

SPRINTER



Body & Equipment Guideline (BEG)

SPRINTER 2016/2017

Publication Date 10/2016

Table of Contents (click chapter to jump)

1. Introduction	3	4.8. Noise Insulation.....	27
1.1. Overview.....	3	4.9. Maintenance and repairs.....	28
1.2. The aim of the Body & Equipment Guideline	4	4.9.1. Storing the vehicle	29
1.3. Granting of body technical assistance.....	4	4.9.2. Battery maintenance and storage	29
1.4. Contact	4	4.9.3. Work before delivering the modified vehicle.....	30
1.5. Definitions	5	4.10. Optional Equipment.....	30
1.6. Vehicle Safety.....	6	4.11. Threshold values of the base vehicle.....	30
1.7. Operating Safety.....	6	5. Technical limiting values for planning.....	31
1.8. Parts Use	7	5.1. Limiting values of the basic vehicle.....	31
1.9. Vehicle Rollover Stability	7	5.1.1. Maneuverability	31
2. General and Regulatory.....	8	5.1.2. Extreme permissible positions of center of gravity	31
2.1. Regulatory Overview	8	5.1.3. Center of gravity Chassis Cab.....	31
2.2. Emissions and safety information.....	9	5.1.4. Vehicle dimensions Chassis Cab	31
2.2.1. Vehicle safety standards information.....	9	5.2. Chassis limiting values	32
2.2.2. Exhaust emission control information ...	10	5.2.1. Permissible axle loads.....	32
2.2.3. Vehicle noise emission control information	10	5.2.2. Approved tire sizes	32
2.3. Upfitter responsibilities	11	5.2.3. Diameter of turning circle.....	32
3. Product Information.....	12	5.2.4. Modifications to the Axles.....	32
3.1. Vehicle and models	12	5.2.5. Modifications to the steering system	32
3.1.1. Vehicle and Model Designations	12	5.2.6. Modifications to the brake system	32
3.1.2. Vehicle and Model Diagrams (for Illustration only) for SPRINTER Model year 2015	13	5.2.7. Modifications to springs, spring mountings/shock absorbers.....	32
3.2. Vehicle Identification Number (VIN) Coding Summary for SPRINTER Model year 2015.....	16	5.2.8. Wheel alignment.....	32
3.3. Labels	17	5.3. Body shell limiting values	33
4. Planning of Bodies	20	5.3.1. Modifications to the body shell	33
4.1. Selecting the chassis.....	20	5.3.2. Limiting values of the vehicle frame	33
4.1.1. Selecting the suspension package	20	5.4. Wheel well lowering for Cargo van	33
4.2. Vehicle modifications	21	5.4.1. Vehicle overhang.....	33
4.3. Dimensions and weights.....	21	5.4.2. Attachment points on the frame	34
4.4. Vehicle type identification date	22	5.4.3. Vehicle roof/roof load.....	34
4.5. Vehicle stability.....	23	5.5. Modifications of engine peripherals / drive train	35
4.6. Tires	23	5.5.1. Fuel system	35
4.7. Bolted and welded connections.....	24	5.5.2. Modifications to the engine/drive train components	35
4.7.1. Bolted connections.....	24	5.5.3. Engine cooling system.....	35
4.7.2. Welded connections.....	25	5.6. Modification to the interior	35

5.6.1. Modifications to airbags and belt tensions	35	7.5. Lighting	55
5.6.2. Modifications to seats	35	7.5.1. Adjusting the Headlamps.....	55
5.7. Limits to Electrics / Electronics	36	7.5.2. Tail lamps	55
5.7.1. Vehicle Marker and Clearance lamps...36		7.5.3. Marker Lamps.....	56
5.7.2. Retrofitting electrical equipment.....36		7.5.4. Exterior lamps.....	56
5.7.3. Mobile communication systems	36	7.5.5. Interior Lamps.....	57
5.7.4. CAN bus	36	7.5.6. Rain-light sensor.....	57
5.7.5. Electronic Stability Program.....36		! 7.5.7. Aftermarket tail light installation.....	57
5.8. Design Limits for additional equipment.....36		7.6. Mobile communication systems	59
5.9. Design Limits for attachments	36	7.6.1. Equipment	59
5.10. Design Limits for the body	37	7.6.2. Connecting and routing the wiring for the radio antenna.....	59
5.10.1. Design Limits of the mounting frame ..37		7.6.3. Radio	60
6. Damage prevention.....38		7.7. Electronic ignition switch (lock) (EZS).....	62
6.1. Brake hoses / cables and lines	38	7.7.1. General Information.....	62
6.2. Welding Work	38	7.7.2. Central locking/rescue vehicle.....	62
6.3. Corrosion protection	40	7.8. Windows and doors.....	64
6.4. Painting work	42	7.8.1. Power windows/window hinges	64
6.5. Mask	42	7.8.2. Load compartment sliding door	64
6.6. Storing and delivery of the vehicle.....42		7.8.3. Sliding sunroof.....	65
7. Electrics/Electronics	43	7.8.4. Windscreen wipers	65
7.1. General Information	43	7.8.5. Exterior mirrors	65
7.2. Electromagnetic compatibility (EMC).....44		7.8.6. Windscreen heating/rear window heating	65
7.3. Battery	44	7.9. Driving assistance systems.....	65
7.3.1. Retrofitting an additional battery	45	7.9.1. Electronic Stability Program (ESP).....	65
7.3.2. Battery maintenance and storage	45	7.9.2. Crosswind Assist (> MY15)	66
7.3.3. Alternator.....	46	7.9.3. Collision Prevention Assist	66
7.4. Interfaces	47	7.9.4. Blind Spot Assist.....	66
7.4.1. CAN bus and networking	47	7.9.5. Highbeam Assist and Lane Keeping Assist	67
7.4.2. Electric wiring/fuses	48	7.9.6. Rain /light sensor	67
7.4.3. Additional power circuits	48	7.9.7. Tire pressure monitoring system	68
7.4.4. Control Switches	48	7.9.8. Parktronic	69
7.4.5. Retrofitting electrical equipment.....49		7.10. Signal acquisition and actuation module (SAM)	69
7.4.6. Retrofitting an alternator	49	7.11. Parametric special module (PSM)	70
7.4.7. Power supply.....	50	7.11.1. Inputs/Outputs	71
7.4.8. Interface overview	50	7.11.2. Parameterization with Logic Blocks....	72
7.4.9. Power supply Aux Battery.....	51	7.11.3. Bodybuilder-CAN	72
7.4.10. Speed Signal.....	53		
7.4.11. Ground Connections	53		

7.11.4. Contacts and pin allocation.....	73	8.5.1. Retrofitting an air-conditioning system	113
7.11.5. PSM signals	74	8.5.2. Auxiliary heating	113
7.11.6. Signal acquisition and actuation module (SAM)	75	8.5.3. Power take-offs.....	114
8. Modifications to the basic vehicle	76	8.6. Attachments	115
8.1.1. General information on the suspension	76	8.6.1. Wind deflectors.....	115
8.1.2. Springs/shock absorbers/anti-roll bars .	77	8.6.2. Attachment above cab.....	115
8.1.3. Brake system	78	8.6.3. Roof racks	115
8.1.4. Air suspension.....	79	8.6.4. Fitted shelving/installations.....	116
8.1.5. Wheels and tires	79	8.6.5. Loading cranes	120
8.1.6. Spare wheel	79	8.6.6. Loading tailgate (lifting platform or cargo lift)	121
8.2. Body shell / Body.....	80	8.6.7. Trailer hitch.....	122
8.2.1. General information on the body shell/body	80	8.6.8. Underride guard.....	123
8.2.2. Chassis frame material	87	9. Design of Bodies	124
8.2.3. Overhang extension.....	87	9.1. Mounting frame	124
8.2.4. Side wall, windows, doors and flaps	90	9.1.1. Material quality	124
8.2.5. End frame cross member.....	91	9.1.2. Design.....	124
8.2.6. Mudguards and wheel wells.....	91	9.1.3. Section dimensions / dimensioning	125
8.2.7. Roof structure.....	91	9.1.4. Attachment to the frame	126
8.2.8. Tire Clearance Chassis-Cab.....	92	9.1.5. Mounting frame as floor assembly	129
8.2.9. Wheel well Cargo-Van	92	9.2. Self-supporting bodies	129
8.2.10. Cutting the cab roof and b-pillar roof arch	93	9.3. Modifications to the interior	130
8.3. Engine peripherals / drive train.....	95	9.3.1. Retrofitting additional rear seats.....	130
8.3.1. Fuel system.....	95	9.4. Modifications to Cargo vans.....	130
8.3.2. SCR system and DEF Tank location	98	9.5. Platform bodies	131
8.3.3. Exhaust system.....	100	9.6. Cargo vans	131
8.3.4. Engine cooling system.....	102	9.7. Refrigerated vehicles	131
8.3.5. Engine air intake	102	9.8. Dump bodies	131
8.3.6. Clearance for assemblies	103	9.9. Rescue vehicles	132
8.3.7. Engine speed regulation	103	9.10. Torsional rigidity of body types.....	132
8.4. Interior.....	104	9.11. RV Conversion	133
8.4.1. General Information	104	9.12. Lifting work platform	134
8.4.2. Safety equipment	105	9.13. Integrated Bodies	135
8.4.3. B-Pillar cover removal & reinstallation	110	9.14. Bodies on chassis with lowered roof	138
8.4.4. Reducing noise in the vehicle interior .	111	9.14.1. Mounting the auxiliary roof frame	138
8.4.5. Ventilation	112	9.14.2. Mounting the body on the auxiliary roof frame.....	138
8.5. Additional equipment	113	10. Calculations	140
		10.1. Center of gravity.....	140

