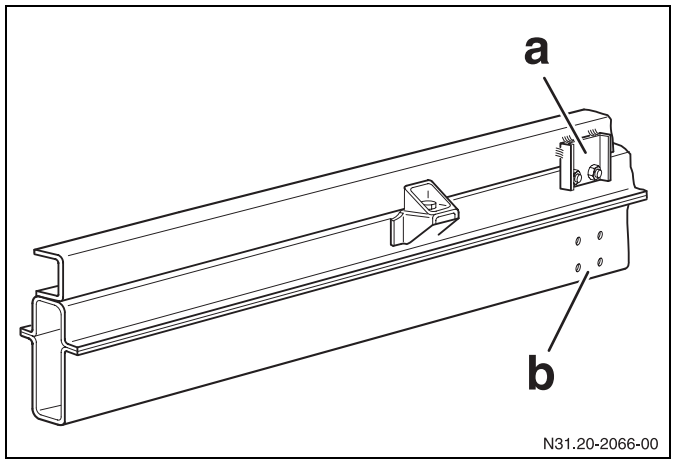
Rigid attachment

Also observe 8.11 "Semitrailer tractors" (▷ page 232).

If the attachment is rigid, the mounting frame longitudinal member must be secured in both longitudinal and transverse directions. This will allow movement of the mounting frame longitudinal member only under specific conditions.

The body can be secured to the sides of the upper chords on the longitudinal frame member. Spacer bushes welded to the frame must be used for reinforcement.

With rigid connections, a double support is required for each longitudinal frame member as depicted in the figure below.



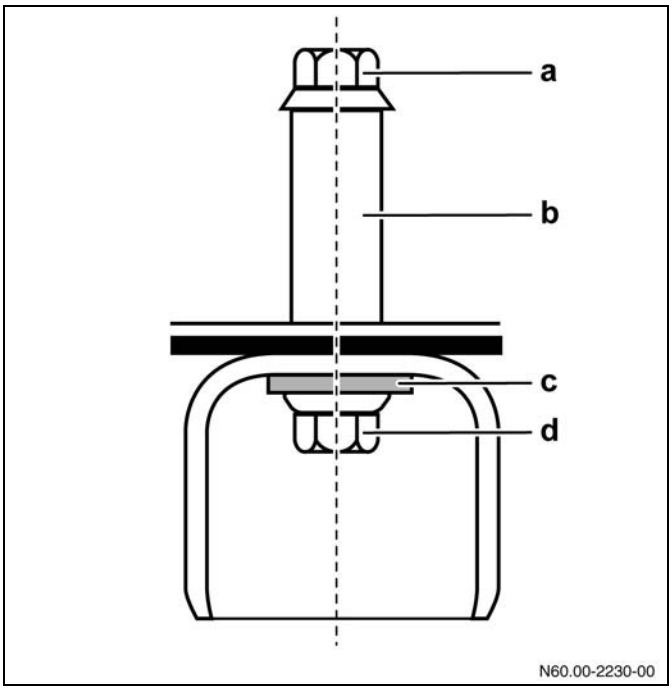
Dual support (rigid connection)

a Rigid attachment at frame end

b Standard holes at frame end

Bolted connections locked to prevent loosening

On rigid bodies (e.g. panel vans or lifting work platforms), bolted connections locked to prevent loosening and spacer sleeves must be provided at the first and second body brackets. The dimensions of the spacer sleeves must be adequate to ensure that they cannot become deformed.



Suggested method for producing a bolted connection locked to prevent loosening

a Bolt with flange M12 x 90, strength 10.9

b Spacer sleeve 22-13 x 50

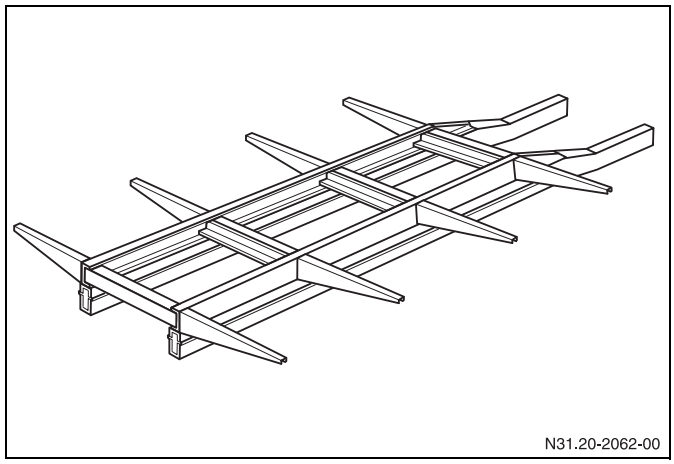
c Washer DIN 7349-13-ST

d Nut with flange M12, strength 10.9

8.1.5 Mounting frame as floor assembly

A mounting frame with continuous longitudinal members is not required if the body floor assembly can assume the mounting frame function.

The longitudinal members can also be integrated in the body. If the mounting frame longitudinal members are intersected by the cross members, the connection between the longitudinal and cross members must be rigid and resistant to torsion and bending.

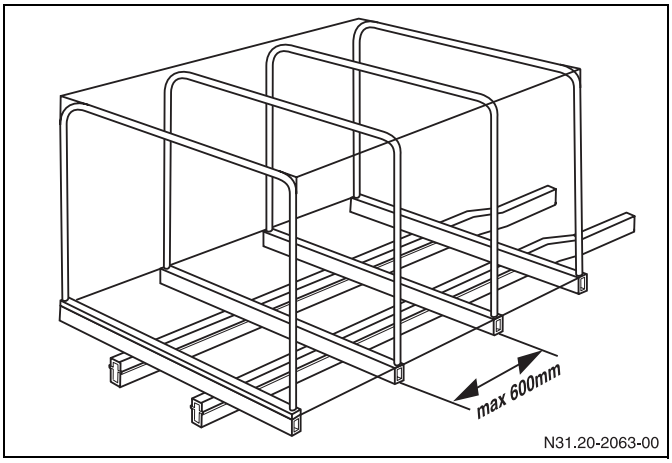


Example of a floor assembly

8.2 Self-supporting bodies

A mounting frame with continuous longitudinal members is not required if the body floor assembly can assume the mounting frame function.

Self-supporting bodies must have the same characteristics as the specified mounting frame. The body floor assembly must have the same rigidity and moment of resistance as a mounting frame.



Example of a body design

8.3 Modifications to the interior

8.3.1 Retrofitting additional seats

Retrofitting standard seats (e.g. front passenger seat) to the body shell is not possible because no reinforcements or suitable attachment points are present.

Daimler AG will issue a certificate of endorsement at its discretion for modifications to the seat attachments (including seat bases) and seat belt anchorages or for the installation of seats other than those available from the factory (▷ page 18).

Proof of the strength of the seats delivered from the factory will only retain its validity if the seats are secured in their original mountings.

When retrofitting seats, it is absolutely essential to keep to the H-point. You can obtain up-to-date documentation from the department responsible (▷ page 18).

When re-installing seat belts, the specified bolts must be tightened to the original torque.

⚠ Risk of injury

If seats other than those fitted at the factory are fitted in conjunction with seat belts available from the factory, only seat belt buckles that are compatible with the belt tongues of the factory-supplied seat belts may be used. Otherwise, the seat belt cannot engage in the seat belt buckle correctly and occupants may be injured in the event of an accident.

Only the components of the series production supplier may be used for the installation of safety belts and seat belt buckles:

Postal address:	Autoliv B.V. & Co. KG Postfach 109 D-25333 Elmshorn
Telephone:	+49 (0)4121 – 797-0

All regulations relevant to approval (e.g. seat belt buckle position) must be observed when fitting seat belts and seat belt buckles other than those available from the factory.

Passenger cabin / load compartment

On panel vans, the bodyshell floor assembly is available from the factory as special equipment under Code V40 (passenger van floor assembly) for retrofitting bench seats. The number of mounting options for the passenger van floor assembly depends on the model series and the equipment and registration variants (the mounting shells for the bench seats are not included in the scope of delivery).

Additional information on special equipment Code V40 can be obtained from your Mercedes-Benz Service Centre, the relevant department (▷ page 17) or under 3.10 "Special equipment" (▷ page 43).

If a rear bench seat with two- or three-point seat belts deviates from the standard seat design, it must comply with the requirements of EC Directives 76 / 115 / EEC and 74 / 408 / EEC.

⚠ Risk of injury

On no account may seats be mounted on the wheel arches. In the event of an accident, persons could be injured if the seats become detached from their anchorages, and this could result in further damage to the vehicle.

8.4 Modifications to closed panel vans

Floor assembly / side panels

On panel vans, the body forms a self-supporting unit with the chassis frame. If body parts are modified or fitted, they must be welded if a bonded connection is not possible.

For this reason, windows, roof hatches and vent openings must be mounted in a sturdy frame. The frame must then be joined by a non-positive attachment to other body elements.

Cab rear panel

If there is an opening in the cab rear panel, a sectional frame must be fitted in the opening.

The remaining braces and pillars must be reinforced by additional gussets and connected to the sectional frame (e.g. by bonding).

Also observe 7.2.6 "Modifications to the cab" (▷ page 130).

Partitions

Partitions in panel vans may be totally or partially removed.

The following partitions are available as special equipment from the factory:

Code	Description
D50	Partition, continuous
D51	Partition, continuous with window
D53	Partition, continuous with a sliding window
D56	Continuous partition on C-pillar
D62	Provision for retrofitting partition
D64	Partition with sliding door
D93	Omission of partition

Additional information on special equipment can be obtained from your Mercedes-Benz Service Centre, the relevant department (▷ page 17) or under 3.10 "Special equipment" (▷ page 43).

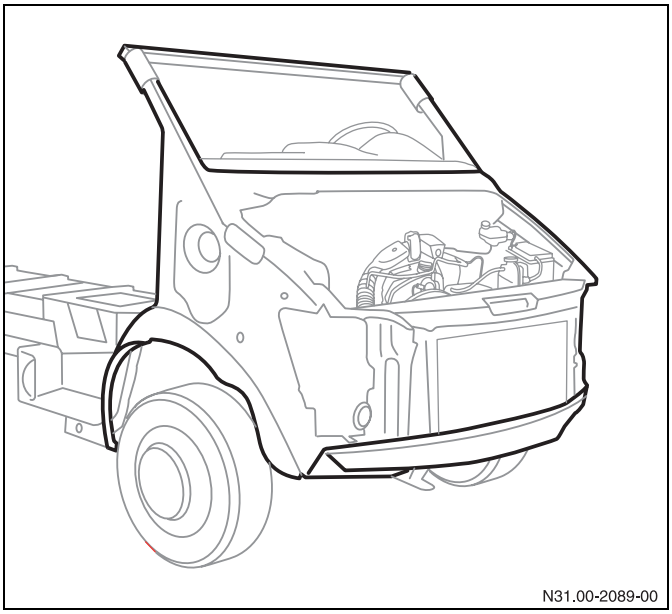
Vehicle roof

Information on roof modifications can be found under 7.2.11 "Panel van / passenger van roof" (▷ page 138).

8.5 Bodies on chassis with supporting base (F28, F50)

Supporting base / windscreen support structure F50

The windscreen support structure offers body manufacturers a base for producing fully integrated bodies (e.g. motor caravans) or special-purpose bodies. It is available from the factory under Code F50 (▷ page 43).



Windscreen support structure

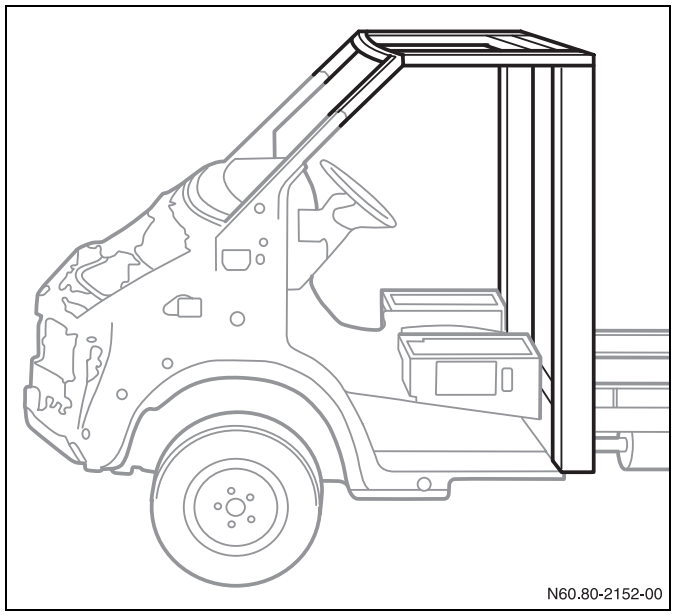
If bodies are mounted on windscreen support structure chassis, you must comply with national regulations and laws.

If bodies are mounted on windscreen support structure chassis, the cab structure must have the same rigidity as the standard vehicle.

The front body part must be designed as a self-supporting structure through to the B-pillar.

A new cell structure is recommended that is identical with the original structure, comprising the following:

- A-pillar
- B–pillar
- Roof cross members
- B-pillar substructure cross members



Example of a windscreen support structure with cell structure

The attachments between the cross members and the cab A- and B-pillars must be positively connected.

A separate, non-positive connection must be made between the headlamp frame and the inner part of the A-pillars – on no account should this connection be bonded.

On no account should a non-steel mudguard be connected by means of a common connection to the headlamp frame and the inside of the A-pillar.

The notes in the following sections must also be observed for bodies on windscreen support structure chassis:

- 3.9 "Maintenance and repairs" (▷ page 40)
- 7.3.3 "Engine cooling system" (▷ page 146)
- 7.3.4 "Engine air intake" (▷ page 147)

We recommend that you obtain a certificate of endorsement from the department responsible for bodies mounted on windscreen support structure chassis.

On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (▷ page 64).

Modifications to the engine flap

If modifications are made to the engine flap, make sure that the water separation feature for the air heating system integrated in the flap is not affected. If necessary, the water separation feature must be replaced by parts with the same function.

In order to ensure that the engine flap functions properly and operates safely, no modifications may be made to the standard engine flap mechanism (bonnet lock, hinges, buffers, catch hook, etc.).

Supporting base with doors F28

On vehicles with supporting base and doors, the cab rear panel and cab roof are omitted ex plant. In addition, an auxiliary roof arch is fitted above the B-pillars to stiffen the cab.

Omission / cutting of B-pillar auxiliary roof arch

If the B-pillar auxiliary roof arches are cut or omitted, reinforcement measures (▷ page 141) are necessary.

For alternative methods of ensuring equivalent rigidity developed by the body manufacturer, a detailed evaluation by the department responsible (▷ page 17) is required.

An endorsement certificate from the department responsible (▷ page 17) is required for the design of the measures ensuring equivalent rigidity.

8.6 Bodies on chassis with low frame

8.6.1 General

A low frame (Code ZM1) that is 205 mm lower than the standard frame is available for vehicles with integral body and the appropriate chassis.

Technical advice on low frame packages

Contact **Mr. Kania** at Alois Kober GmbH if you have any questions or require drawings and technical data relating to the low frame.

Telephone:	+49 (0)8221-97470
Fax:	+49 (0)8221-97369
E-mail:	Bernhard.Kania@al-ko.de
Postal address:	Alois Kober GmbH
	Ichenhauser Strasse 14
	D-89359 Kötz

Sprinter with low frame

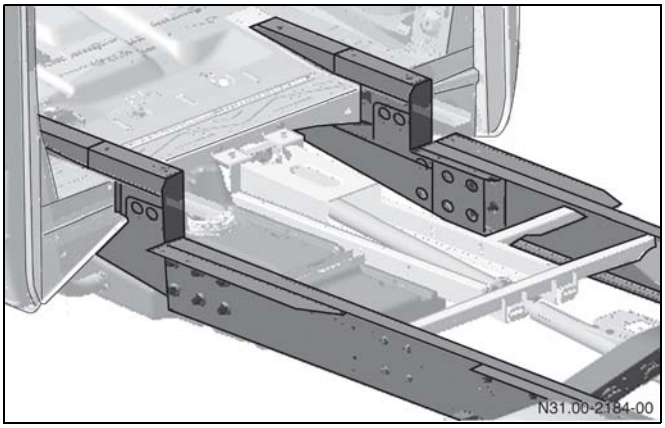
In the case of bodies with a low frame, please refer to all the other sections in these Body / Equipment Mounting Directives, in particular 8.14 "Motor caravans" (▷ page 236).