10.1.1. Determination of the center of gravity in the x-direction.....	140
10.1.2. Determination of the center of gravity in the z-direction.....	142
11. Technical details.....	145
11.1. Bulb ratings of exterior lights	145

1. Introduction

1.1. Overview

This is the Body & Equipment Guidelines (BEG) for Mercedes-Benz USA LLC (MBUSA) and Mercedes-Benz Canada (MBCAN) and Daimler Vans USA LLC (DVUSA) Mercedes-Benz SPRINTER & Freightliner SPRINTER Vans and Chassis Cabs.

This publication provides Upfitters who modify or install equipment in Mercedes-Benz Sprinters & Freightliner Sprinters ("SPRINTER") Engineering specifications and assists them with their regulatory responsibilities.

The specifications and descriptions contained in this book, including regulatory information, are believed to be accurate at time of publication. Nevertheless Upfitters should consult with legal counsel to ensure compliance of pertinent laws and regulations. Periodically, this book will be updated as new products are introduced and additional information regarding these products become available. It is the responsibility of the Upfitter to ensure they have the most up-to-date version.

Prior to making any modifications to or installing any equipment in or on a SPRINTER, read this Body & Equipment Guidelines, and if necessary consult with UPFITTER MANAGEMENT VANS USA/Canada. Copies of this book and technical bulletins may be obtained through the following website:

www.UpfitterPortal.com

For options and model information please visit the following Websites:

www.sprintervansusa.com

Upon written requests MBUSA, MBCAN and DVUSA designee set forth below will provide certain additional technical data.

UPFITTER MANAGEMENT VANS USA / Canada

Dept:	UPFITTER MANAGEMENT VANS
Contact:	Via website
Website:	www.UpfitterPortal.com

1.2. The aim of the Body & Equipment Guideline

The Design of the Body & Equipment Guideline is divided into 11 interlinked sections to help find the required information more quickly:

1. Introduction
2. General and Regulatory
3. Product Information
4. Planning of bodies
5. Technical Limit in values for planning
6. Damage prevention
7. Electrics/electronics
8. Modifications to the basic vehicle
9. Design of bodies
10. Calculating the center of gravity
11. Technical details

Further information and technical data is available in the form of 2D drawings as separate documents in the aforementioned website.

The table of contents in this PDF format is linked to help find the required information more quickly.

Ensure that the limiting values selected in Section 4 are observed, as design planning must be based on these values.

The sections entitled “Modifications to the basic vehicle” and “Body Design” are the main sources of technical information contained in this document.

1.3. Granting of body technical assistance

Modifications by Upfitters must not affect safety of the SPRINTER. MBUSA, MBCAN and DVUSA, through their designee, UPFITTER MANAGEMENT VANS will offer technical assistance concerning SPRINTER vans and Sprinter Chassis Cab, including technical data & drawings and product info brochures, but it is the responsibility of Upfitters to ensure modifications do not affect safety of the vehicle.

MBUSA, MBCAN and DVUSA, through their designee, UPFITTER MANAGEMENT VANS , neither approves nor disapproves SPRINTER modifications or equipment installations made by Upfitters, or Dealers nor others since MBUSA, MBCAN, DVUSA, and their designee, UPFITTER MANAGEMENT VANS , do not control such Upfitters, manufacturing techniques nor assume the responsibility as the final stage manufacturer and consequential product liability.

1.4. Contact

To obtain technical assistance or information, please contact MBUSA, MBCAN and DVUSA’s designee:

UPFITTER MANAGEMENT VANS

Dept:	UPFITTER MANAGEMENT VANS
Contact:	Via website
Website:	www.UpfitterPortal.com

1.5. Definitions

Upfitters include Final-Stage Manufactures, Intermediate Manufacturers, Incomplete Vehicle Manufacturers, Vehicle Alters and Equipment Manufacturers.

Complete Vehicle means a vehicle that requires no further manufacturing operations to perform its intended function, other than the addition of readily attachable components, such as mirrors, tires or tire and rim assemblies, of finishing operations such as painting.

Completed SPRINTERs “As Delivered” means SPRINTERs manufactured by Daimler AG reassembled if necessary by Daimler AG’s designee, certified to comply with all applicable laws and regulations and delivered as a complete vehicle (Cargo & Passenger Vans, Chassis Cab) to Dealers, Upfitters and others engaged in the manufacturing and marketing of new motor vehicles and equipment.

Daimler Group (DG) Parts means genuine parts, accessories for installation on or attached to vehicles, components, aggregates and assemblies, including those for exchange or replacement which are supplied by or through MBUSA, MBCAN & DVUSA or any of its parent companies, affiliates or subsidiaries.

Dealers mean entities authorized by MBUSA, MBCAN & DVUSA to sell and/or service SPRINTERs.

Final-Stage Manufacturer means a person who performs manufacturing operations on an incomplete vehicle such that it becomes a completed vehicle.

Incomplete Vehicle means an assembly consisting, as a minimum, of a frame and chassis structure. Powertrain, steering system, suspension, system and braking system, to the extent that those systems are to be part of the completed vehicle that requires further manufacturing operations, other than the addition of readily attachable components, such as mirrors or tire and rim assemblies, or minor finishing operations such as painting, to become a Completed Vehicle.

Incomplete Vehicle Manufacturer means a person who manufactures an incomplete vehicle by assembling such components that none of the components, taken separately, may constitute an incomplete vehicle.

Vehicle Alterer is a person or company who modifies a previously certified vehicle other than by the addition, substitution or removal of readily attachable components. Readily attachable components can mean mirrors, tire and rim assemblies, or minor finishing operations such as painting. Alterers are responsible for ensuring the previously certified vehicle meets all emissions and FMVSS/CMVSS standards; comprehensive regulatory information is available at www.nhtsa.gov.

1.6. Vehicle Safety

Warning

Before installing bodies or attaching, mounting, installing or modifying assemblies, please read the relevant section of the detailed Operating Instructions concerning installation work. You could otherwise fail to recognize dangers that may cause serious injury or death.

We recommend that you only use parts, assemblies, conversion parts and accessories that have been recommended by MBUSA MBCAN and DVUSA for the type of vehicle concerned.

Any modifications to the vehicle that change the vehicle's certification could endanger road users or adversely affect exhaust emissions or noise.

The use of parts, assemblies, conversion parts or accessories that have not been recommended may jeopardize the safety of the vehicle.

Ensure that you comply with all applicable regulations, as retrofitted equipment on the vehicle or modifications to the vehicle will change the vehicle and may invalidate the vehicle's certification. Further regulatory information is contained in the sections titled Regulatory Overview (→ Chapter 2.1) and Emissions and safety information (→ Chapter 2.2).

1.7. Operating Safety

Warning

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

Malfunctions in the electronic systems could seriously jeopardize the operating safety of the vehicle. The warranty is voided in this case.

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

We recommend that you use an authorized Mercedes-Benz SPRINTER or Freightliner SPRINTER Service Centers for this purpose. In particular, work relevant to safety or on performed on safety-related systems must be carried out by 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 while the vehicle is in motion. Shutting the vehicle off while in motion impairs the vehicle brake system, driving stability and handling characteristics: this may cause serious injury or death.

1.8. Parts Use

Warning

Daimler AG requires the use of Genuine DG parts and DG replacement & conversion Parts, or replacement & conversion Parts and accessories expressly approved by the SPRINTER Van Manufacturer in order for Upfitters to maintain regulatory compliance of these components or equipment as well as the durable and safe operation of SPRINTERs. In areas beyond regulatory compliance, Upfitters may elect to use other parts or conversion parts or accessories and assume the Manufacturers' warranty of these parts themselves.

In the case that these conversion parts cause damage to the original DG Parts, the warranty of the original DG Parts is void. It is the Upfitter's responsibility to ensure that non-approved replacement conversion parts and accessories do not render the vehicle unsafe.

1.9. Vehicle Rollover Stability

Warning

Rollover stability is an important consideration in the safety design of a vehicle. Stability is influenced by many factors including chassis and body configuration, suspension, axle track width, tire size, tire pressure, etc. The cargo type and weight (payload), the body size, shape, and center of gravity height are particularly important. Therefore, alterations or installation of additional equipment to the SPRINTER vehicles by any Upfitter or intermediate and/or Final-Stage Manufacturer may affect rollover stability of the vehicle.

The Office of Vehicle Safety Research at NHTSA has conducted research and established guidelines to improve rollover stability. Upfitters are advised to consult with that Office and/or visit the NHTSA website at www.nhtsa.gov for more information.

2. General and Regulatory

2.1. Regulatory Overview

The U.S and Canadian Governments have established emission standards and motor vehicle safety standards for new engines and/or new vehicles and equipment under the provisions of the Clean Air Act, the Noise Control Act and the National Traffic and Motor Vehicle Safety Act in the U.S., and the Canadian Motor Vehicle Safety Act in Canada (“Acts”). The acts govern original equipment manufacturers of the Mercedes-Benz SPRINTER & Freightliner SPRINTER vans, dealers, Upfitters and others engaged in the manufacturing and marketing of new motor vehicles and equipment.

Part 568 of the Title 49 Code of Federal regulations (CFR) specifies detailed regulatory requirements for vehicles manufactured in two or more stages, including Final Stage Manufacturers. This document is intended to fulfill a part of Daimler AG’s obligations as the original equipment manufacturer or as an incomplete vehicle manufacturer. Section Emissions and safety information (→ Chapter 2.2) identifies regulatory requirements to assist Intermediate and Final Stage Manufacturers in determining their obligations to conform to these standards.

Completed SPRINTERS “As Delivered” are certified to comply with the aforementioned applicable standards. Compliance labels affixed to SPRINTERS and engines provide the status of initial compliance at the date of manufactured by Daimler AG (DAG).

Upfitters and Dealers who make any modifications that may affect the final certification of the engine, vehicle or equipment assume the sole responsibility for the vehicle.

Upfitters should consult with legal counsel concerning the final certification status of the vehicle.

Further, it is the Upfitter’s responsibility to ensure that such modifications do not affect the safety of the vehicle. Contact the Environment Protection Agency (U.S. EPA) & the California Air Resources Board (CARB) concerning the applicable U.S. & California exhaust emissions and noise standards, and the National Highway Traffic Safety Administration (NHTSA) concerning the applicable U.S. vehicle safety standards. For Canadian standards, contact Environment Canada and Transport Canada respectively.

Upon completion of the modified vehicle, the Upfitter is required by law (Title 49 of the Code of Federal Regulations S567.7 in the United States, the Clean Air Act section 203(a), and under provisions of, EPA CFR Part 86 section 86.09911; Emissions standards for 1999 and later model year diesel heavy duty engines and vehicles) to certify that it continues to comply with all applicable Federal and Canada Motor Vehicle Safety standards/Regulations. In addition, the modified vehicle must continue to comply with all applicable Federal, Canada and/or California Emissions regulations. In the United States, sale of a non-complying new vehicle is illegal and is punishable by a fine of up \$25,000 (Federal) and \$5,000 (California) per vehicle for emissions non-compliance, \$1,000 per vehicle for safety non-compliance, plus a recall and other sanctions.

The Upfitter is responsible for certifying the altered vehicle pursuant to Title 49 of the Code of Federal Regulations S567.7 and S568.8 in the United States or to Section 9 of the Canadian Motor Vehicle safety Regulations in Canada.

Daimler AG makes no representations with regard to conformity of the altered vehicle to any other Federal or Canada Motor Vehicle Safety Standards or Regulations that may be affected by the vehicle alteration; it is the responsibility of the Upfitter to certify that the vehicle conforms to any other standards affected by the vehicle alteration.

2.2. Emissions and safety information

A complete SPRINTER Van “As Delivered” or a Chassis Cab, i.e. an incomplete vehicle, delivered by MBUSA, MBCAN & DVUSA to Dealers or Upfitters is certified for by Daimler AG for compliance with the U.S. and Canadian emissions and safety standards at the time of manufacture. If this vehicle is altered, after delivery by MBUSA, MBCAN & DVUSA, Upfitters and/or Dealers assume the regulatory responsibility for certification

This section provides general information concerning applicable emissions and safety standards at the time of the vehicle manufacture. This section is written to assist Upfitters in understanding the U.S. EPA and the CARB exhaust emission and noise standards, Federal Motor Vehicle Safety Standards (FMVSS) and Canadian Motor Vehicle Safety Standards (CMVSS). VANS ENGINEERING SUPPORT neither approves nor recommends any modifications or additions to the SPRINTER vehicle, which may cause noncompliance with any EPA or FMVSS or CMVSS standards, or render the vehicle unsafe.

Questions concerning the content of this Section can be directed to MBUSA, MBCAN or DVUSA designee set forth below:

Michael D. Scott
Department Manager
Regulatory Mgt. & Campaigns Vans
Mercedes-Benz USA
Contact via website
www.upfitterportal.com

Adrian Coleman
National Manager, Government & Regulatory Affairs
Mercedes-Benz Canada, Inc.
Contact via website
www.upfitterportal.com

- 1 Canada
- 2 Contact

Engine calibrations such as fuel output settings, injection timings, emission control device calibration and location, charge air and cooling system calibration and locations are prohibited from any alterations from the certified configurations.

Provisions of the Clean Air Act also prohibit any persons, including but not limited to, Dealers or Upfitters to remove or render inoperative any devices or elements of design installed in a motor vehicle engine in compliance with the regulations. Please refer to Section Exhaust system (→ Chapter 8.3.3) for further information.

2.2.1. Vehicle safety standards information

In the U.S. National Traffic and Motor Vehicle Safety Act of 1966 and NHTSA’s FMVSS regulations and in Canada, Motor Safety Act of 1993 and Transport Canada’s (TC) CMVSS, identify certain requirements and certification responsibilities for the various stages of vehicle manufacturing.

Therefore, Upfitters and Dealers need to review all regulatory requirements carefully to ensure compliance with applicable standards.

Please consult with an attorney to ensure compliance with applicable laws or standards.

All vehicles as manufactured by Daimler AG meet all safety and emissions standards as set forth by the National Highway Traffic Safety Administration (NHTSA) and the Environmental Protection Agency (EPA). If any modifications or alterations are made to the vehicle that takes the vehicle out of compliance with Federal and local regulations, it is the responsibility of the vehicle alterer, intermediate manufacturer, or final stage manufacturer to ensure the vehicle meets all emissions and FMVSS/CMVSS standards.

For manufacturers who are defined as alterers, please visit www.nhtsa.gov for regulatory direction.

For intermediate or final stage manufacturers please visit www.nhtsa.gov as well as reviewing the Incomplete Vehicle Document (IVD) that is included in each incomplete vehicle as manufactured by Daimler AG. At no time the BEG should ever be used as a regulatory source for certification. Each alterer or modifier is advised to have their own regulatory department or consultant.

2.2.2. Exhaust emission control information

The sprinter engines, Mercedes-Benz OM642, Mercedes-Benz OM651 are certified with the U.S. EPA, and the Environment Canada and CARB, to comply with the heavy-duty diesel engine exhaust emission standards under Title II, Section 206 of the Clean Air Act and 40 CFR Part 86 regulations. Proof of this EPA certification is shown by an exhaust emission control label, i.e., an “important Engine information” label, (→ Chapter 3.3), affixed to the rocker cover of the engine for diesel powered vehicles and VEC I label affixed to the front cross member for gasoline power vehicles.

Provisions of the EPA regulations require that the emission-related components function in-use over the prescribed full useful life period as certified, i.e., 5 years or 100,000 miles (SHORT-TERM EMISSION CONTROL SYSTEM) and 7 years or 70,000 miles (LONG-TERM EMISSION CONTROL SYSTEM), whichever occurs first. To be certain that these components function properly, the end users are required to use appropriate fuels and lubricants and maintain these components properly in accordance with the Operator's Manual and Service Booklet.

Additionally, there is a requirement for applicable noise control packages that were tested at over 100% reduction in noise levels below the aforementioned noise standards. Final Stage Manufacturers should consult with their attorney concerning the compliance of their vehicles with appropriate regulations and laws once they have been altered or modified. The law and regulations prohibit tampering with noise control devices or components.