For bodies with a low frame also note the following:

- On no account should modifications be made to the suspension.
- When retrofitting seats, it is absolutely essential to keep to the H-point. You can obtain up-to-date documentation from the department responsible (▷ page 18).
- On no account should modifications be made to bolted connections between the frame and the cab.
- The minimum distance between the rear edge of the door and an integrated body must be complied with (▷ page 236).
- Make sure that you do not exceed the permissible axle loads.

8.6.2 Low frame bodyshell

On vehicles with low frame the chassis behind the cab has its own frame. The contact person responsible at Alois Kober GmbH will be happy to answer any questions relating to the frame (▷ page 212).



Attachment of the low frame

Overhang extension	
Wheelbase [mm]	**Maximum vehicle overhang from wheel centre on rear axle [mm]**
3,600	2,160
3,850	2,310
4,100	2,460

The vehicle overhang length is part of the total overhang from the rear axle, including the frame overhang extension as well as the body and attachments.

Information on the different types of overhang can be obtained from ALKO (▷ page 212).

On no account should modifications be made to the wheelbase on vehicles with low frame.

8.6.3 Threshold values for the body

Inherent rigidity of the body / floor

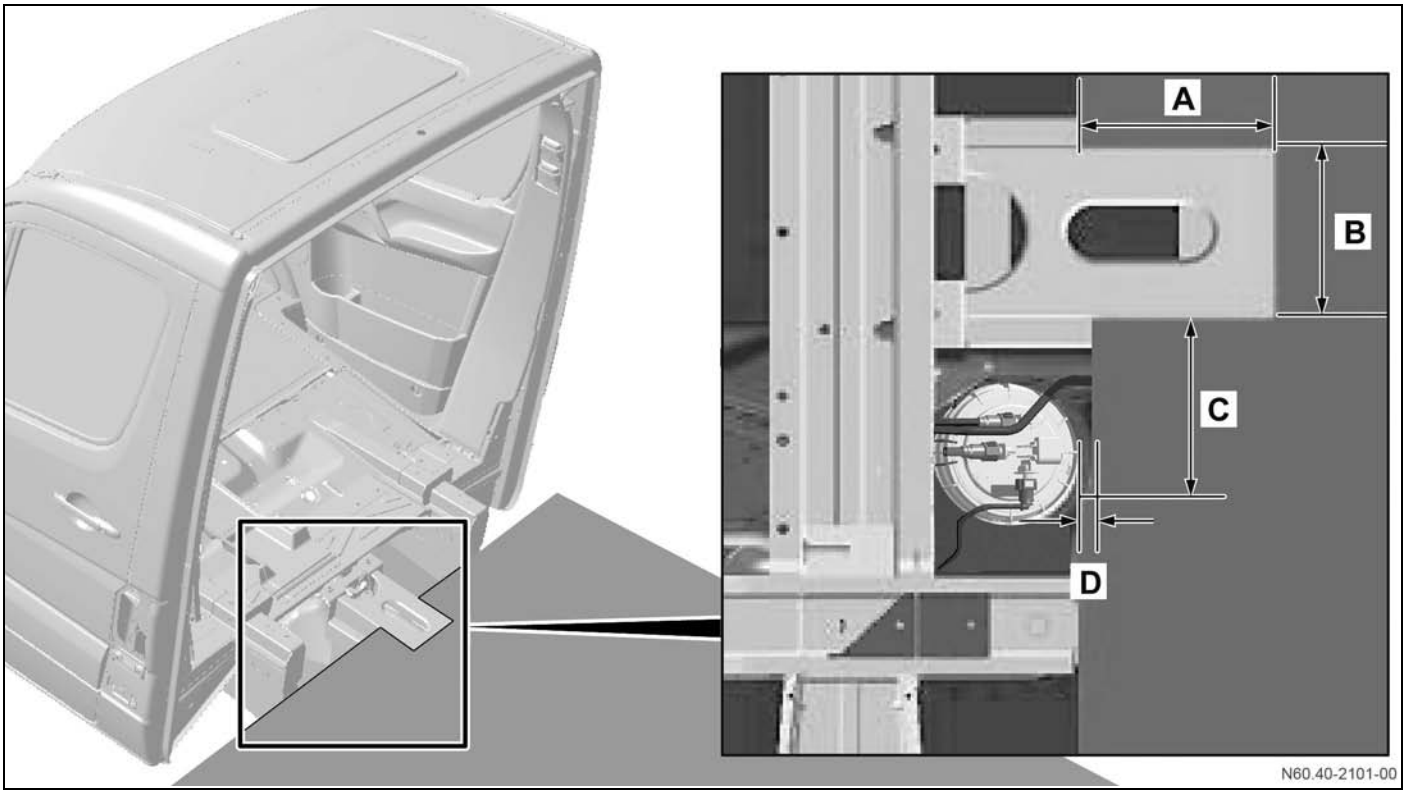
In order to transmit forces between the body and the chassis, the floor of the body must have a bending resistance about the x-axis of EI =8 x 10^{10} Nmm² at a width of 2,000 mm.
Example: sandwich floor of thickness t = 36 mm with 3 mm wooden supports at top and bottom (multiplex wooden floor). In the area where the force is introduced, the floor of the body must be solid wood (e.g. areas near wheel arches, longitudinal members, body mounting brackets, etc.).

Cutting body floor panel

⚠ Risk of accident

A minimum distance of 20 mm must be maintained between the fuel tank and between lines or electrical connections. Otherwise, these components may rub against each other due to movements during operation and suffer damage. This may result in accident or property damage.

In order to compensate for vehicle and body tolerances, the floor panel of the body must be cut in the area indicated.



Specified dimensions for area of cut

A 230 mm
B 215 mm
C 225 mm
D 20 mm

Inherent rigidity of the side wall / body

In order to transmit forces between the body and the chassis, the side wall of the body must be rigid.
Example: sandwich floor t = 30 mm with 3 mm wooden supports inside and outside.

Modifications to the cab

Modifications to roof arches or supporting parts may not be removed without replacement, see 7.2.6 "Modifications to the cab" (▷ page 130).
Bodies with modifications to roof arches or supporting parts on the cab require a certificate of endorsement from the department responsible, see (▷ page 18).

If the fuel filler cap is removed or parts are attached to the fuel filler cap, blocking may occur in the event of an accident. Because of this, the protrusion space in the B-pillar may no longer function correctly. On no account should the cap be covered with panelling parts, and "blocking" parts must never be mounted on the B-pillar.

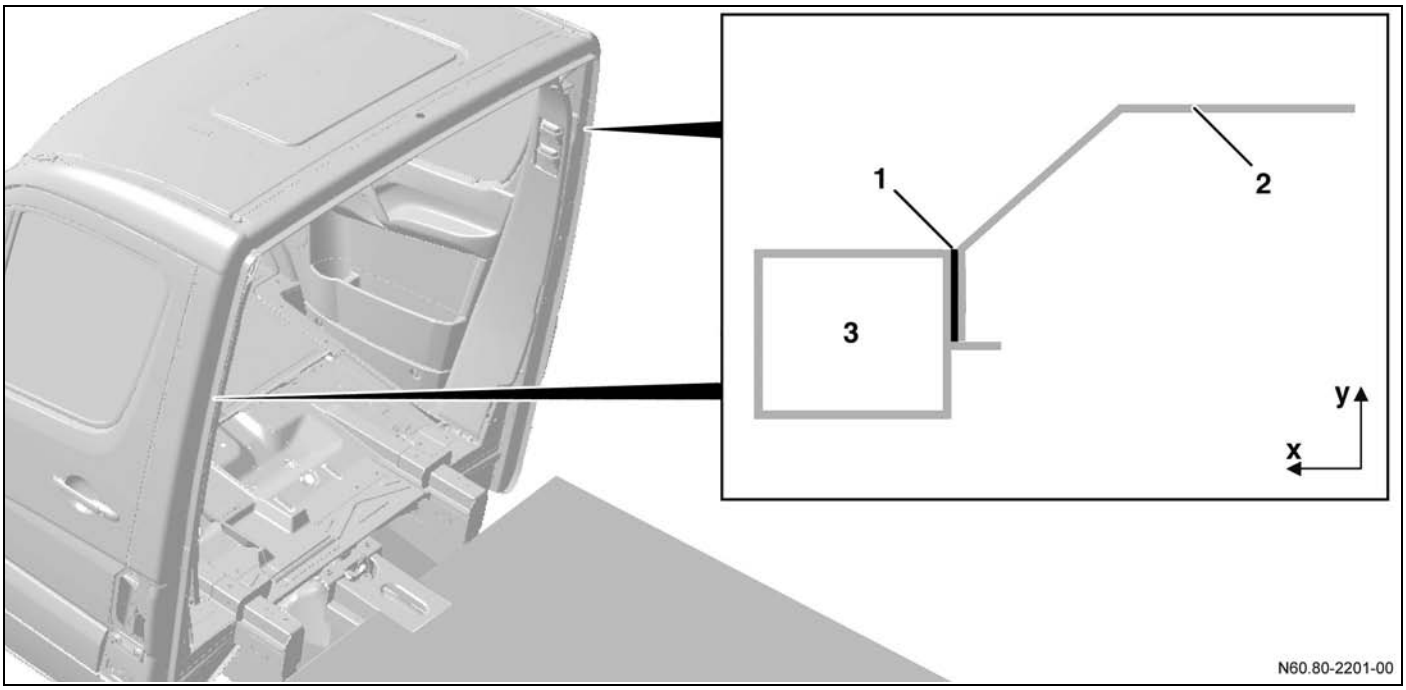
8.6.4 Attachment of the body to the cab

Attachment of cab rear panel to B-pillar (z-axis)

The body side wall must always be connected to the B-pillar. The connection between body and basic vehicle must be non-positive.
It must be assured that forces are transmitted between the body and the B-pillar. This can be achieved by e.g.:

Variant 1

Attachment of body to B-pillar by means of a stay plate with t = 2 mm angled at approx. 2 x 45°. The stay plate must be bonded across its entire surface area.



Variant 1: Connection of body to B-pillar via stay plate

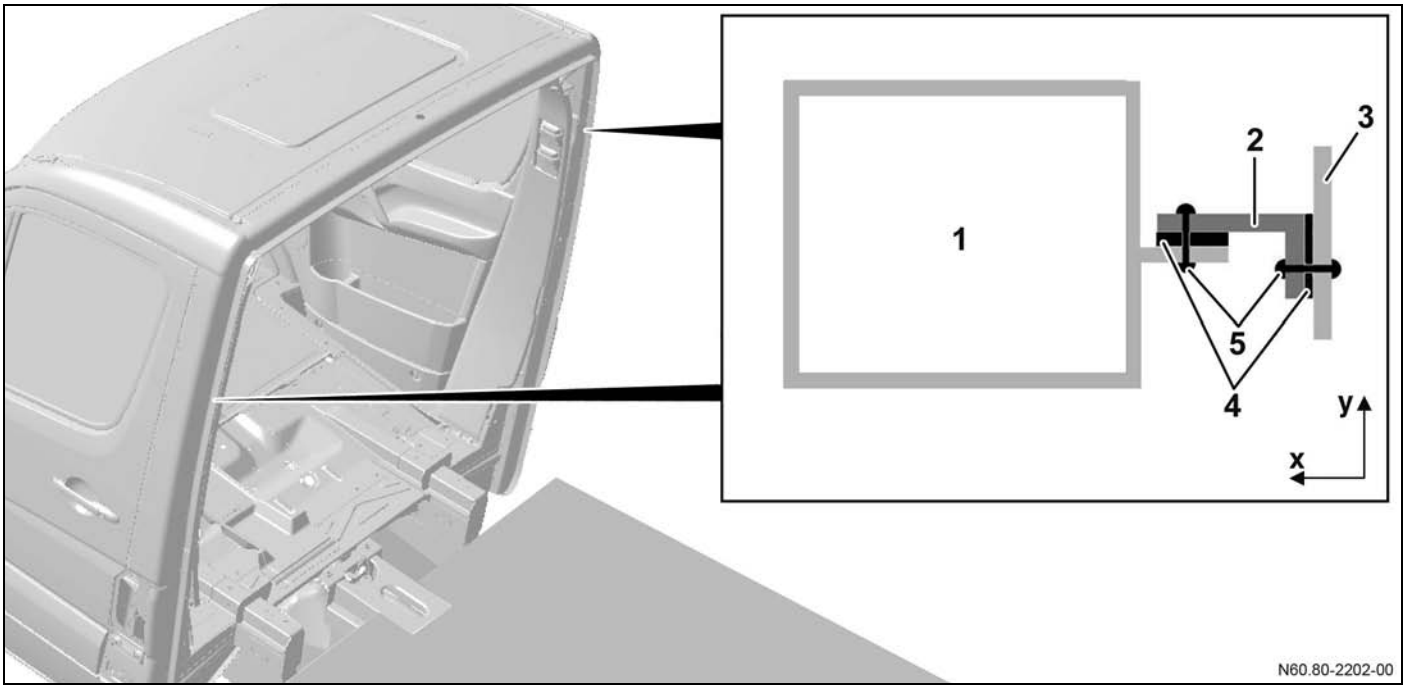
1 Bonding flange

2 Stay plate

3 B-pillar

Variant 2

Attachment of body to welding flange of B-pillar with angle pieces.



Variant 2: Connection of body to B-pillar welding flange via angle pieces

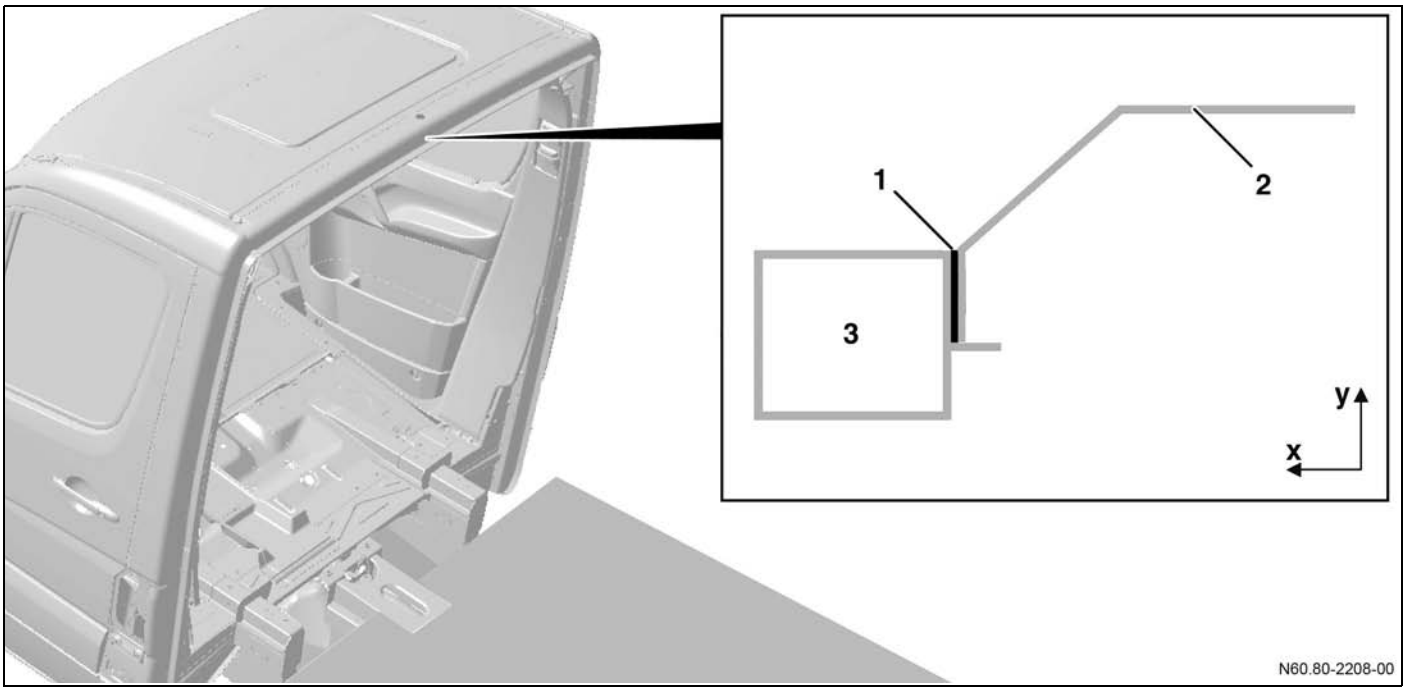
1 B-pillar
2 Angle piece
3 Front wall of body
4 Bonding flange
5 Rivet

Attachment of cab rear panel to B-pillar roof arch (y-axis)

In addition to the connection between body side wall and basic vehicle, it is necessary to form a non-positive connection between body and basic vehicle in the area of the B-pillar roof arch on vehicles with integral bodies. This can be achieved by e.g.:

Variant 1

Attachment of body to B-pillar roof arch by means of a stay plate with t = 2 mm angled at approx. 2 x 45°. The stay plate must be bonded across its entire surface area.