Specifically, the removal or rendering inoperative of any devices or elements of design incorporated into any new vehicle for the purpose of noise control is not permitted. Such devices or elements are identified as noise emission related components, such as engine calibrations including governor settings, exhaust system components, air induction system components, radiator, shield, fan/drive, noise shields or acoustical absorptive material, etc.

The regulations also require maintenance of the noise control performance in use, to comply with the U.S. EPA 40 CFR Part 202, or DOT 49 CFR part 325, Exterior Drive-By Noise Emission Standards for Interstate Motor Carrier.

2.2.3. Vehicle noise emission control information

The Noise Control Act of 1972 and the 40 CFR Part 205 U.S. EPA regulations, “Transportation Noise Emission Controls”, require new medium and heavy trucks over 10,000lbs. GVWR to comply with an exterior drive-by noise standard of 80 dB(A). In Canada, CMVSS 1106 Noise Emissions Standard requires an additional interior sound level certification at 90 dB(A).

All SPRINTER vehicles come equipped with extensive NVH equipment.

Upfitter should, however, consult with an attorney concerning interpretations of the applicable laws and regulations and determine if the modifications the Upfitter made to the SPRINTER may affect the final certification of compliance of the vehicle.

Furthermore, it is the Body Builder's responsibility to ensure modifications do not render the vehicle unsafe.

2.3. Upfitter responsibilities

Each completed SPRINTER “As Delivered” in the U.S. is certified for the U.S. EPA or CARB exhaust emissions in accordance with 40 CFR Part 86, or Title 13 of CCR, and an exhaust emission control information label is affixed thereto. While the complete SPRINTER van “As delivered” is certified to comply with the applicable FMVSS safety regulations in accordance with 49 CFR Section 567.4 and a complete vehicle certification label is affixed thereto, the Chassis Cab is certified to comply with the applicable FMVSS safety regulations in accordance with 49 CR Section 567.5 and 568.4 and an incomplete vehicle certification label is affixed thereto.

In addition, every individual SPRINTER Chassis Cab contains an Incomplete Vehicle Documentation information packet. SPRINTER vehicles intended for Canada are similarly certified and labeled in accordance with the Canadian regulations.

Once these SPRINTER vehicles are altered or completed with the installation of additional equipment, Upfitters assume the responsibility of final certification to all applicable emissions and safety regulations, including labeling and documentation, affected by their modifications.

→ Chapter 2.1 of these Guidelines provides Upfitter with general information concerning modifications. Provisions of 49 CFR Sections 567.5 through 567.7, and 568.8 specifically set the regulatory responsibility for the Upfitters to comply with the vehicle safety standards. These provisions are available in full at www.nhtsa.gov. Upfitters should consult with legal counsel concerning these responsibilities.

Any alterations or installations by Upfitters must comply with the following:

- Do not alter or modify SPRINTER components forward of the rear cab wall for Chassis Cab or forward of the seating reference point for SPRINTERs, unless modifications are approved component installations (such as air conditioning, radio, etc.) which are manufactured, approved or endorsed by Daimler AG, MBUSA, MBCAN, DVUSA or their designee, UPFITTER MANAGEMENT VANS .
- Do not alter the location or impair functional reliability and or the clearance of all movable chassis components, i.e., axles, springs, drive shafts, steering systems, braking systems, gearshift linkages, exhaust systems, etc.
- Do not drill, alter, impair or damage the frame top and bottom flanges.
- Do not alter, damage, or relocate the SPRINTER fuel system, seat belt assemblies and anchorages, braking system and steering.
- Do not impair the operational reliability, road worthiness and drivability of the SPRINTER by body or accessory equipment installation of modification.

Upfitter is responsible for ensuring that modification or equipment installation does not affect the safety of the SPRINTER. MBUSA, MBCAN, DVUSA, and UPFITTER MANAGEMENT VANS are not responsible for any final certification or claims sounding in product liability or warranty claims, which result from any component, assembly, or system being altered, or which cause non-compliance with any of the emission control standards of motor vehicle safety standards, or which would otherwise cause the vehicle to be or become defective or unsafe.

3. Product Information

3.1. Vehicle and models

3.1.1. Vehicle and Model Designations

Mercedes Model	Freightliner Model	Description
M2CA144	F2CA144	SPRINTER 2500 Cargo Van 144" WB
M2CA170	F2CA170	SPRINTER 2500 Cargo Van 170" WB
M2CA170E	F2CA170E	SPRINTER 2500 Cargo Van 170" WB Ext
M3CA144	F3CA144	SPRINTER 3500 Cargo Van 144" WB
M3CA170	F3CA170	SPRINTER 3500 Cargo Van 170" WB
M3CA170E	F3CA170E	SPRINTER 3500 Cargo Van 170" WB Ext
M2CV144	F2CV144	SPRINTER 2500 Crew Van 144" WB
M2CV170	F2CV170	SPRINTER 2500 Crew Van 144" WB
M2PV144	F2PV144	SPRINTER 2500 Passenger Van 144" WB
M2PV170	F2PV170	SPRINTER 2500 Passenger Van 170" WB
M3CC144	F3CC144	SPRINTER 3500 Chassis Cab 144" WB
M3CC170	F3CC170	SPRINTER 3500 Chassis Cab 170" WB

Note:

All 3500 SPRINTERs come with Dual Rear Wheels as standard

Roof heights are sales codes

144" WB Cargo, Crew and Passenger Van, sales code D03 = High Roof

170" WB Cargo, Crew and Passenger Van, sales code D05 = Super High Roof

GVWR 11,030 lbs is sales code XB5

GVWR 10,140 lbs is sales code XA4 (SuperSingle Rear Tires)

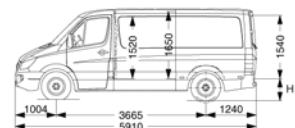
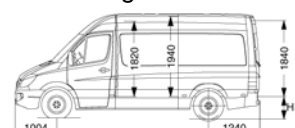
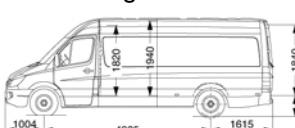
3.1.2. Vehicle and Model Diagrams (for Illustration only) for SPRINTER Model year 2015

To Download 2D-Drawings visit www.UpfitterPortal.com.

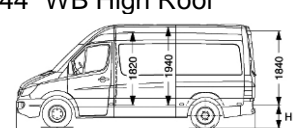
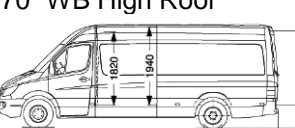
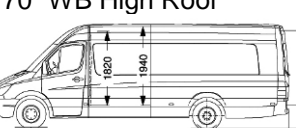
2500 Cargo SPRINTER with 8550 GVWR		
<p>906.633 144" WB Low roof</p>		
<p>906.633 (D03) 144" WB High Roof</p>	<p>906.635 (D03) 170" WB High Roof</p>	<p>906.637 (D03) 170" WB ext High Roof</p>
	<p>906.635 (D03) 170" WB Super High Roof</p>	<p>906.637 (D03) 170" WB ext Super High Roof</p>

2500 Passenger SPRINTER with 8550 GVWR		
<p>906.633 144" WB Low roof</p>		
<p>906.633 (D03) 144" WB High Roof</p>	<p>906.635 (D03) 170" WB High Roof</p>	

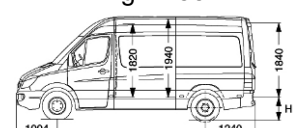
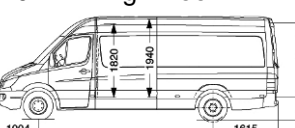
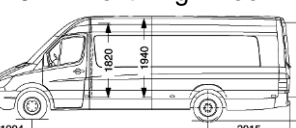


2500 Crew Van SPRINTER with 8550 GVWR

<p>906.633 144" WB Low roof</p> 		
<p>906.633 (D03) 144" WB High Roof</p> 	<p>906.635 (D03) 170" WB High Roof</p> 	

3500 Cargo SPRINTER with 9990 GVWR

<p>906.653 (D03) 144" WB High Roof</p> 	<p>906.655 (D03) 170" WB High Roof</p> 	<p>906.657 (D03) 170" WB High Roof</p> 
--	--	--

3500 Cargo SPRINTER SuperSingel with 10140 GVWR

<p>906.653 (D03) 144" WB High Roof</p> 	<p>906.655 (D03) 170" WB High Roof</p> 	<p>906.657 (D03) 170" WB ext. High Roof</p> 
	<p>906.655 (D03) 170" WB Super High Roof</p> 	<p>906.657 (D03) 170" WB ext Super High Roof</p> 

3500 Cargo SPRINTER with 11030 GVWR

<p>906.653 (XB5, D03) 144" WB High Roof</p>	<p>906.655 (XB5, D03) 170" WB High Roof</p>	<p>906.657 (XB5, D03) 170" WB ext. High Roof</p>
	<p>906.657 (XB5, D03) 170" WB Super High Roof</p>	<p>906.657 (XB5, D03) 170" WB ext Super High Roof</p>

3500 Chassis Cab SPRINTER with 11030 GVWR

<p>906.153 144" WB Low Roof</p>	<p>906.155 170" WB Low Roof</p>	
-------------------------------------	-------------------------------------	--

3.2. Vehicle Identification Number (VIN) Coding Summary for SPRINTER Model year 2015

VIN Positions 1, 2, & 3:

Code	Manufacturer	Make	Type
WDA	Daimler AG	Mercedes-Benz	Incomplete Vehicle
WD3	Daimler AG	Mercedes-Benz	Truck
WDZ	Daimler AG	Mercedes-Benz	Bus
WDP	Daimler AG	Freightliner	Incomplete Vehicle
WDY	Daimler AG	Freightliner	Truck
WCD	Daimler AG	Freightliner	Bus

VIN Position 4 – Chassis Configuration:

Code Chassis Configuration / Intended Market

P	All 4x2 Vehicle Types / U.S.
B	All 4x2 Vehicle Types / Canada
F	All 4x4 Vehicle Types / U.S.
C	All 4x4 Vehicle Types / Canada

VIN Positions 5 & 6 - Model, Wheelbase, GVWR:

Code	Model	Wheelbase	Wheel Size	GVWR	
E7	C2500/P2500	3665mm	16 in.	8,000lbs to 9,000 lbs.	Class G
E8	C2500/P2500	4325mm	16 in.	8,000lbs to 9,000 lbs.	Class G
F0	C3500	3665mm	16 in.	9,000lbs to 10,000 lbs.	Class H
F1	C3500	4325mm	16 in.	9,000lbs to 10,000 lbs.	Class H
F3	C3500/3500C	3665mm	16 in.	10,000lbs to 14,000 lbs.	Class 3
F4	C3500/3500C	4325mm	16 in.	10,000lbs to 14,000 lbs.	Class 3

VIN Positions 7 - Engines, Brake:

Code	Engine	Fuel	Displacement / Configuration	Brake
C	MG5+MH5	Diesel	3.0L/6cyl.	Hydraulic
D	MG3+MH5	Diesel	2.1L/4cyl.	Hydraulic

VIN Positions 8 - Restraint Systems

Code Airbag Position:

A	None
B	SA5 airbag for driver
C	SA5 + SA6 airbag for driver and co-driver
D	(SA5 + SA6 + (SH6 / SH7) + SH9) side-airbag for driver or driver and co-driver window airbags

VIN Position 9 - Check Digit (Calculated from a mathematical computation of all other VIN characters)

VIN Position 10 - Model Year:

Code	Model Year
E	2014
F	2015

VIN Position 11 - Plant of Manufacture:

Code	Build Location
5	Duesseldorf, Germany
9	Ludwigfelde, Germany

VIN Position 12-17 - Vehicle Serial Number (Sequentially assigned vehicle serial number at Plant of Manufacturer)

3.3. Labels

The following OEM compliance labels are affixed at the locations noted in diagrams below.

Warning

Do not remove any of these labels!

The depicted labels below are not intended to be used as a source for certification, but as a pictorial description and visual location indicator. For vehicle labeling requirements please visit the national highway traffic safety administration online at www.nhtsa.gov and the environmental protection agency inline at www.epa.gov.

1. VIN Plate Location
2. Safety Label location
3. Noise Emission Label (example)
4. Complete Vehicle Safety Label (example)
5. Incomplete Vehicle Certification Label
6. Vehicle Emission Control Information Label
7. Airbag Warning Label
8. Tire and Loading Information (example)
9. Unloaded Vehicle Weight UVW rating and Label
10. QR – Code – Rescue – Label

1. VIN Plate Location



2. Safety Label location

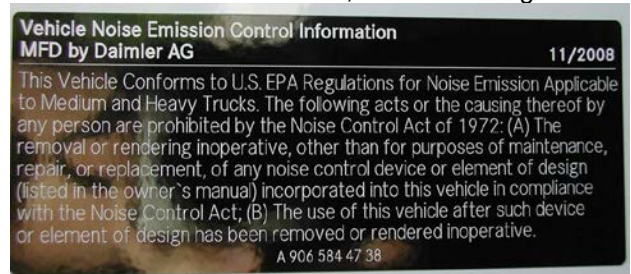


1. Noise Emission Label
2. Safety Certification Label

Location: below driver seat, outward facing

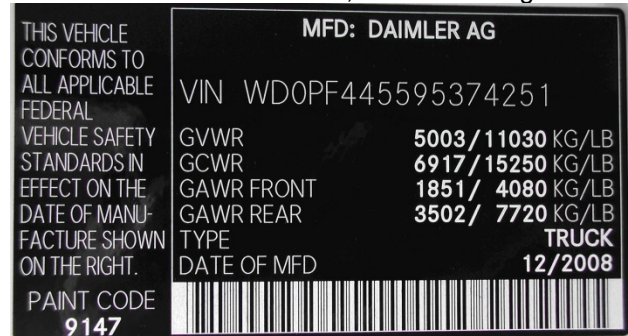
3 Noise Emission Label (example)

Location: below driver's seat, outward facing

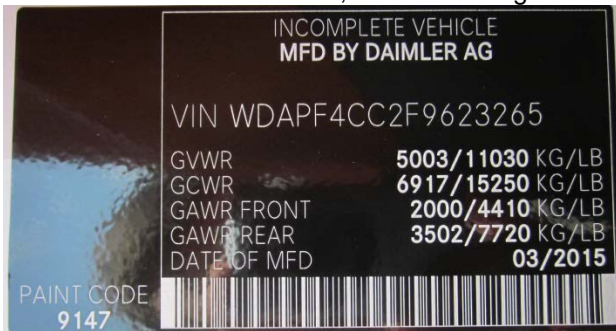


4. Complete Vehicle Safety Label (example)

Location: below driver's seat, outward facing



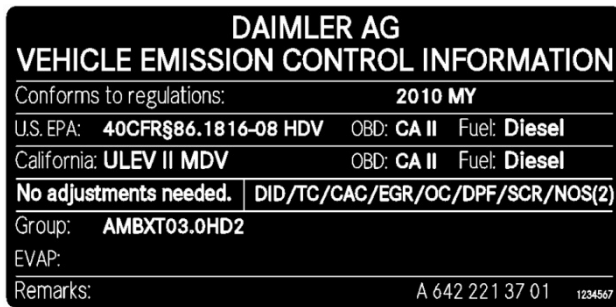
5. Incomplete Vehicle Certification Label
Location: below driver's seat, outward facing



6. Vehicle Emission Control Information Label
Location: on radiator cowling

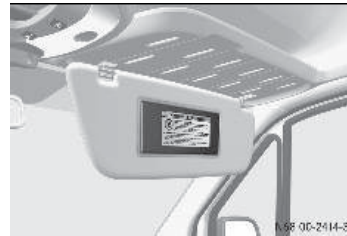


Below 10,000GVWR (radiator cowling)

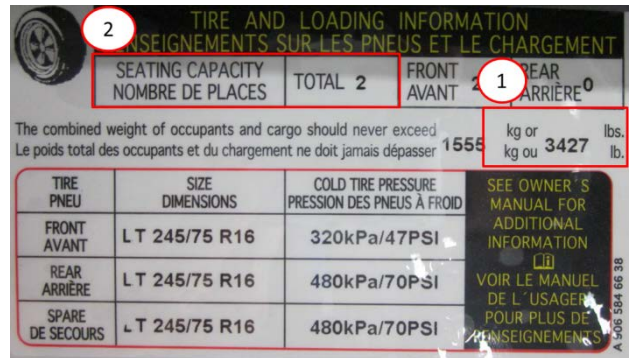


Above 10,000GVWR (radiator cowling)

7. Airbag Warning Label
Location: on sun visor



8. Tire and Loading Information (example)
Location: on driver's door frame



NOTE: Data shown on label are for illustration purposes only.

1. Payload limit data and
2. seating data

are specific to each vehicle and may vary from data shown in the illustration. Refer to label on vehicle for actual data specific to your vehicle.

This label can be found on vehicles with 10,000lbs GVWR or less.