Variant 1: Connection of body to B-pillar roof arch via stay plate

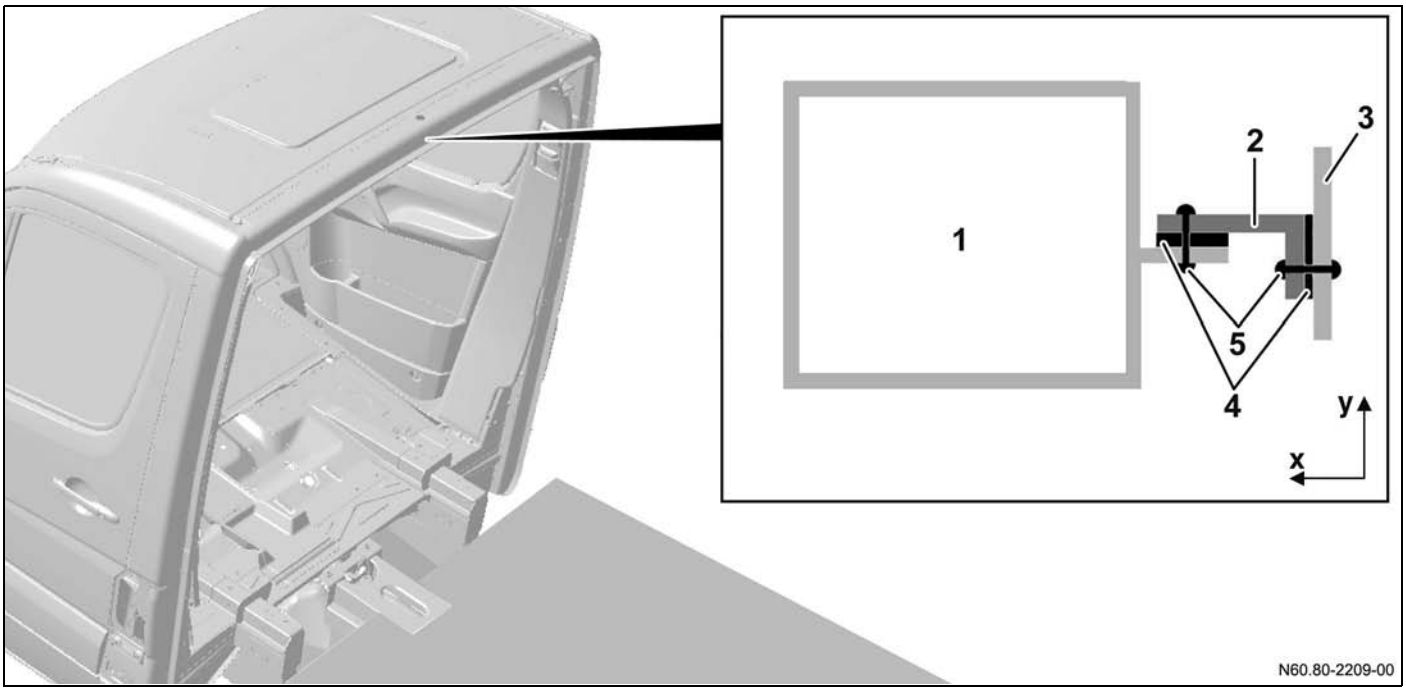
1 Bonding flange

2 Stay plate

3 B-pillar

Variant 2

Attachment of body to welding flange of B-pillar roof arch with angle pieces.



Variant 2: Connection of body to B-pillar roof arch welding flange via angle pieces

1 B-pillar

2 Angle piece

3 Front wall of body

4 Bonding flange

5 Rivet

On vehicles with cut B-pillar roof arch, the body manufacturer must ensure force transfer to the simulating structure (▷ page 141). A certificate of endorsement is required from the department responsible (▷ page 18).

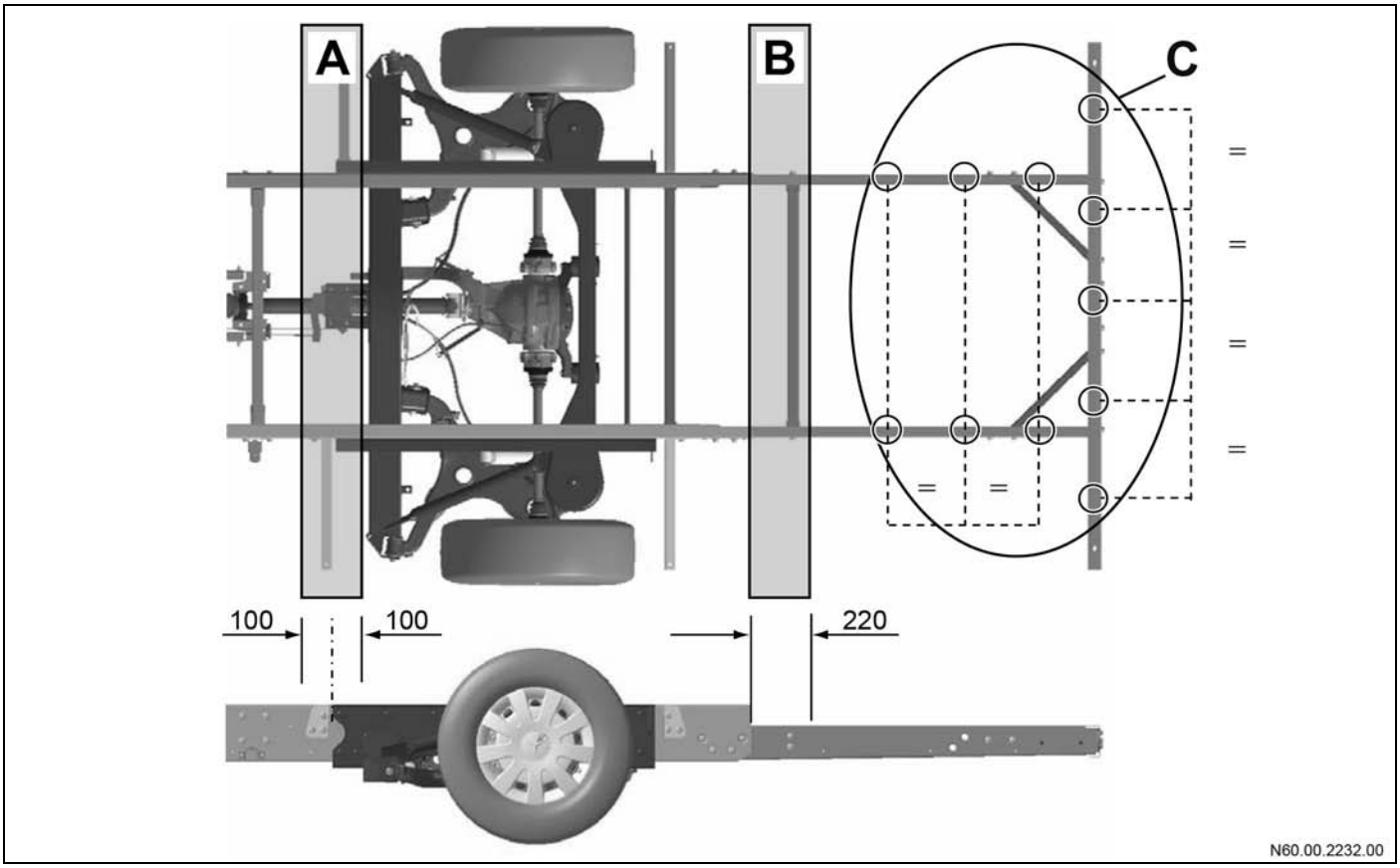
8.6.5 Attachment to the low frame

Bonding of body floor / wooden floor to low frame chassis

The body is attached to the low frame by bonding. The floor must be bonded to the longitudinal members along its entire length using a flexible adhesive (e.g. Sikaflex 221).

Bolting of body floor / wooden floor to low frame chassis

In addition to the bond between body and low frame chassis over the entire area, the body floor must be bolted to the longitudinal frame member in the vehicle overhang. Additional bolted connections may be added to the entire area of the longitudinal frame member except in the areas marked (A) and (B).



Bolting of body floor / wooden floor to low frame chassis

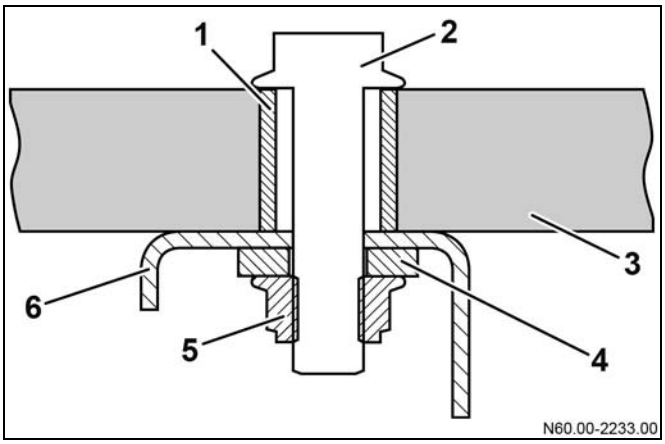
A Area 100 mm in front of and behind front subframe edge

B Area of overhang up to 220 mm after the end of the main longitudinal member

C Area of required bolted connection in vehicle overhang

When bolting the body floor / wooden floor to the low frame chassis, observe the following:

- Bolted connections are not permissible 100 mm in front of and behind the front subframe edge (area A).
- Bolted connections are not permissible in the overhang up to 220 mm after the end of the main longitudinal member (area B).
- In the overhang, three bolted connections are required in each longitudinal frame member and five bolted connections are required in the end cross member.
- A spacer sleeve must be used on every bolted connection:



Bolted connection between longitudinal frame member of low frame and body / floor panel

1 Spacer sleeve
2 Bolt M10
3 Body floor
4 Washer M10
5 Nut M10
6 Frame

- The bolted connection must be tightened to the standard tightening torque.
- An M10 washer (outside diameter 25 mm) that is free of burrs must be used for all bolted connections.

Trailer coupling

The maximum trailer load of 2 t must not be exceeded. Information on trailer couplings can be obtained from the contact person at ALKO.
See "Technical advice on low frame packages" (▷ page 212).

The permissible axle loads must be observed regardless of the vehicle's operating state.

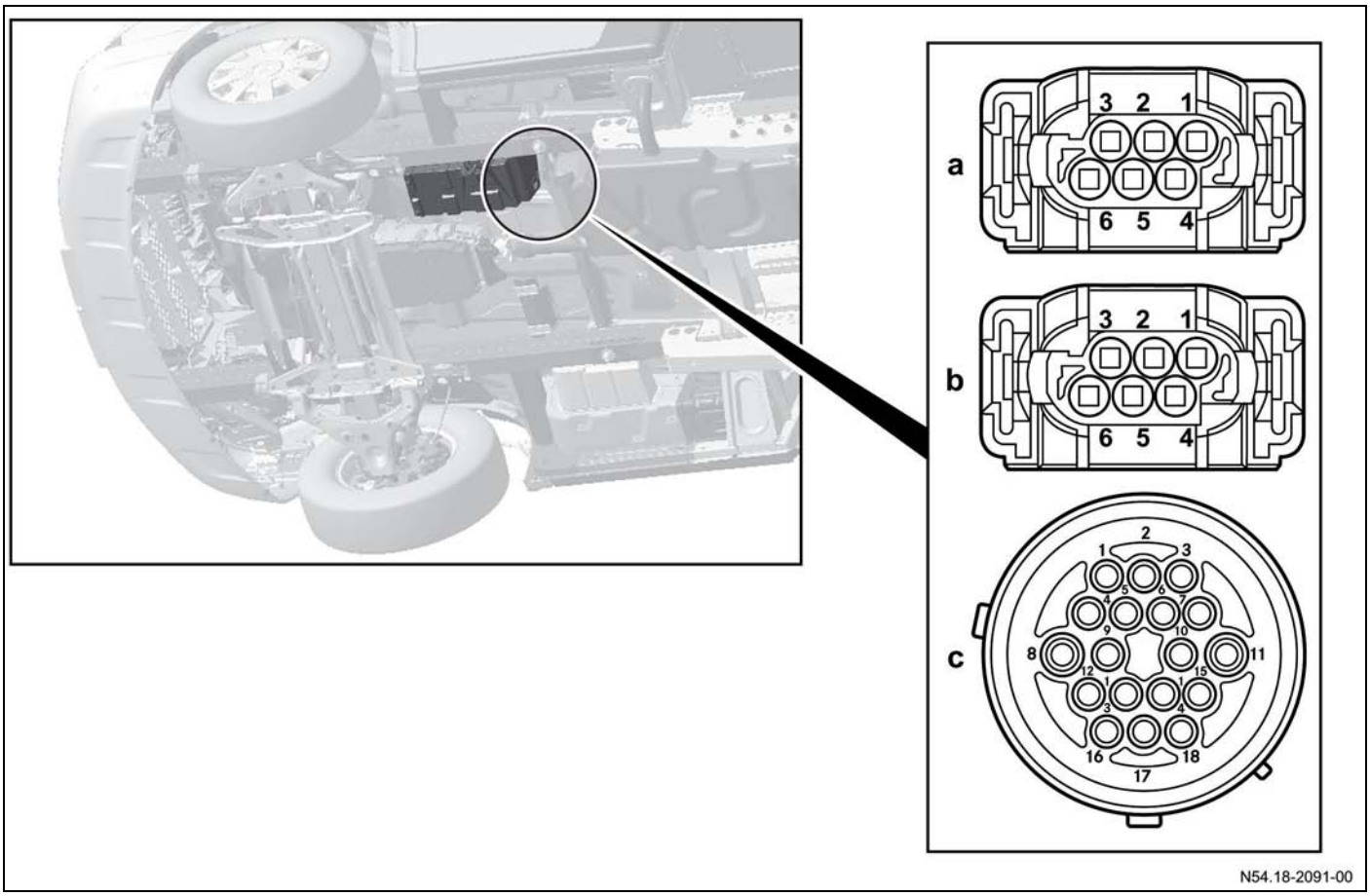
8.6.6 Low frame electrics

General

On low frame vehicles, the frame beyond the B-pillar to the rear must no longer be used as an earth return. An earth line to the rear lights and other consumers must be routed separately as far as the rear end of the vehicle.
See (▷ page 84)

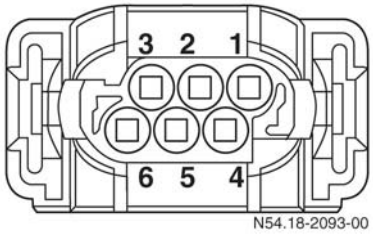
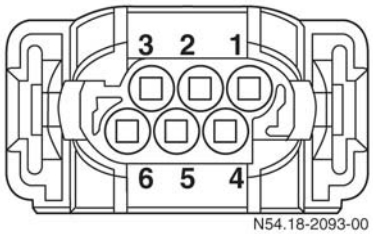
Interfaces

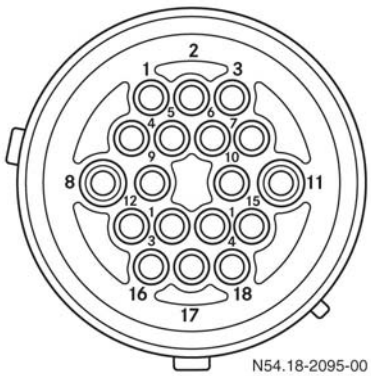
An interface consisting of max. 3 connectors is provided on vehicles with a low frame. This is located in the underbody behind the battery well, and is only accessible from below. In addition to the connections for the rear lights, it also provides connections for side marker lamps and the electrics for the trailer power socket, depending on the vehicle's equipment.