Warning

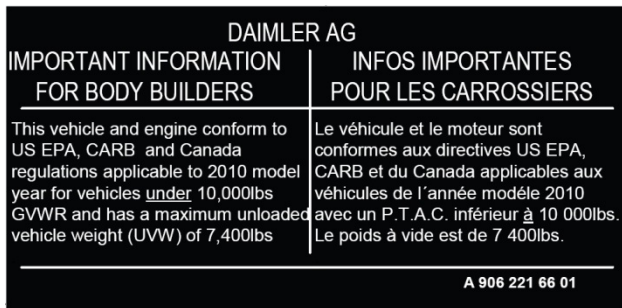
For an alterer, there is a re-labeling required if any of the equipment installed changes

1. the payload limit data or
2. seating data

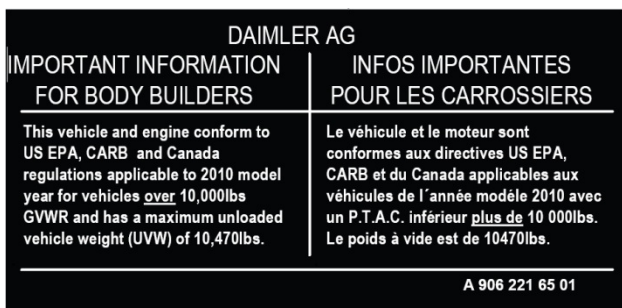
of the vehicle!

For additional Tire and Loading Information,
(→ Chapter 8.1.4)

9. Unloaded Vehicle Weight UVW rating and Label Locations



Example UVW Label - Below 10,000 GVWR (radiator cowling)



Example UVW Label - Above 10,000 GVWR (radiator cowling)



Example UVW Label - Above 10,000 GVWR (radiator cowling) SuperSingle

UVW means the weight of a vehicle including upfitter equipment with maximum capacity of all fluids necessary for operation of the vehicle but without cargo, passengers, or accessories that are usually removed from vehicle when not in use. GVWR (Gross Vehicle Weight Rating) means the value specified by the manufacturer as the loaded weight of a single vehicle, i.e. the maximum allowable weight for the fully loaded single vehicle including cargo and passengers.

NOTE:

- Due to chassis certification Sprinters under 10,000lbs GVWR cannot exceed the UVW and inertia weight of 7,400lbs
- Due to chassis certification Sprinters over 10,000lbs GVWR cannot exceed the inertia weight of 10,470lbs
- Due to chassis certification Sprinters equipped with Super Single rear tires with 10,140lbs GVWR cannot exceed the inertia weight of 9,580lbs.

10. QR – Code – Rescue – Label



2 labels are affixed at the left and right B—personnel can locate the QR code quickly and scan it with an Internet-enabled mobile device. The rescue label contains valuable information.

4. Planning of Bodies

The relevant operating conditions of the subsequent complete vehicle are crucial to the selection of a suitable basic vehicle or chassis when planning work on the vehicle body. Observe the following points:

- Customized design of vehicle or chassis
- Body variant
- Standard and special equipment

For better orientation when planning, the identification plate, the model designation and the vehicle identification number (VIN) must be used as well.

NOTE: When designing bodies in addition to a user-friendly and maintenance friendly design, the careful choice of materials and, in consequence, the associated corrosion protection measures are of great importance.

4.1. 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
- Axle
- Maximum permissible gross vehicle weight (GVWR)
- Position of the center of gravity

NOTE: Before carrying out any work on the body or modification work, the delivered vehicle must be reviewed to verify whether it fulfills the necessary requirements.

For more information on the chassis and body variants, see the "Model designation" section (→ Chapter 3.1.1) or contact VANS ENGINEERING SUPPORT.

4.1.1. Selecting the suspension package

Suspension Package I – X17



Chassis Cab:

- Ambulance
- Armored Vehicles
- Shuttle Bus
- Box Body
- Refrigeration Vehicle



Cargo Van:

- Shuttle Bus
- Refrigeration Vehicle
- Armored Vehicles
- Tail Lift
- Mobile work shops
- RVs on cargo van

Suspension Package II – X18



Chassis Cab:

- RV's
- Box Bodies with Tail Lift
- All vehicles with high center of gravity will benefit

Suspension Package III – X19



Chassis Cab:

- Platform Bodies
- Stake Bodies



Cargo Van:

- Ambulance

Suspension Package IV – X20



Chassis Cab:

- Refrigeration vehicles with built-in shelving
- Car transporter

Warning

Do not use any aftermarket suspension components not approved by DG or Vans Engineering Support, including but not limited to air suspension. After market suspension components may have an adverse impact on the vehicle's stability, ESP function and may lead to frame damage. The driver could lose control of the vehicle and cause an accident and may cause serious injury or death.

4.2. Vehicle modifications

Before starting work on the body, the Upfitter 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 2D drawings from VANS ENGINEERING SUPPORT, product information and technical data or you can retrieve this information from the communications system (→ Chapter 1). Furthermore, you must note the optional equipment that is fitted by the Manufacturer.

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

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

Warning

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

Under no circumstances should modifications be made to the noise encapsulation.

4.3. Dimensions and weights

On no account should modifications be made to the vehicle width, vehicle height or vehicle length if they exceed the limiting values specified in the current version of the Body & Equipment Guideline for all dimension and weight specifications, please refer to the 2D drawings and technical data in the SPRINTER Upfitter Website (→Chapter 1) and to the technical limiting values (→ Chapter 5).

They are based on a vehicle that is fitted with standard equipment. Items of optional equipment are not taken into consideration.

Weight tolerances of up to +5% in production must be taken into consideration.

Do not exceed the gross axle weight rating (GAWR) and the gross vehicle weight rating (GVWR). Information about GAWR & GVWR is contained in the "Technical advice on the basic vehicle" section (→ Chapter 5)

Warning

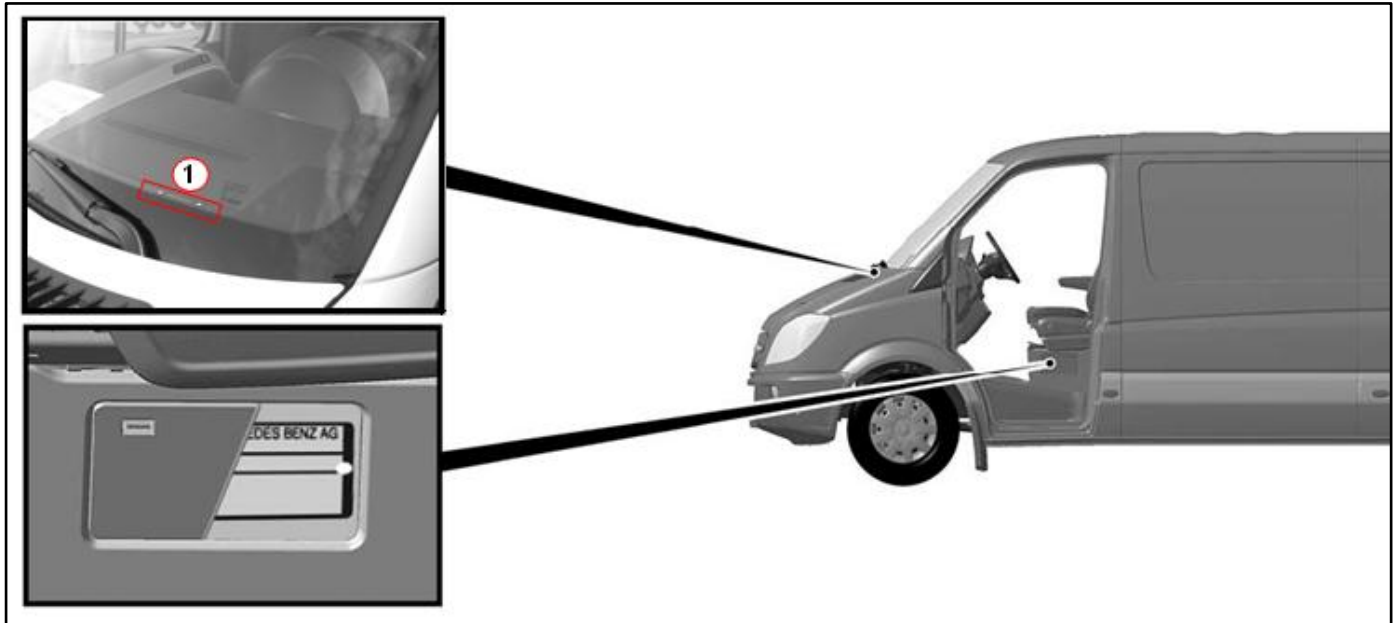
Make sure that you do not exceed the permissible axle loads. Doing so would prevent the ESP system from functioning correctly. Exceeding the permissible axle loads and / or gross vehicle weights significantly impairs the vehicle driving stability and handling characteristics and may cause serious injury or death.

Information about changes in weight is available from: VANS ENGINEERING SUPPORT (→ Chapter 1.4). All bodies must comply with the individual axle loads and the permissible gross vehicle weight.

4.4. Vehicle type identification date

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 lower windshield support member 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.

Seat pedestal (→Chapter 3.3)



Vehicle Identification Data

1. Vehicle Identification number

Location: below driver's seat, outward facing

4.5. Vehicle stability

For approval of the vehicle with body / equipment mounted, a calculation of the height of the center of gravity of the laden vehicle must be submitted in accordance with FMVSS / CMVSS standards.

You will find the permissible heights for the center of gravity in the “Technical limiting values for planning” section (→ Chapter 5). VANS ENGINEERING SUPPORT will make no statements concerning:

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

Of bodies for payloads with an unfavorable located center 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 Upfitter is in a position to make an assessment.

Warning

In extreme driving conditions, the vehicle behaves like a vehicle without ESP. The permissible axle loads, gross weights and center of gravity positions must be complied with. Exceeding the permissible axle loads and / or gross vehicle weights significantly impairs the vehicle driving stability and handling characteristics and may cause serious injury or death.

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

Warning

Make sure that you do not exceed the permissible axle loads. Doing so would prevent the ESP system from functioning correctly. Exceeding the permissible axle loads and / or gross vehicle weights significantly impairs the vehicle driving stability and handling characteristics and may cause serious injury or death. Further information regarding permissible weights is contained on the vehicle type identification plates on the vehicle itself (→ Chapter 5).

4.6. Tires

The Upfitter must ensure that:

- there is always sufficient space between the tire and the mud guard or wheel well, even if snow or anti-skid chains are fitted and the suspension is fully compressed (also allowing for axle twist) and that the relevant data in the 2D drawings from website (→ Chapter 1) are observed
- only permissible tires with the correct dimension & load rating documents

Warning

Make sure that you do not exceed the permissible tire loads. Doing so would prevent the ESP system from functioning correctly. Exceeding the permissible tire loads and / or gross vehicle weights significantly impairs the vehicle driving stability and handling characteristics and may cause serious injury or death.

4.7. Bolted and welded connections

4.7.1. Bolted connections

If it is necessary to replace standards 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

Warning

Do not change any bolted connections that are relevant to safety, e.g. that are required for wheel location, steering and braking functions. They may otherwise no longer function correctly. The driver may lose control of the vehicle and cause an accident and may cause serious injury or death. Parts must be refitted in accordance with DAG after sales service instructions and using suitable standard parts. We recommended the use of genuine DAG SPRINTER parts.

- Installation work must always comply with applicable Federal and State regulations.
- It is strictly prohibited to shorten the length of the free clamping bolt, change or reduce the bolts' shaft or use bolts with a shorter thread.
- No design modification is possible of bolts that are tightened to the required torque and angle by Daimler AG.
- The settling behavior of bolted connections must be observed.

Information about the SPRINTER after sales instructions is available from any authorized SPRINTER dealer.

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

The use of SPRINTER Torque Values assumes coefficients of friction for the bolts in the tolerance range of (=0.08...0.14).

We recommend the use of original SPRINTER spare parts.

Warning

Screws / bolts or nuts with locking splines, micro-encapsulated screws / bolts and self-locking nuts must be replaced after having been used once. Before new micro-encapsulated screws / bolts are screwed in, the mating thread must be cleaned & re-cut or the nut must be replaced so that the old thread locking agent residues are removed. It is essential that the re-cut thread clearance holes and threaded holes for stud bolt are cleaned with pressurized air, as any adhesive residue remaining in the thread may prevent the screws / bolts from being tightened correctly.

If this is not observed, the insufficient screw / bolt pre-stress may cause a high bending moment to the screw / bolt and this may result of the screw / bolt failure. As a consequence the driver may lose control of the vehicle and cause an accident.

Warning

When removing micro-encapsulated screws / bolts, there is a risk of injury due to the sudden release of these screws / bolts. Always ensure that there is sufficient clearance for movement when unscrewing micro-encapsulated screws/bolts.

4.7.2. Welded connections

General

In order to maintain the high standard of welding demanded by Daimler AG, 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

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 paneling for the sidewall is laser-soldered with the roof edge paneling.

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 work piece is/are accessible.

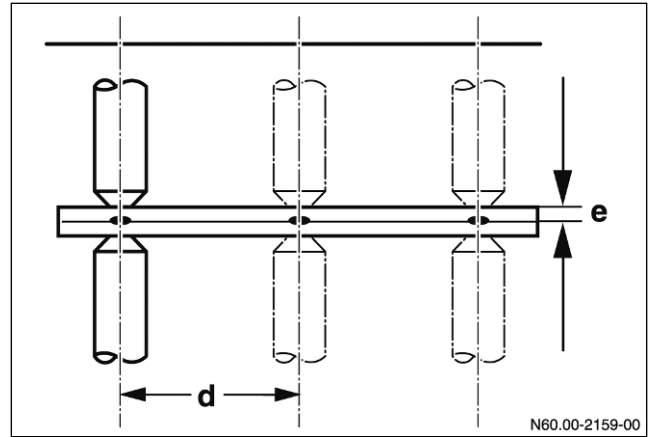
Accessible sides	1	Gas-shielded plug welding
	2	Resistance spot welding

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 ($d=10e + 10\text{mm}$).

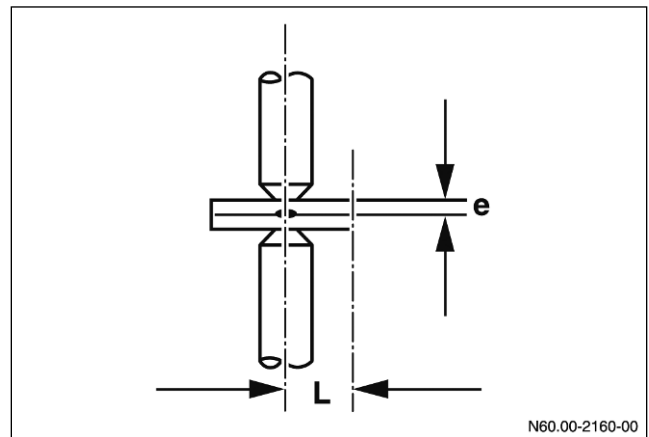


Ratio of sheet thickness to distance between spot welds

- 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 ($L = 3e + 2\text{ mm}$).

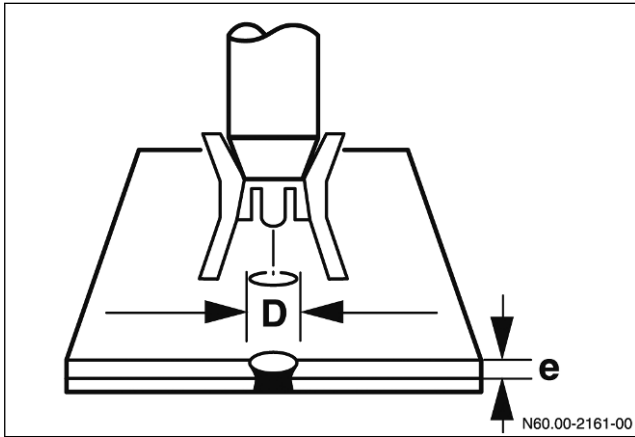


Ratio of sheet thickness to distance from the edge

- e Sheet thickness
- L Distance from sheet edge

Gas-shielded plug welding

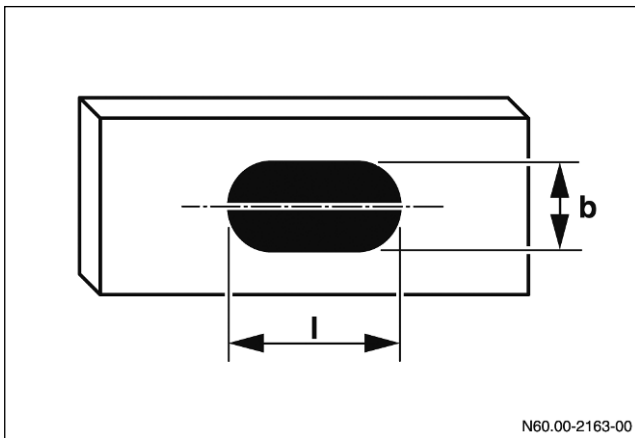
If overlapping sheets can only be welded from one side, use either inert gas plug welding or tack welding. If the joint is produced by stamping or drilling followed by plug welding, the drilled area must be deburred before welding.