Position of low frame interface connector behind battery box

Connector assignment

	Part number	Colour	Pin assignment	Body manufacturer mating connector
a	A 210 540 36 81  N54.18-2093-00	Black	Pin 1: Taillight Pin 2: Brake light Pin 3: Rear fog light Pin 4: Perimeter lamps / side marker lamp in rear light Pin 5: Turn signal light	A 220 540 02 81
b	A 220 540 00 81  N54.18-2093-00	White	Pin 1: Perimeter lamps / side marker lamp in rear light Pin 2: Brake light Pin 3: Taillight Pin 4: Dual backup lamp Pin 5: Turn signal light	A 220 540 03 81

	Part number	Colour	Pin assignment	Body manufacturer mating connector
c	A 203 545 24 28  N54.18-2095-00	Black	Pin 1: – Pin 2: – Pin 3: Left side marker lamp no. 1 Pin 4: Left side marker lamp no. 2 Pin 5: Right side marker lamp no. 1 Pin 6: Right side marker lamp no. 2 Pin 7: Side marker lamp earth 1 Pin 8: Side marker lamp earth 2 Pin 9: – Pin 10: Trailer socket backup lamp Pin 11: Trailer socket terminal 30 Pin 12: Trailer socket left turn signal Pin 13: Trailer socket rear fog light Pin 14: Trailer socket right turn signal Pin 15: Trailer socket right taillight Pin 16: Trailer socket brake light Pin 17: Trailer socket left taillight Pin 18: –	A 203 545 22 28

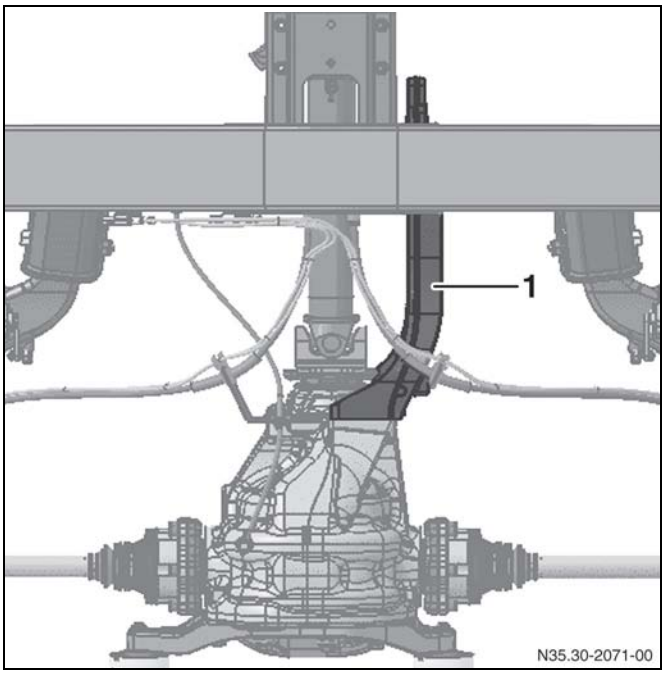
!

Vehicles with cab, crewcab or low frame do not have a separate licence plate lamp. The licence plate is illuminated by a lamp lens integrated in the standard tail lamps. An additional lamp at pin 1 is not possible. For retrofitting a separate license plate illumination, see 6.5.2 "Fitting additional lamps" (▷ page 86).

8.6.7 Low frame drive train / chassis

General

Modifications to the transfer case torque support are not permitted.



Torque support

1 Torque support

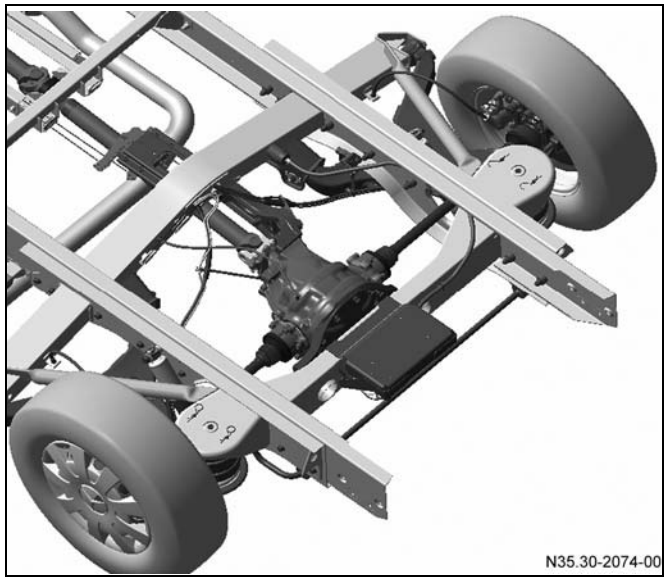
Propeller shaft clearance

With all attachments and bodies, a minimum clearance of 15 mm from the body to the propeller shaft must be maintained (▷ page 147).

Suspension

Modifications to chassis components, such as subframes, semi-trailing arms, axle housings and spring mountings, are not permitted.

In contrast to the basic vehicle, chassis with a low frame are equipped with semi-trailing arm rear suspension. Code CE2 rear air springs are available as special equipment for low frame vehicles.



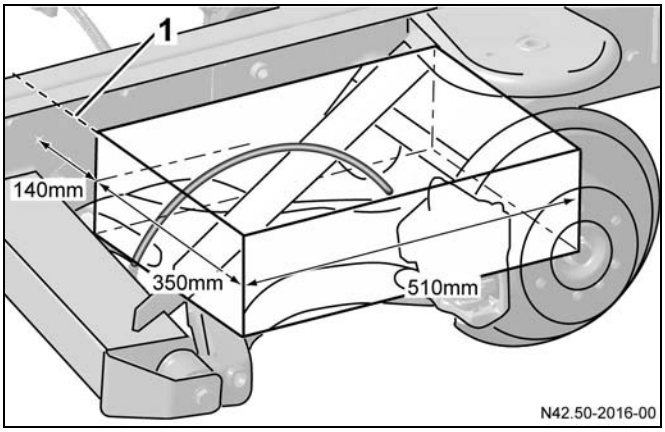
Suspension

During the planning phase, take steps to ensure that bodies or mounted equipment will not impair installation or removal of the subframe.

Brake hose clearance

Modifications to the standard brake hose clearances due to additional bodies or mounted equipment are not permissible in the area between the axle articulation components and centre of the rear axle (▷ page 113).

There must be no possibility of the brake hose touching the body, including during driving operations. If necessary, suitable protective measures must be taken e.g. installation of an anti-chafing coil.

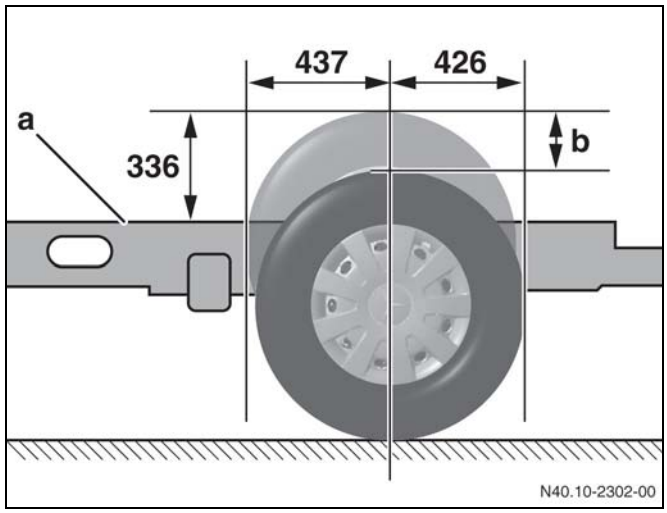


Area of brake hose clearance

1 Maximum height to upper edge of longitudinal member

8.6.8 Wheel clearance / wheel arch design

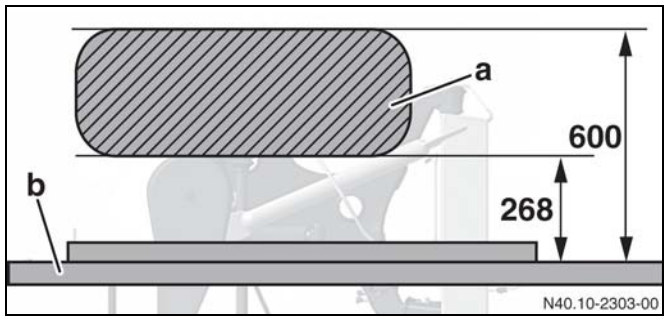
In the case of bodies on vehicles with low a frame, sufficient distances must be maintained between the basic vehicle and the body, e.g. the wheel arches.



Minimum clearance to the body

a Top frame edge

b Spring travel



Minimum clearance to the frame

a Necessary freedom of movement between wheel and body

b Longitudinal frame member

8.6.9 Low frame fuel tank shield

If you retrofit a trailer coupling, a fuel tank shield will be needed for the following vehicles:

- 4-cylinder diesel engine on 3.5 t vehicles with low frame and underbody protection
- 4-cylinder diesel engine on 3.88 t vehicles with low frame
- 6-cylinder diesel engine on 3.88 t vehicles with low frame

Information is available from your Mercedes-Benz Service Centre.

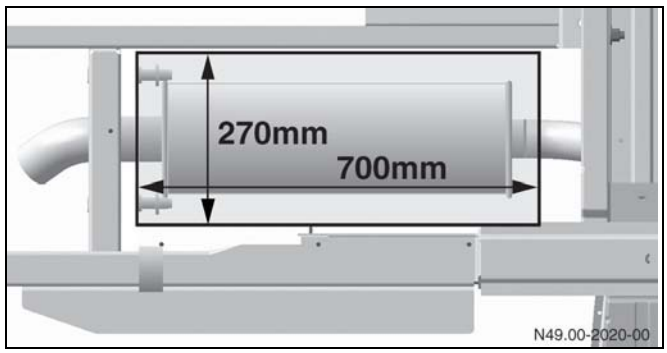
8.6.10 Low frame exhaust system

General

On no account should modifications be made to the exhaust system, especially in the vicinity of exhaust gas aftertreatment components (diesel particulate filter, catalytic converter, oxygen sensor etc.). See 7.3.2 "Exhaust system" (▷ page 145).

Heat shield

In vehicles with low a frame chassis it is necessary to install a suitable heat shield in the area of the main silencer in order to prevent heat from affecting the body.



Heat shield

8.7 Platform bodies

To ensure the uniform loading of the chassis frame, the body must be attached to the chassis frame by means of a mounting frame (U-section longitudinal members) (▷ page 200).

If the standard platform is subjected to point loads (e.g. for the transportation of cable drums, coils, etc.), the substructure and the platform floor must be reinforced to support the load.

Before mounting the body:

- Weigh the chassis and define the body length.

Chassis with crewcab:

- If necessary, the rear frame overhang may have to be shortened to prevent the permissible rear axle load from being exceeded and to ensure that the minimum front axle load is maintained.
- Reflectors must be mounted on the body to comply with legal requirements (in Germany, Section 51a StVZO, German Road Traffic Licensing Regulations) (▷ page 86).

Version	Moment of resistance W_x for each longitudinal member in cm^3
3.5 t	17
4.6 t and 5 t	30

For the section dimensions of the mounting frame longitudinal members, see the graph on (▷ page 202).

!

Where bodies include attachments which move independently, ensure that there is adequate clearance between the attachments and the basic vehicle, otherwise they may collide with the basic vehicle, resulting in damage.

i

For vehicles with natural gas system, also observe 7.3.9 "NGT Sprinter natural gas system" (▷ page 150)

8.8 Panel vans

To ensure the uniform loading of the chassis frame, the body must be attached to the chassis frame by means of a mounting frame (U-section longitudinal members) (▷ page 200).

On panel vans, bolted connections locked to prevent loosening and spacer sleeves must be provided behind the cab at the first and second body brackets. The dimensions of the spacer sleeves must be adequate to ensure that they cannot become deformed (▷ page 206).

Version	Moment of resistance W_x for each longitudinal member in cm^3
3.5 t	30
4.6 t and 5 t	40

i

For integral box bodies (▷ page 244).

i

For vehicles with natural gas system, also observe 7.3.9 "NGT Sprinter natural gas system" (▷ page 150)

8.9 Refrigerated vehicles

Refer also to the following sections:

- 7.5.1 "Retrofitting an air-conditioning system" (▷ page 169).
- 7.5.4 "Power take-offs" (▷ page 170).
- 7.2.11 "Panel van / passenger van roof" (▷ page 138).
- 6.4.6 "Retrofitting electrical equipment" (▷ page 75).

With panel vans, easy access to the components of the door mechanism (e.g. guide rails and hinges) must be retained so as not to hinder possible repair work.

!
On panel vans, the insulation increases the weight of the doors and therefore the load on the hinges, carriages and locking systems.

8.10 Tipper bodies

Vehicles with tipper bodies must comply with national regulations and laws.

On vehicles with automatic transmission, hydraulic assemblies cannot be driven by PTOs on the transmission side (▷ page 170).

Make sure that you do not exceed the permissible axle loads.

For vehicles with natural gas system, also observe 7.3.9 "NGT Sprinter natural gas system" (▷ page 150)

Also see section "Side underride guards" (▷ page 198) and 7.6.8 "Underride guard" (▷ page 197).

Pivots

- The rear pivot on three-way and rear-end tipper bodies must be positioned as close to the rear axle as possible.
- When the side gates or tailgate are folded down, they must not strike against the frame end, the light fittings or the trailer coupling.
- The front pivot must be provided with guide brackets so that the pivots can be guided when the tipper body is lowered.

Restraining facilities

- Comply with all national regulations and laws.
- Fit a support (folding support) to prevent the tipper body from lowering
- Secure operating devices against accidental operation
- Connect a "Tipper body" indicator lamp to provide a visual warning that the tipper body has not folded back completely (in driving position)

Lifting press

- The press carrier is attached to cross members in the mounting frame.
- The cross members of the mounting frame and the chassis must be placed on top of each other as far as possible.
- On three-way tipper bodies, the application point of the lifting press must be in front of the centre of gravity of the body and the payload.

Mounting frame

If chassis are provided with tipper bodies, the mounting frame must have the correct dimensions to support the high loads to which the vehicle will be subjected.

Observe the following points:

- Attach mounting frame to body support brackets as per 8.1.4 "Attachment to the frame" (▷ page 203).
- Make sure that the steel longitudinal and cross members have the correct dimensions.
- Close off the rear area of the mounting frame towards the panel van and, if necessary, reinforce the mounting frame by installing a diagonal cross or by taking other appropriate measures.

Vehicles with tipper bodies can only be used under normal operating conditions. If the vehicle is to be used in heavy-duty operating conditions, we recommend that you contact the department responsible (▷ page 17).

Version	Moment of resistance W_x for each longitudinal member in cm^3
3.5 t	30
4.6 t and 5 t	40

8.11 Semitrailer tractors

Chassis may be converted into semitrailer tractor vehicles provided that this conversion complies with national regulations and laws.

The conversion of chassis into semitrailer tractor vehicles requires a certificate of endorsement from the department responsible.

The longitudinal frame members must be reinforced by an auxiliary frame or a semitrailer bracket.

The vehicle must be equipped with anti-roll bars on the front and rear axles.

⚠ Risk of accident

Vehicles equipped with ESP are not suitable for use as semitrailer tractor vehicles. Otherwise, if the vehicle is fitted with ESP, this system may no longer work correctly and could ultimately fail. The driver could lose control of the vehicle and cause an accident.

It is therefore imperative to select the special equipment available under Code BW2, "Omission of ESP", if the vehicle will be used as a semitrailer tractor vehicle.

Recommended special equipment (option codes) for conversion to semitrailer tractor vehicle

Code BW2: ESP omission

Code EE8: Uprated battery 12 V 100 Ah

Code E28: Additional battery 12 V 100 Ah

Code EK1: Auxiliary consumer terminal strip

Code E57: Trailer socket electrical system

We also recommend the use of additional anti-roll bars as special equipment to optimise handling characteristics, depending on the type of semitrailer used. You can obtain information on recommended special equipment from the department responsible (▷ page 17).

Mounting frame for semitrailer tractor vehicles

If the vehicle is used as a semitrailer tractor vehicle, a steel mounting frame made of rectangular tubes, 100 x 60 x 3 (or s = 4 mm) is required. The mounting frame must extend rearwards as far as the standard chassis end and, towards the front, as far as the first body support bracket behind the cab.

The mounting frame must be attached via the ex factory body support brackets as per 8.1.4 "Attachment to the frame" (▷ page 203).

In addition, the attachment between the frame and the mounting frame must be rigid at the frame end. The attachment must be made to the upper chord of the longitudinal frame members on the 906.1, 906.2, 906.6 and 906.7 model series (▷ page 203).

An additional rigid attachment must be made at the front end of the longitudinal frame members.

Electrical connection for the semitrailer

All additional electrical consumers must be connected as per 6.4 "Interfaces" (▷ page 73) and 6.4.6 "Retrofitting electrical equipment" (▷ page 75).

- Connecting lines must not scrape against body parts.
- The body manufacturer must ensure freedom of movement when cornering.
- Connecting lines must not get caught on the semitrailer or pull on the trailer power socket.
- When the tractor is driven without a semitrailer, the connecting lines must be secured correctly.

Brake system

The semitrailer brake system must be connected to the semitrailer tractor vehicle. On no account should overrun brakes be fitted.

To allow the department responsible (▷ page 17) to issue a certificate of endorsement, the body manufacturer must ensure:

- The brake system of the semitrailer tractor and semitrailer, the compressed air supply and the compressed air reservoir must be designed in accordance with EC directive 71 / 320 / EEC and / or ECE-R13.
- A hydraulic-pneumatic control valve must be installed in the vehicle brake system for actuation of the semitrailer brake. Two valves manufactured by Beka are approved by Daimler AG. The certificate from the German Federal Bureau of Motor Vehicles can be accessed via Mercedes-Benz Ceron or obtained from the department responsible (▷ page 17).

!

The semitrailer brake circuit must be designed with a sufficient supply of energy in accordance with EC Directives 71 / 320 / EEC and ECE-R13.

The semitrailer manufacturer and the body manufacturer are responsible for the correct functioning of the semitrailer brake.

Mounting plate and semitrailer coupling

The body manufacturer must ensure that the mounting plate and semitrailer coupling are adequately dimensioned.

Comply with all national regulations and laws. (e.g. 94 / 20 / EC, ECE-R55).

The mounting plate and the semitrailer coupling must be mounted in compliance with the manufacturer's specifications and mounting instructions.

8.12 Rescue vehicles

Vehicles with bodies for rescue or recovery equipment must be attached with mounting frames of adequate dimensions (▷ page 203).

In addition, the bodies must be fitted with two rigid connections on each longitudinal frame member (▷ page 205).

Bodies for rescue and recovery vehicles require a certificate of endorsement from the department responsible.

For the attachment of cable winches, also see "Winches behind the cab" (▷ page 178).

Also observe "Side underride guards" (▷ page 198) and 7.6.8 "Underride guard" (▷ page 197).

8.13 Torsional rigidity of body types

The bodies and mounting frames for torsionally rigid bodies (e.g. municipal vehicles, fire-brigade panel vans or street-cleaning vehicles) must be attached by means of bolted connections locked to prevent loosening and spacer sleeves at the front of the frame (▷ page 206). The body support brackets fitted at the factory must be used.

If required, the mounting frame must be additionally reinforced at the rear by fitting a diagonal cross.

Also observe 6.4.6 "Retrofitting electrical equipment" (▷ page 75).

A certificate of endorsement is required from the department responsible (▷ page 18).

8.14 Motor caravans

For integral motor caravans (▷ page 244).

Prior to conversion into a motor caravan, please make sure that:

- legal requirements are observed (national road traffic type approval laws or the relevant EC directives)
- the minimum requirements for interior design and motor caravan equipment are fulfilled

For vehicles with natural gas system, also observe 7.3.9 "NGT Sprinter natural gas system" (▷ page 150)

For the conversion of vehicles in Germany, appropriate information sheets can be requested from the relevant technical inspection authorities for motor vehicles (e.g. TÜV, DEKRA).

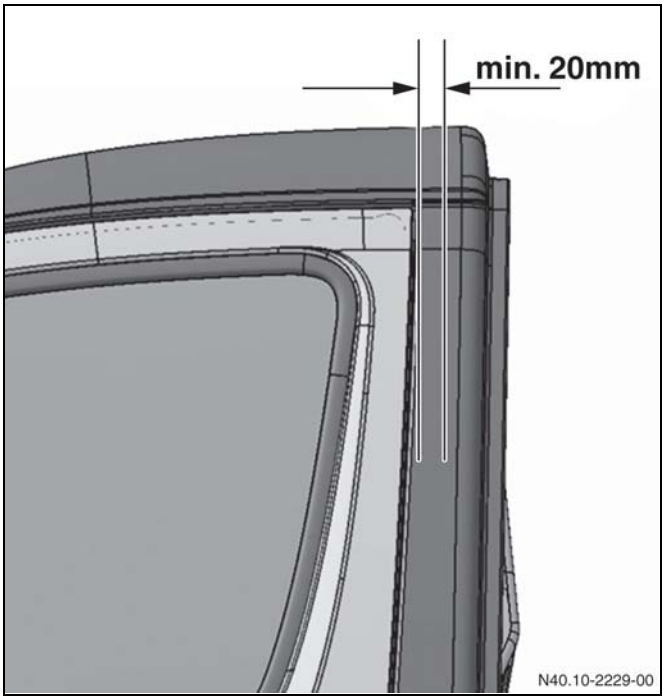
- Easy access to the components of the door mechanism (e.g. guide rails and hinges) must be retained so as not to hinder possible repair work.
- The standard fuel filler cap must not be removed or covered with any "blocking" parts.

If the fuel filler cap is removed or parts are attached to the fuel filler cap, blocking may occur in the event of an accident. Because of this, the protrusion space in the B-pillar may no longer function correctly. On no account should the cap be covered with panelling parts, and "blocking" parts must never be mounted on the B-pillar.

Attachment to the frame

- The body must be secured to the basic vehicle by means of body support brackets fitted at the factory or by means of additional body support brackets (▷ page 203).
- The body support brackets must be secured using two bolts for each body support bracket.

The minimum distance between the rear edge of the door and an integrated body must be > 20 mm. Otherwise, the rear edge of the door may come into contact with the body in the event of an accident, and in extreme cases the door may be jammed.



Minimum distance between rear edge of door and integrated body

Particular attention must be paid to the following sections of the body / equipment mounting directives:

- Dimensions and weights (▷ page 31).
- Instructions on modifications to the basic vehicle (▷ page 111).
- Electrics / electronics (▷ page 69)
- Rain / light sensor (▷ page 108).
- Mudguards and wheel arches (▷ page 134)
- Liquefied-petroleum gas (LPG) (▷ page 169).
- Minimum rear axle loads (▷ page 47)

Modifications or conversions to standard vehicles (e.g. the installation of a raised roof) may invalidate the type approval. In Germany, modifications to the vehicle must therefore be inspected by the relevant technical authorities in accordance with Section 19, Paragraph 2 of the StVZO (German Road Traffic Licensing Regulations).

The vehicle registration documents must be presented. After the modifications have been entered, the vehicle registration documents must be submitted to the relevant registration office so that a new type approval can be issued.

Due to the higher centre of gravity, at least one anti-roll bar is required on the front axle (NCV3 model series 906).

We recommend fitting an additional anti-roll bar on the rear axle. This is available from the factory as special equipment under Code CE6 (▷ page 43).

Additional information on electrical components and additional assemblies can be found under 6 "Electrics / electronics" (▷ page 69) and 7.5 "Additional equipment" (▷ page 169).

8.15 Lifting work platform

General

Where bodies include attachments which move independently, ensure that there is adequate clearance between the attachments and the basic vehicle, otherwise they may collide with the basic vehicle, resulting in damage.

The lifting work platform may only be used when the vehicle is fully raised on its outriggers. The vehicle must not be moved with the lifting work platform extended (improper use). The frame may be damaged if the vehicle is moved with the lifting work platform extended. The body manufacturer must implement a safety facility to prevent the vehicle from being moved with the lifting work platform extended. This may be done through the control system of the lifting work platform, for example, or in conjunction with the parameterizable special module (PSM) (▷ page 98).

When the platform is raised, there must be no additional loads in or on the cab (improper use). There is otherwise a risk of damage to the frame.

For vehicles with natural gas system, also observe 7.3.9 "NGT Sprinter natural gas system" (▷ page 150)

If chassis are equipped with lifting work platforms, the following points must be observed due to high loads when in the raised state:

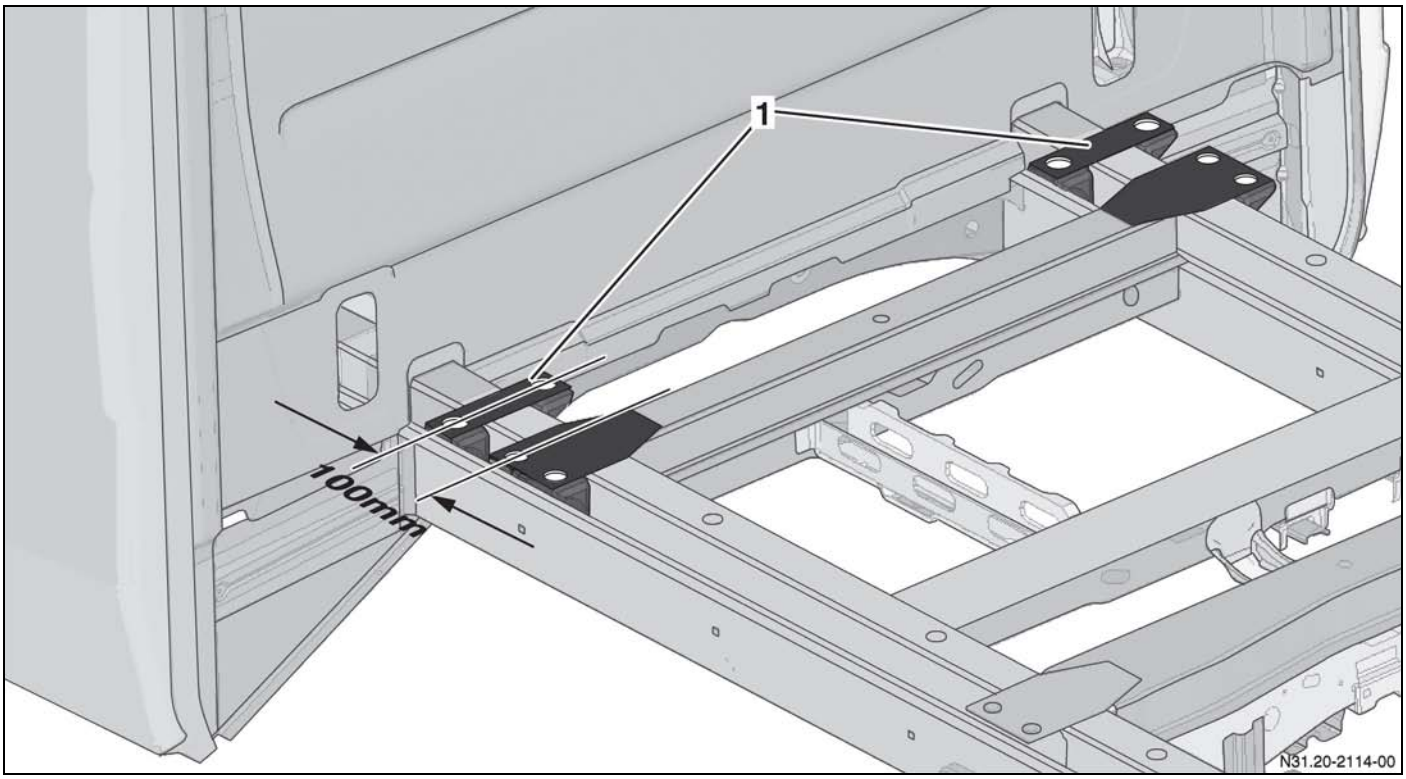
- Retrofitting of lifting work platforms requires a certificate of endorsement from the department responsible (▷ page 18).
- The stability of the lifting work platform must be ensured by the body manufacturer.
- The body manufacturer must produce additional operating instructions for the lifting facility, which are to be supplied with the vehicle. The operating instructions must contain the warning that no persons or loads are permitted in the cab when the vehicle is in the raised state.
- To ensure the uniform loading of the chassis frame, the body must be attached to the chassis frame by means of a mounting frame.
- All body support brackets must be fastened to the mounting frame.
- An additional, double body support bracket must be installed for each longitudinal frame member behind the cab (see example illustration).
- The attachment of the first and additional brackets must be with bolted connections locked to prevent loosening and spacer sleeves (▷ page 206).
- The introduction of force in the supports must be exactly halfway between the two standard double bracket pairs behind the cab on the mounting frame. In addition, the mounting frame must be sufficiently protected against torsion in the area of force introduction by means of a cross member.

Required additional body support bracket

To ensure a uniform introduction of force in the chassis frame, one additional body support bracket is required for each longitudinal frame member in the area behind the cab.

The body support brackets must be of at least the same quality as the standard material H240LA and have a wall thickness of 3 mm.

The hole spacing of the additional body support bracket to the next adjacent hole in the existing body support bracket must measure 100 mm.



Body support brackets

1 Additional body support brackets

When installing additional body support brackets, we recommend the use of genuine Mercedes-Benz parts.

For more detailed information on the standard positions and dimensions of the body support brackets, see 2.4.1 "Body manufacturer portal" (▷ page 20) and 8.1.4 "Attachment to the frame" (▷ page 203).

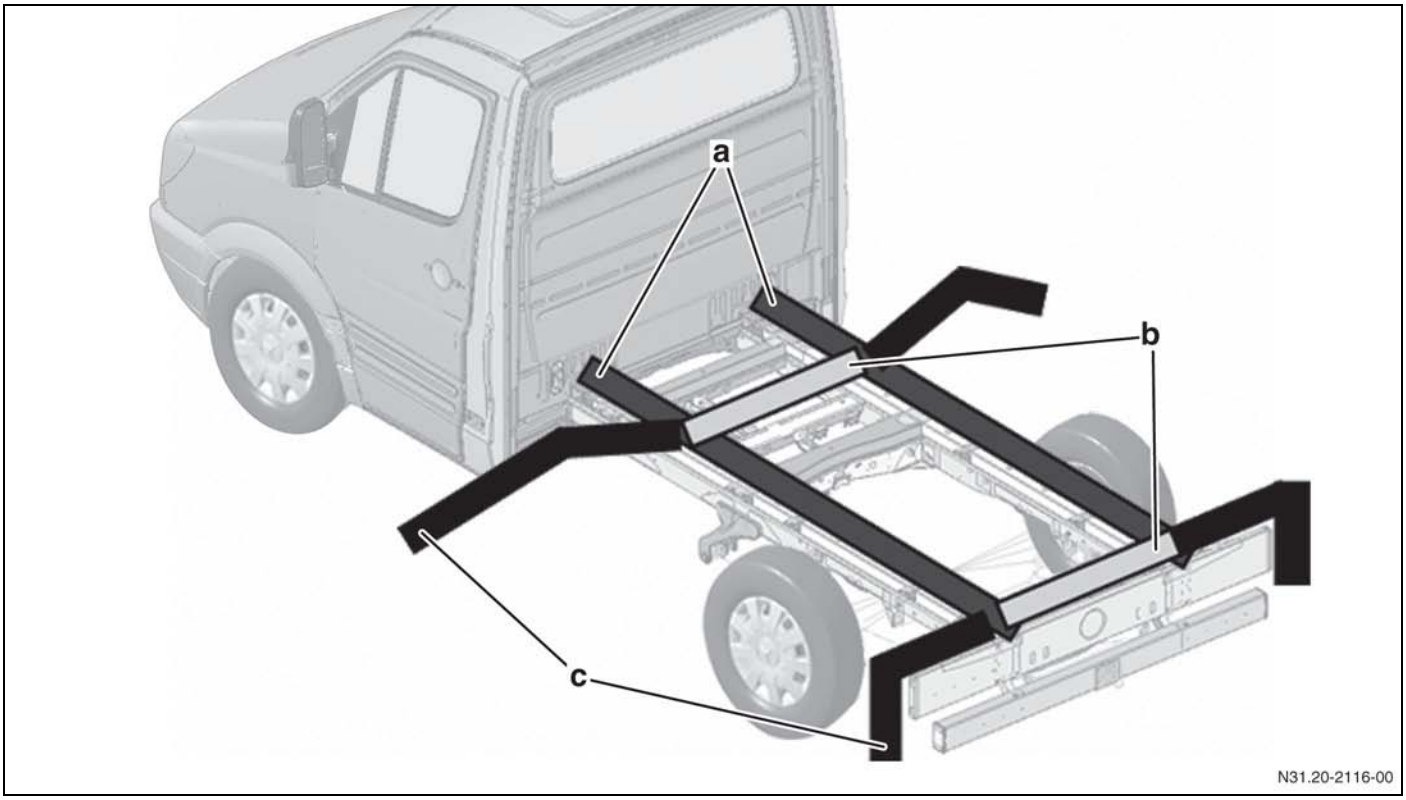
Mounting frame

The installation of lifting work platforms on a chassis requires a mounting frame of sufficient size.

Version	Moment of resistance W_x for each longitudinal member in cm^3
3.5 t	30
4.6 t and 5 t	40

The mounting frame must be attached in the same way to all body support brackets. The attachment of the mounting frame at the first and additional brackets must be with bolted connections locked to prevent loosening and spacer sleeves (▷ page 206).
The introduction of force in the mounting frame by the outriggers must be exactly halfway between the two as standard double bracket pairs behind the cab.

In the area of the introduction of force in the mounting frame by the outriggers, a rigid cross member (front and rear) must be installed to protect the mounting frame against torsion.



Attachment of mounting frame to body support brackets

a Area of additional brackets

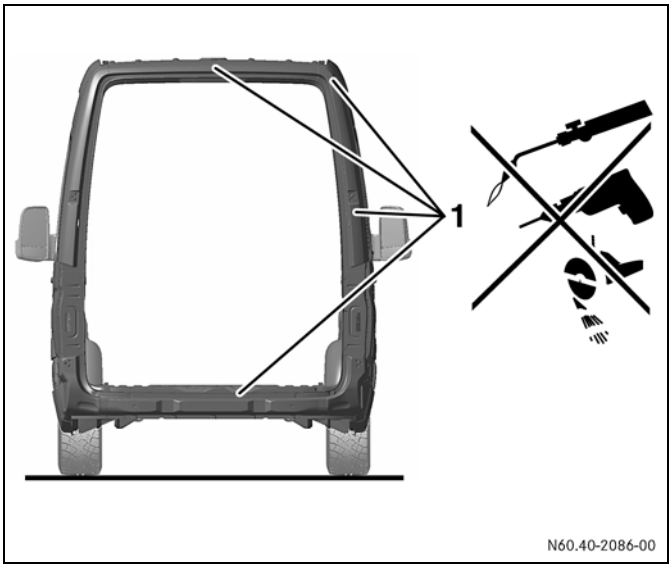
b Required cross members for mounting frame in area of force introduction from outriggers

c Outriggers

8.16 Increasing the height of the roof

For increasing the height of the vehicle roof post-delivery, observe the guidelines under "Increasing the height of the roof" (▷ page 139).

!
Any modifications to the rear door opening including the roof area are only permitted in exceptional cases and require a certificate of endorsement from the department responsible (▷ page 18).



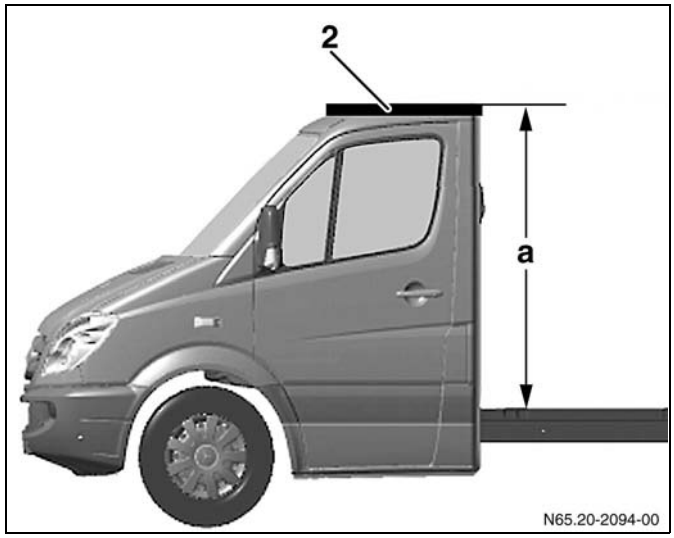
Rear door opening and roof area

1 Areas in which modifications are not permitted (certificate of endorsement required)

8.17 Bodies on chassis with lowered roof

Code FA1 "Lowered roof" is available for partially integrated and alcove bodies on vehicles with Code F28 "Platform with doors". Code FA1 comprises the following changes from the standard version:

- The height of the roof is reduced by approx. 70 mm.
- The vehicle is cut in the area of the roof / door portal, reinforced by means of bodyshell modifications and then painted in the area of the bodyshell modifications.
- The standard-equipment sun visors and grab handles are mounted in the same position at modified attachment points.
- The headliner can be attached at the previous attachment points, but must be trimmed and adjusted to fit the interior at the front and sides by the body manufacturer.
- The vehicle is fitted with a temporary roof arch for transportation.
- Before the body is erected it is necessary for the body manufacturer to install the auxiliary roof frame supplied at the attachment points provided in order to ensure adequate equivalent rigidity. This provides a lowered attachment plane for bodies.



Location of auxiliary roof frame

2 Auxiliary roof frame

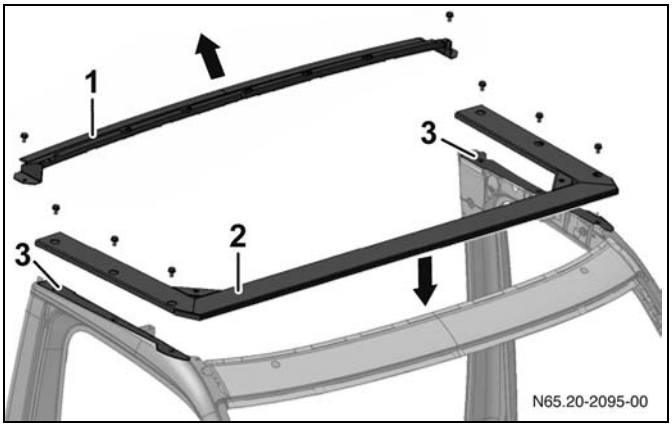
a Distance between top edge of longitudinal frame member and top edge of auxiliary roof frame:

3.5 t	a = 1,556 mm
5 t	a = 1,536 mm

8.17.1 Mounting the auxiliary roof frame

The temporary roof arch (1) must be detached before mounting the auxiliary roof frame (2).

The auxiliary roof frame (2) must then be mounted at the points provided using six M10 x 20 10.9 hexalobular bolts (tightening torque 40 Nm +/-2 Nm).



Mounting of auxiliary roof frame

1 Transport roof arch

2 Auxiliary roof frame

3 Cutting area with reinforcements (bodyshell modifications)

8.17.2 Mounting the body on the auxiliary roof frame

The body can be attached to the auxiliary roof frame by

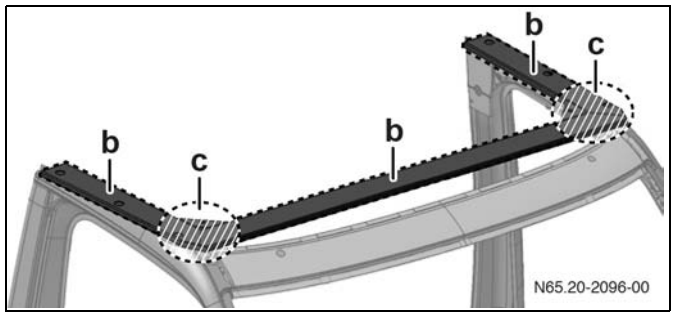
- Bolts
- Rivets
- Adhesive bonding
- Welding

Holes must not be drilled in the corners of the auxiliary roof frame.

The auxiliary roof frame must not be cut.

The introduction of force to the auxiliary roof frame must occur by way of an area load (line load). Point loads must not be introduced into the auxiliary roof frame.

The load on the auxiliary roof frame while driving must not exceed 100 kg. When the vehicle is stationary, a load of 200 kg is permissible.



Attachment areas for auxiliary roof frame on vehicles with lowered roof

b Attachment area

c No drilling allowed

Also observe 5.3 "Corrosion protection measures" (▷ page 64). The department responsible will be happy to answer any questions (▷ page 17).

8.18 Partially integrated bodies

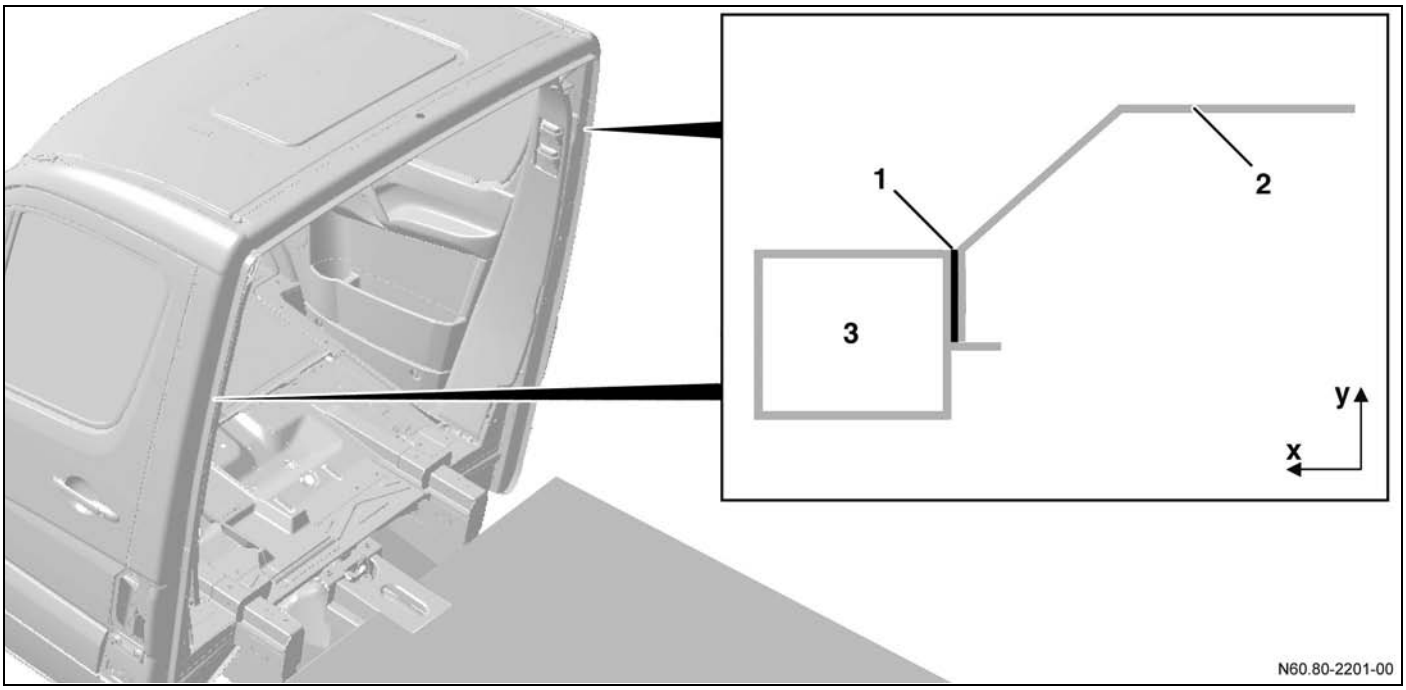
A non-positive connection between cab and body is required on vehicles with partially integrated bodies e.g. partially integrated motor caravans, integral box bodies etc.

Attachment of cab rear panel to B-pillar (z-axis)

The body side wall must always be connected to the B-pillar. The connection between body and basic vehicle must be non-positive.
It must be assured that forces are transmitted between the body and the B-pillar. This can be achieved by e.g.:

Variant 1

Attachment of body to B-pillar by means of a stay plate with t = 2 mm angled at approx. 2 x 45°. The stay plate must be bonded across its entire surface area.



Variant 1: Connection of body to B-pillar via stay plate

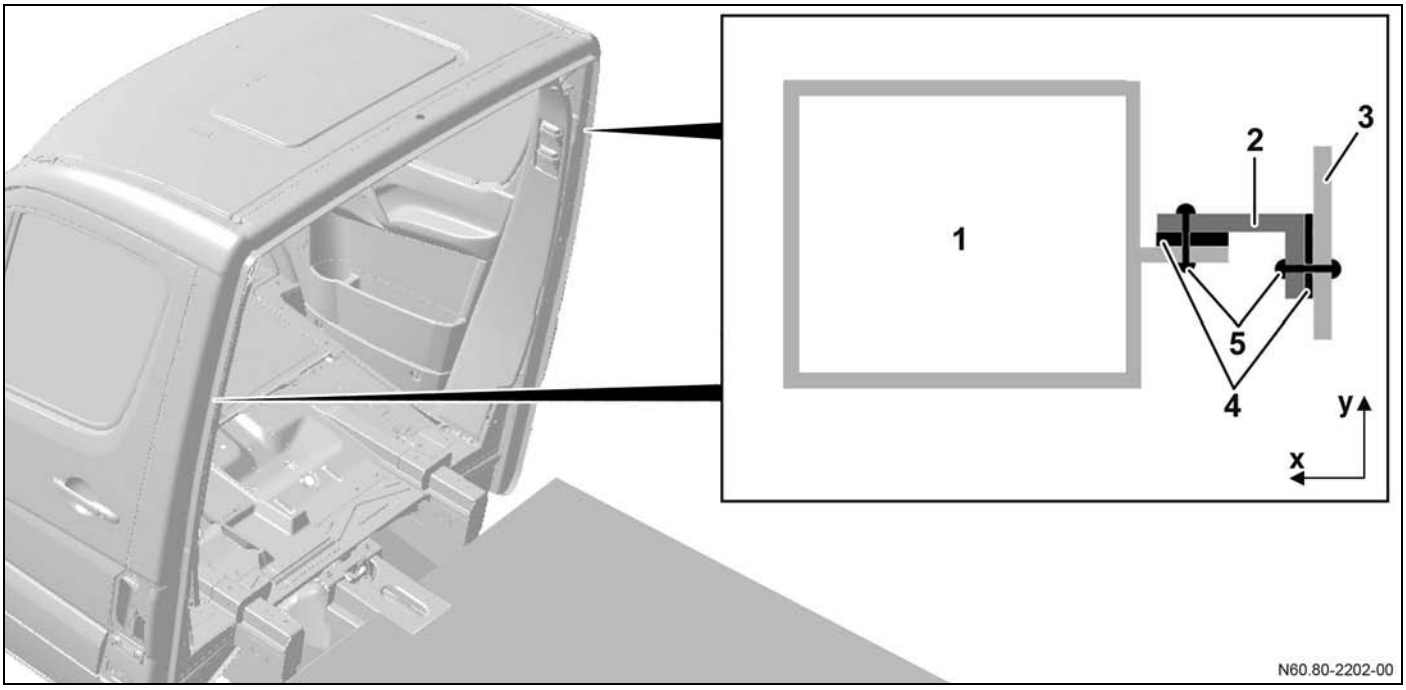
1 Bonding flange

2 Stay plate

3 B-pillar

Variant 2

Attachment of body to welding flange of B-pillar with angle pieces.



Variant 2: Connection of body to B-pillar welding flange via angle pieces

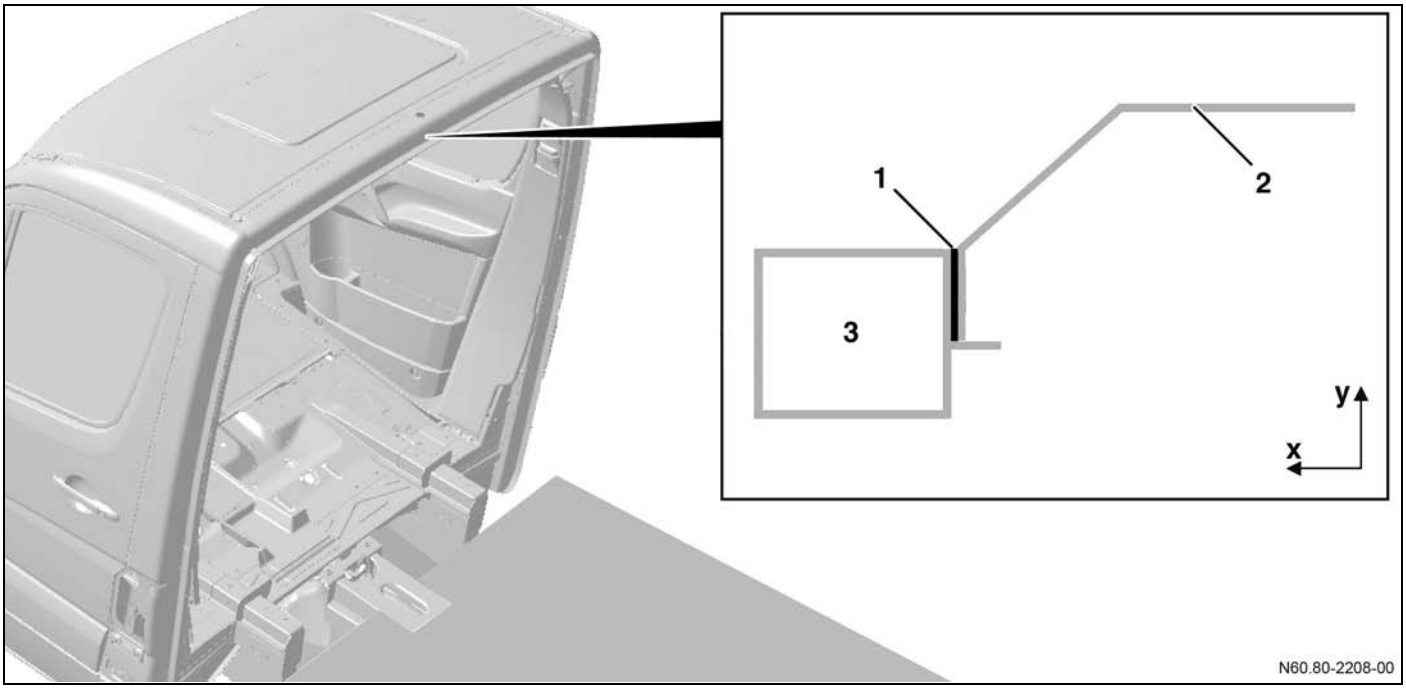
1 B-pillar
2 Angle piece
3 Front wall of body
4 Bonding flange
5 Rivet

Attachment of cab rear panel to B-pillar roof arch (y-axis)

In addition to the connection between body side wall and basic vehicle, it is necessary to form a non-positive connection between body and basic vehicle in the area of the B-pillar roof arch on vehicles with integral bodies. This can be achieved by e.g.:

Variant 1

Attachment of body to B-pillar roof arch by means of a stay plate with t = 2 mm angled at approx. 2 x 45°. The stay plate must be bonded across its entire surface area.



Variant 1: Connection of body to B-pillar roof arch via stay plate

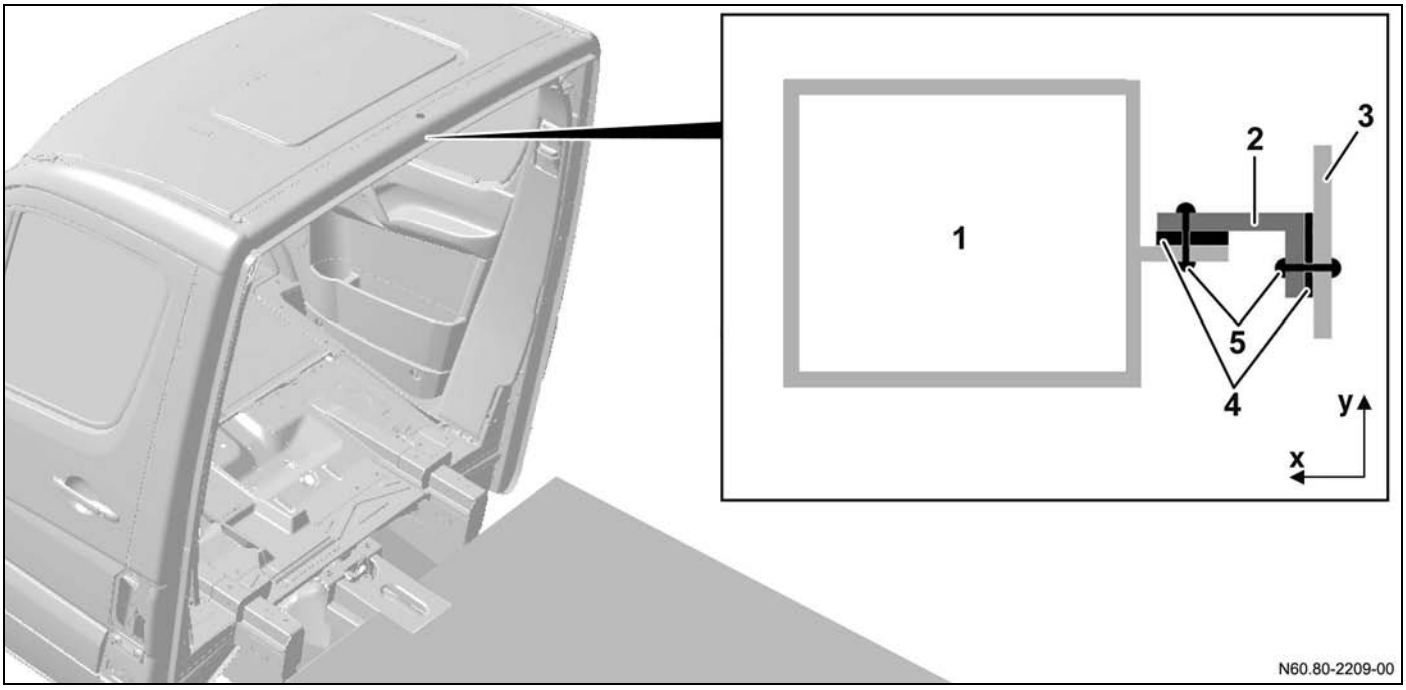
1 Bonding flange

2 Stay plate

3 B-pillar

Variant 2

Attachment of body to welding flange of B-pillar roof arch with angle pieces.



Variant 2: Connection of body to B-pillar roof arch welding flange via angle pieces

1 B-pillar
2 Angle piece
3 Front wall of body
4 Bonding flange
5 Rivet

On vehicles with cut B-pillar roof arch, the body manufacturer must ensure force transfer to the simulating structure (▷ page 141). A certificate of endorsement is required from the department responsible (▷ page 18).

9.1 Calculating the centre of gravity

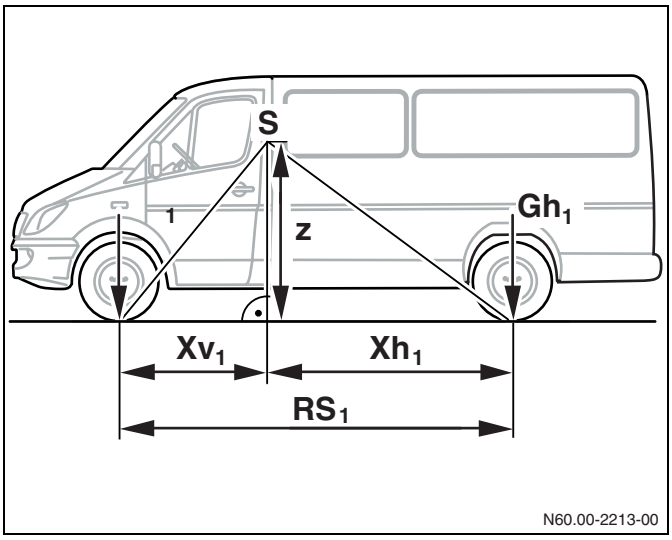
After installation or modification of the equipment, vehicles must be weighed on a weighbridge in two different positions with a secured load appropriate to the area of vehicle application.

The determined centre of gravity must not exceed the specified threshold values (▷ page 44).

Before the measurement is taken, the tyres must be inflated to maximum pressure and the vehicle suspension must be locked at the front and rear axle.

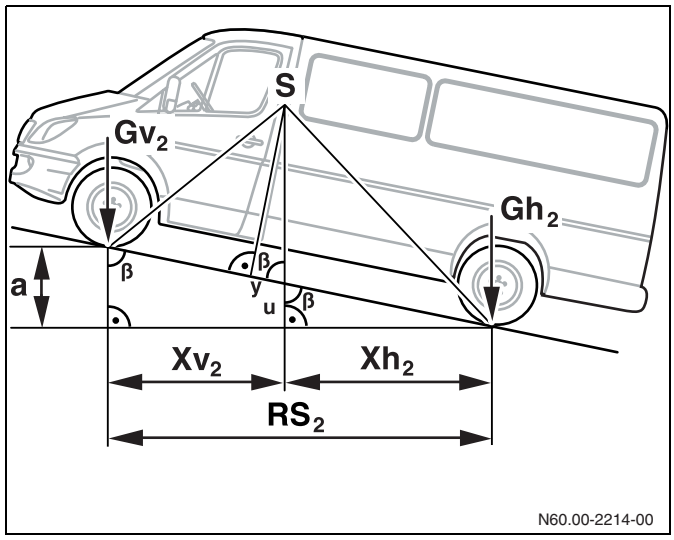
The axle loads must be weighed when the vehicle is horizontal (Gv1 and Gh1) and when one axle is raised by amount "a" (Gv2 and Gh2; we recommend a = 500 mm). The wheelbase RS1 (3,250 mm, 3,665 mm or 4,325 mm) is defined by the vehicle model series (see Ordering) or must be measured using a rule.

Measurement 1



***Measurement* with vehicle level**

Measurement 2



Measurement with axle raised

x_{v1}, x_{v2}...distance from centre to front axle, measurement 1 / 2

x_{h1}, x_{h2}... distance from centre to rear axle, measurement 1 / 2

$_{v}$ = front axle

$_{h}$ = rear axle

9.1 Calculating the centre of gravity

The sum of all moments about a point is zero. Therefore:

$$Mh = 0$$

$$(Gv_1 + Gh_1) \times xh_1 = Gv_1 \times RS_1 \quad (1)$$

$$xh_1 = \frac{Gv_1 \times RS_1}{Gv_1 + Gh_1} \quad (2)$$

The "new" wheelbase RS_2 after raising one axle is calculated as follows:

$$RS_2 = \sqrt{RS_1^2 - a^2} \quad (3)$$

xh_2 is calculated analogously to xh_1:

$$xh_2 = \frac{Gv_2 \times RS_2}{Gv_2 + Gh_2} \quad (4)$$

The height of the centre of gravity z is calculated from:

$$z = \tan\beta \times y \quad (5)$$

The unknown angle β can be calculated from:

$$\cos\beta = \frac{a}{RS_1} \quad (6), \text{ therefore, the following results for } \beta:$$

$$\beta = \cos^{-1}\left(\frac{a}{RS_1}\right) \quad (7)$$

The required y is obtained from the equation:

$$y = xh_1 - \sqrt{u^2 + xh_2^2} \quad (8)$$

The values for xh_1 and xh_2 are already known from equations (2) and (4). The required **u** is calculated using:

$$\frac{a}{RS_2} = \frac{u}{xh_2} \quad (9) \text{ and results in the following equation:}$$

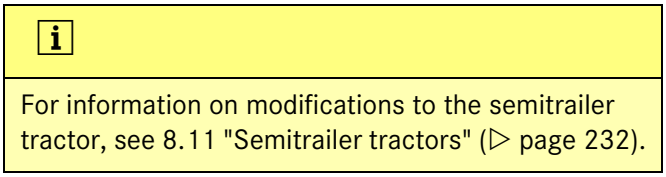
$$u = \frac{a \times xh_2}{RS_2}$$

If equations (7) and (10) are used in equation (5) and are referred back to the given / measured values **a**, $\mathbf{RS_1}$, $\mathbf{Gv_1}$, $\mathbf{Gh_1}$, $\mathbf{Gv_2}$ and $\mathbf{Gh_2}$, the result for the height of the centre of gravity **z** is:

$$z \equiv \tan\left[\cos^{-1}\left(\frac{a}{RS_1}\right)\right] \times \left(\frac{Gv_1 \times RS_1}{Gv_1 + Gh_1} - \frac{Gv_2 \times RS_1}{Gv_2 + Gh_2}\right)$$

9.2 Position of semitrailer coupling

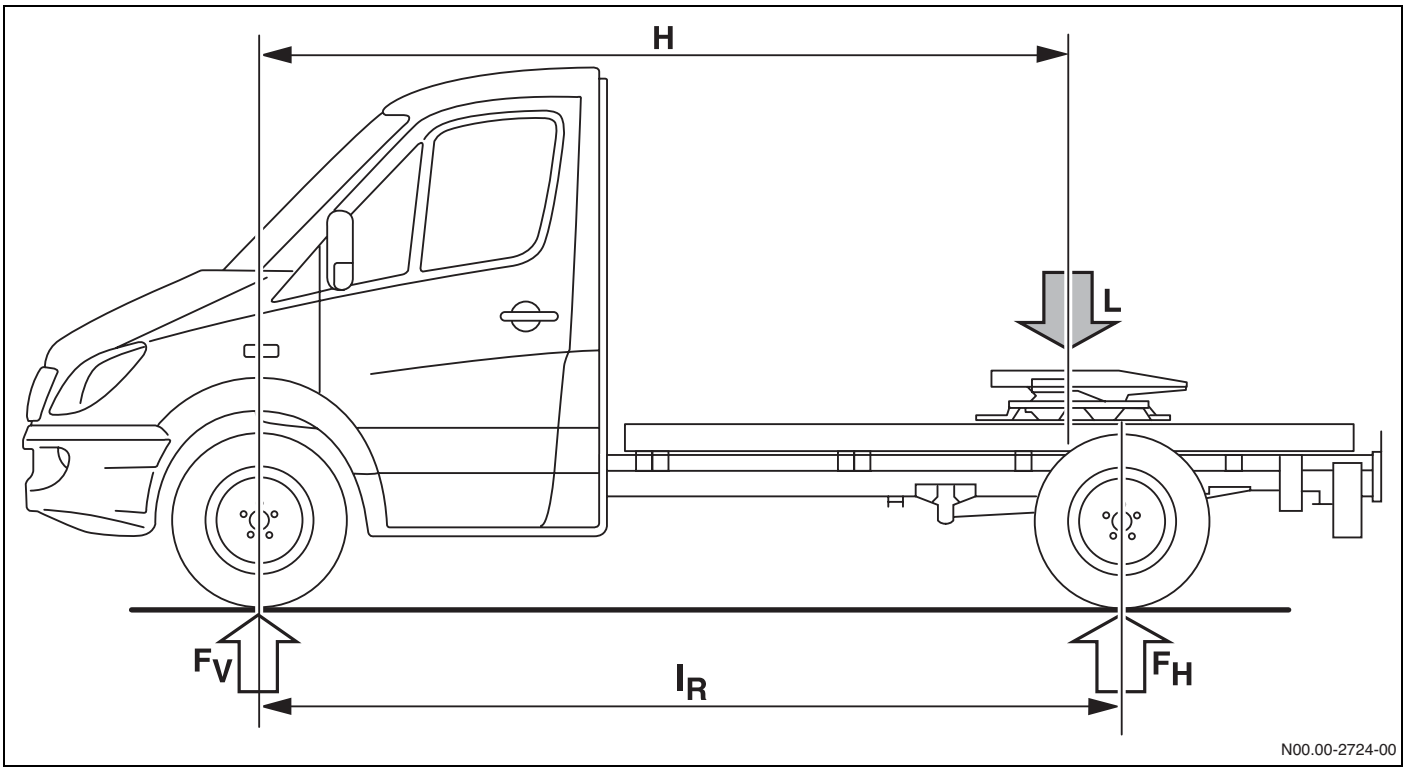
Calculating the position of the semitrailer coupling



For information on modifications to the semitrailer tractor, see 8.11 "Semitrailer tractors" (▷ page 232).

Drawbar ratio semitrailer coupling

$$D = \frac{0,6 \times 9,81 \times Z \times A}{Z + A - L}$$



A permissible gross weight of semitrailer

D drawbar ratio of coupling

F_H maximum permissible rear axle load

F_{HL} rear axle load of unladen vehicle

F_{H*} resulting maximum rear axle load

H distance between front axle and semitrailer coupling

I_R wheelbase

L maximum vertical load on coupling

Z permissible gross weight of tractor vehicle

The permissible axle loads must be maintained at the front and rear axles.

To avoid exceeding the maximum axle loads, the position of the semitrailer coupling is calculated as follows:

$$H = \frac{F_{H*} \times l_R}{L}$$

$$F_{H*} = F_H - F_{HL}$$

$$L = Z + A - \frac{0,6 \times 9,81 \times Z \times A}{D}$$

10.1 Signal acquisition and actuation module (SAM)

Function	Equipment		SAM_{Min}	SAM_{Low}	SAM_{Med}	SAM_{High}
	Standard	Special equipment				
Exterior lights control with bulb monitoring	X		X	X	X	X
Centre high-mounted brake lamp		X		X	X	X
Front foglamps		X			X	X
Turn signal control	X		X	X	X	X
Interior lights control	X		X	X	X	X
Comfort interior lighting						X
Windscreen wipe / wash	X		X	X	X	X
Rear window wipe / wash		X			X	X
Windscreen heating		X				X
Rear window heating		X			X	X
Central locking: sliding door, hinged rear door		X		X	X	X
Central locking: second sliding door		X			X	X
Rotary light switch read-in	X		X	X	X	X
Read-in of sensor signals (including washer fluid level, coolant level, brake fluid level, fuel level sensor, outside temperature, brake lining wear) and switches	X		X	X	X	X
Electric hinged windows		X				X
Headlamp cleaning system		X			X	X
Auxiliary flasher module		X			X	X
Alarm function		X	X	X	X	X
ATA function		X			X	X
Xenon headlamps with cornering lamps		X				X
Front passenger's door central locking	X		X	X	X	X
Front passenger's door power window	X		X	X	X	X
Motion detector		X			X	X

Not all functions are supported by all control unit variants. Depending on the equipment, only "minimal" variants of the SAM or TSG are fitted, for example. In such cases, the control unit concerned must be retrofitted if necessary.

10.2 Bulb ratings of exterior lights

Pin	Function	Model	Load [W]	Remarks
FL_L	Left-hand main-beam headlamp	H7	55	Vehicles with xenon lamps: left-hand cornering lamp
FL_R	Right-hand main-beam headlamp	H7	55	Vehicles with xenon lamps: right-hand cornering lamp
NSW_L	Left-hand front foglamp	H7	55	Front foglamp in the main headlamp unit
NSW_L	Left-hand front foglamp	H11	55	Front foglamp in the bumper
NSW_R	Right-hand front foglamp	H7	55	Front foglamp in the main headlamp unit
NSW_R	Right-hand front foglamp	H11	55	Front foglamp in the bumper
ABL_L	Left-hand dipped-beam headlamp	H7	55	With left-hand xenon bulb
ABL_R	Right-hand dipped-beam headlamp	H7	55	With right-hand xenon bulb
	Shadow mask			Only with xenon
STL_L	Left-hand side lamp	W5W	5	
STL_R	Right-hand side lamp	W5W	5	
SL_L	Left-hand tail lamp	R21/5W	5	On panel van and passenger van
		R21/5W	2 x 5	Two lamps in parallel on cab, crewcab, open model series
SL_R	Right-hand tail lamp	R21/5W	5	On panel van and passenger van
		R21/5W	2 x 5	Two lamps in parallel on cab, crewcab, open model series
BR_L	Left-hand brake lamp	P21	21	Also rear left turn signal function with SAE in conjunction with cab, crewcab, open model series
BR_R	Right-hand brake lamp	P21	21	Also rear right turn signal function with SAE in conjunction with cab, crewcab, open model series
BR_3	Centre high-mounted brake lamp	LED	Approx. 1.8	LED lamp
NSL	Rear foglamp	P21	21	
KZB	Licence plate lamp	C5W	2 x 5	Two lamps in parallel on panel van and passenger van
	Rear perimeter lamp	R21/5W	2 x 5	Two lamps in parallel on chassis
RFL	Reversing lamp	P21	2 x 21	Two lamps in parallel, optional buzzer in parallel
BL_L	Left-hand turn signal	PY21	Front 21	Rest of World (except NAFTA)
		HPV16	Side 16	
		PY21	Rear 21	
BL_R	Right-hand turn signal	PY21	Front 21	Rest of World (except NAFTA)
		HPV16	Side 16	
		PY21	Rear 21	

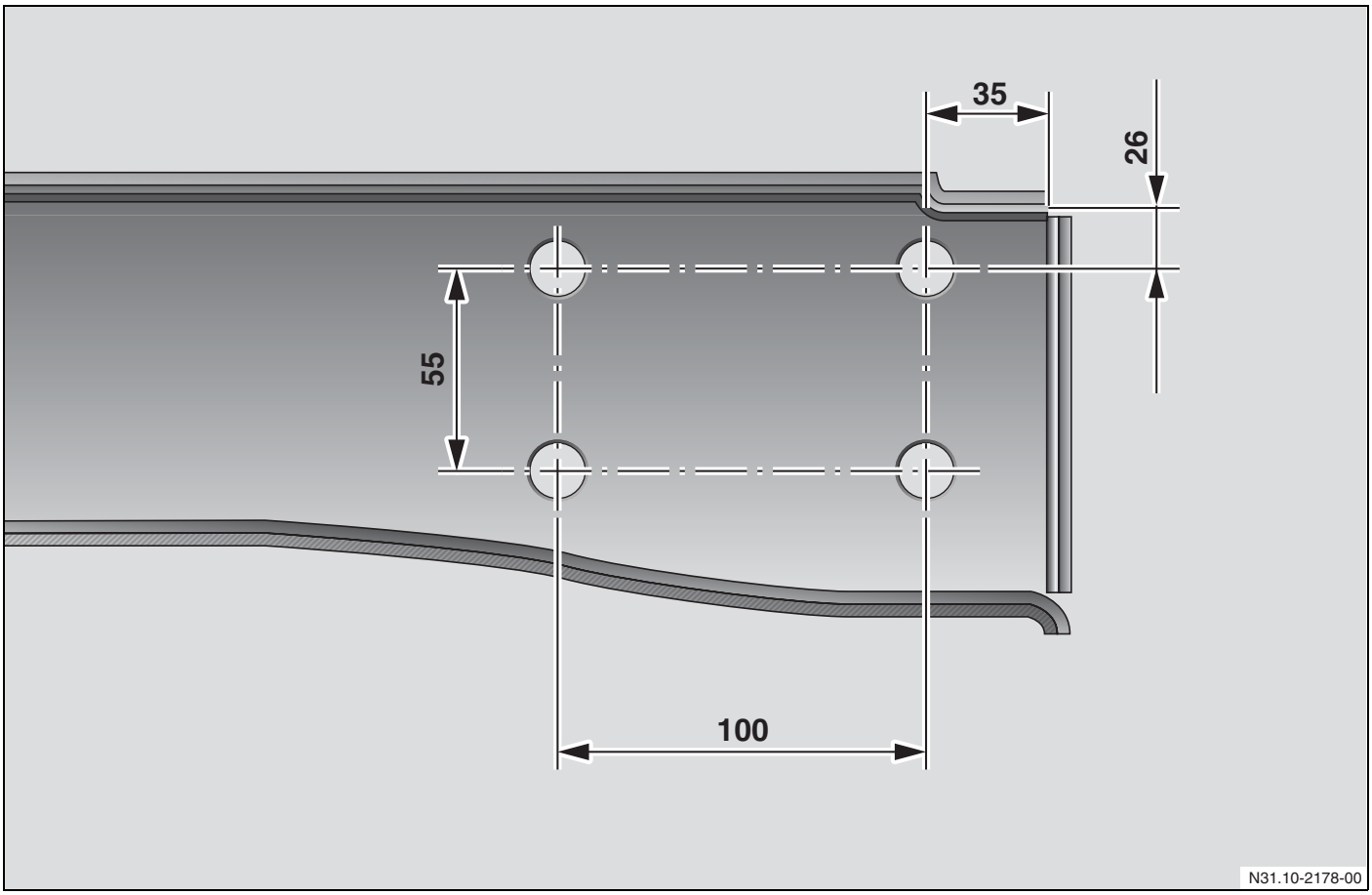
Pin	Function	Model	Load [W]	Remarks
BL_L	Left-hand turn signal	PY21	Front 21	ROW all-wheel drive
		PY21	Side 21	
		PY21	Rear 21	
BL_R	Right-hand turn signal	PY21	Front 21	ROW all-wheel drive
		PY21	Side 21	
		PY21	Rear 21	
BL_L	Left-hand turn signal	3457NAK	Front 28.6	Only on SAE
		HPV16	Side 16	
		PY21	Rear 21	
BL_R	Right-hand turn signal	3457NAK	Front 28.6	Only on SAE
		HPV16	Side 16	
		PY21	Rear 21	
URL	Front perimeter lamps	W5W	2 x 5	Two lamps in parallel
SM_L	Side marker lamp, left	W3W	2 x 3	Two lamps in parallel
SM_R	Side marker lamp, right	W3W	2 x 3	Two lamps in parallel
TSG_L	Left-hand entry lamp	W5W	5	
TSG_R	Right-hand entry lamp	W5W	5	

Information on connectors / mating connectors on the basic vehicle can be obtained from the department responsible (▷ page 17) or found in the Workshop Information System (WIS) (▷ page 21).

10.3 Trailer coupling hole patterns

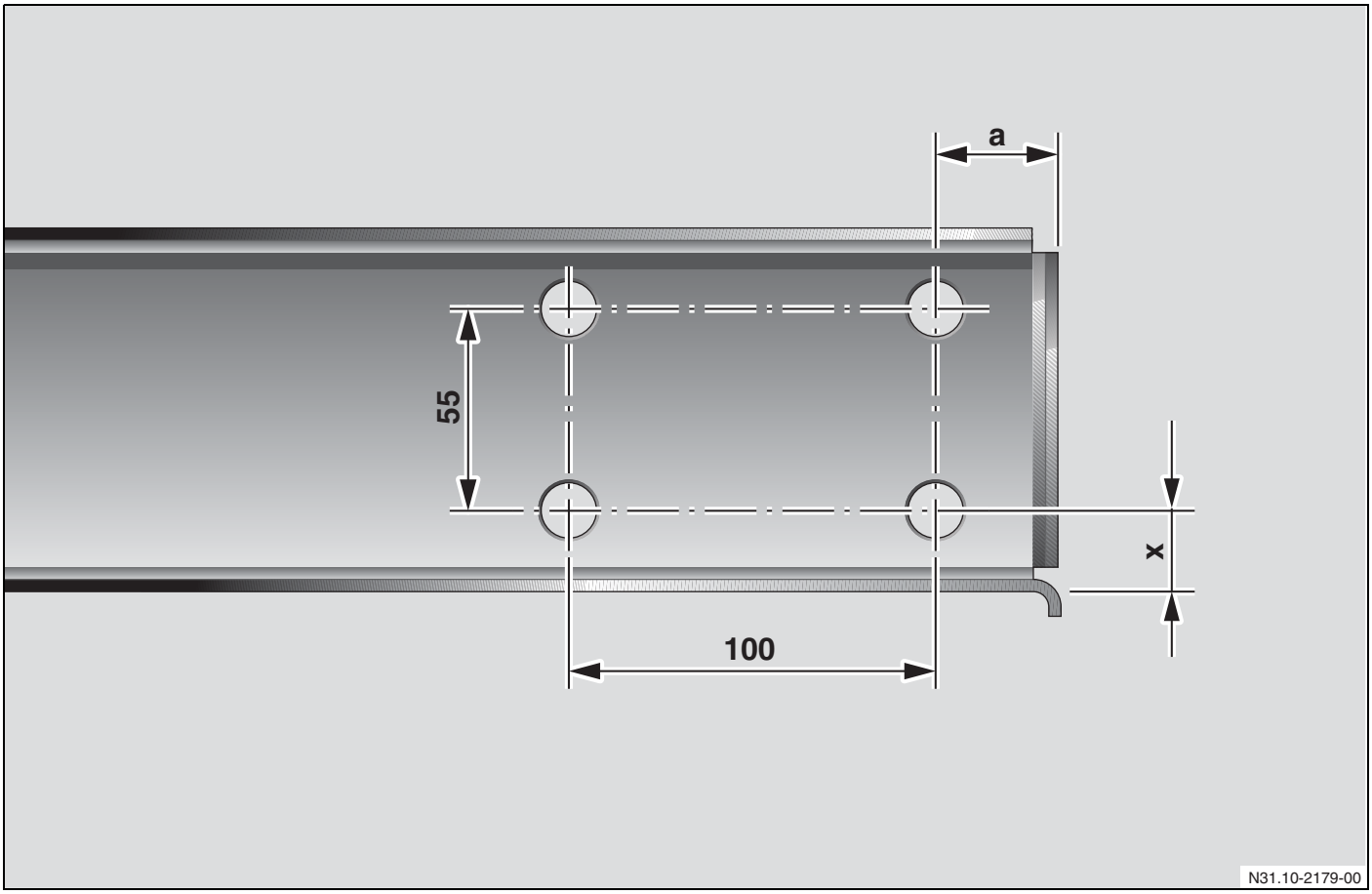
When fitting a trailer coupling, it is not necessary to reinforce its bolting points.

10.3.1 Installation dimensions, version 1



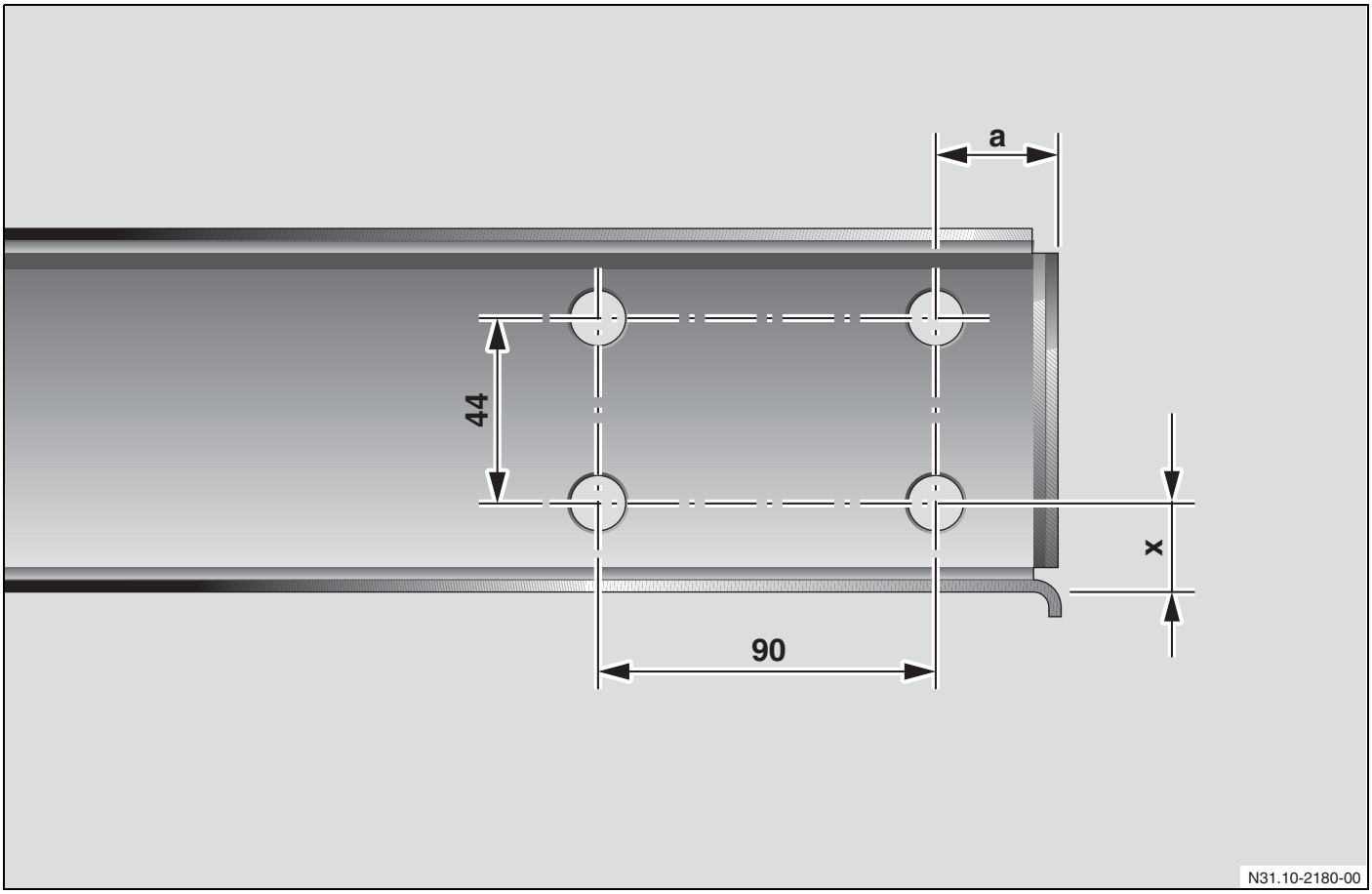
Vehicle type	Wheelbase	Dimension a	Dimension x	Overhang
Panel van / passenger van 3.0 t to 5.0 t	3,250 mm			950 mm
	3,665 mm			1,150 mm
	4,325 mm			1,250 m

10.3.2 Installation dimensions, version 2



Vehicle type	Wheelbase	Dimension a	Dimension x	Overhang
Chassis / platform / tipper with cab / with crewcab 3.0 t to 3.5 t	3,250 mm	34 mm	39 mm	950 mm
	3,665 mm	34 mm	39 mm	1,150 mm
	4,325 mm	34 mm	39 mm	1,250 mm

10.3.3 Installation dimensions, version 3



Vehicle type	Wheelbase	Dimension a	Dimension x	Overhang
Chassis / platform with cab / with crewcab 5.0 t	3,665 mm	27 mm	34 mm	1,250 mm
	4,325 mm	27 mm	34 mm	1,350 mm