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 ($l = 2 * b$).

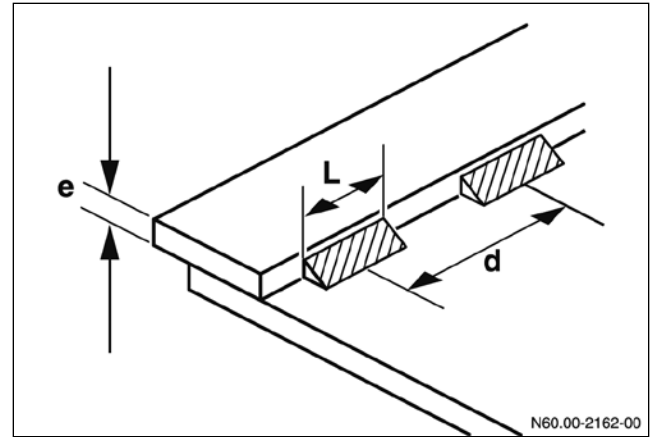


Ratio of width to length of slotted holes

- b Width of slotted hole
- l Length of slotted hole

Tack welding

If sheet thickness is $>2\text{mm}$ [$3/32$ in], overlapping sheets can also be joined by tack welding ($30\text{mm} < L < 40 * e$; $d > 2L$) [$1 \frac{1}{4}$ in $< L < 40 * e$; $d > 2L$]



Ratio of sheet thickness to distance between spot welds

- d Distance between tack weld centers
- 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

More information is contained in the "Limiting values for planning" (\rightarrow Chapter 5) and "Damage prevention" (\rightarrow Chapter 6) sections, the "body shell" (\rightarrow Chapter 8.2) section.

Anti-corrosion protection after welding

On completion of all welding work on the vehicle, it's important to comply with the specified corrosion protection measures (\rightarrow Chapter 6.3).

When carrying out welding work, note the instructions specified "Damage prevention" (\rightarrow Chapter 6) and "Modifications to the basic Vehicle" sections (\rightarrow Chapter 8)

4.8. Noise Insulation

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

- engine
- exhaust system
- air intake system
- tires, etc

Sound level measurements must be made and Federal and State regulations and guidelines shall apply.

Do not remove or modify noise-insulating parts fitted to vehicle to prevent modifications from changing the vehicle's sound levels applicable to FMVSS/CMVSS regulations

Do not adversely affect the level of interior noise.

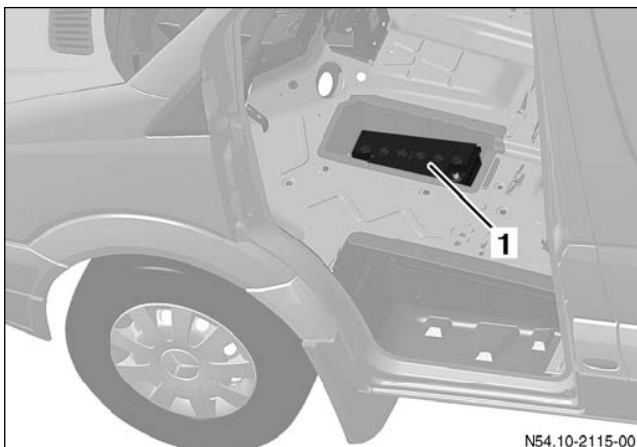
All modifications to the vehicle must comply with vehicle sound levels applicable to FMVSS/CMVSS regulations.

4.9. Maintenance and repairs

Maintenance and repair of the vehicle must not be hindered by the body, modifications or additional equipment. The Operating Instructions must be observed.

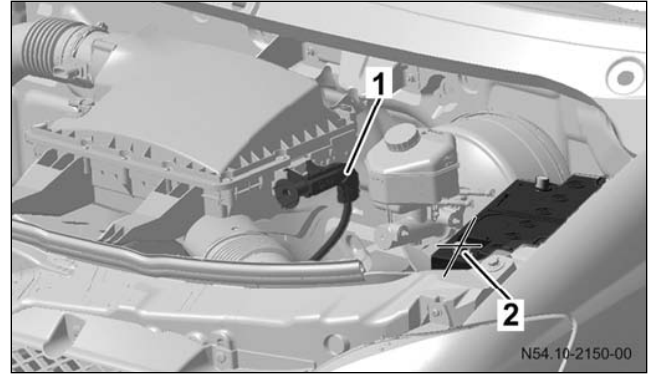
- Maintenance points and assemblies must remain easily accessible
- Storage boxes must be fitted with maintenance flaps or removable rear panels.
- The battery compartment must be sufficiently ventilated, with provision for air to enter and exit.
- Check the condition and capacity of batteries and service them in accordance with the manufacturer's specifications (→ Chapter 7.3)

Leaving the vehicle parked up for long period of time can lead to battery damage. This can be avoided by disconnecting the battery and storing it. For more information consult the owner's manual.



Installation location of the main battery

- 1 Main battery



Installation location of the jump-starting / charging connection

- 1 Jump-starting / charging connection
- 2 Positive terminal, auxiliary battery – not suitable for jump-starting

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

Do not use the auxiliary battery in the engine compartment for connection to an external power supply as this could result in damage to the vehicle.

Daimler AG, MBUSA LLC, MBCA and Daimler Vans USA LLC are not responsible for the cost of any additional work made necessary by the Upfitter which has to be performed during warranty, maintenance or repair work.

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

- Check the headlamp setting or have this checked at an authorized Sprinter workshop.
- VANS ENGINEERING SUPPORT recommends an authorized Mercedes-Benz SPRINTER or Freightliner SPRINTER Dealer.
- Retighten the wheel nuts to the specified torque.

The Upfitter must provide the vehicle with operating instructions and maintenance instructions for the body and any additional equipment installed.

4.9.1. Storing the vehicle

Storage in an enclosed space:

- Clean the entire vehicle
- Check the oil and coolant levels
- Inflate the tires to 0.5 bar / 7.25 PSI above the specified tire pressures
- Release the handbrake and chock the wheels
- Disconnect the battery in charged state (more than 80%) 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 windshield wipers away from the windshield
- Close all air inlets and set the heating system to "Off"
- Remove the battery and store it in accordance with the battery manufacturer's specifications (→ Chapter 7.3.3).

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 tire pressures once a month

Removing the vehicle from storage

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

4.9.2. Battery maintenance and storage

To avoid damage to the battery, disconnect the battery if the vehicle is to be parked for a period longer than one week. If the vehicle is parked for periods of longer than one month, remove the battery and store it in a dry place at temperatures between 32°F to 86°F [0°C to 30°C]. Store the battery in an upright position. The battery charge must be kept above 12.55V at all times. If the voltage drops below 12.55V but not below 12.1V, the battery must be recharged.

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

4.9.3. Work before delivering the modified vehicle

- **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 delivering the vehicle.
- **Checking the tires**
Before delivering the vehicle, check that the tires are inflated to the specified pressure and check the tires for damage. Damaged tires must be replaced
- **Checking wheel alignment**
We recommend that the wheel alignment be checked if modifications have been made by an authorized SPRINTER repair shop. More detailed information is contained in the SPRINTER Service Manual.

4.10. Optional Equipment

We recommend ordering available optional equipment from the factory. Information about all optional equipment available as an option is available from your authorized Mercedes-Benz SPRINTER and Freightliner SPRINTER Dealer. Optional equipment (e.g. reinforced springs, frame reinforcement, 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.

4.11. Threshold values of the base vehicle

Parts which must not be welded:

- The A- and B-pillar
- Top and bottom chord of the frame
- In the vicinity of the airbag
- Plug welding is only permissible in the vertical webs of the longitudinal frame member

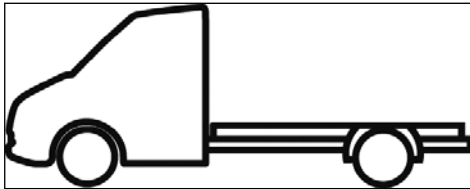
Parts which must not be drilled:

- The A- and B-pillar
- 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

5. Technical limiting values for planning

5.1. Limiting values of the basic vehicle

This section contains the basic vehicle technical limiting values which are important for planning the vehicle's layout. In addition, you will find more information in the other sections of the current version of the Body & Equipment Guideline.



5.1.1. Maneuverability

- Under all loading conditions, the front axle load must represent at least the following proportion of the gross permissible weight:

With cargo lift	at least 30% of the gross vehicle weight
Without cargo lift	at least 25% of the gross vehicle weight

Warning

Do not exceed the maximum Center of Gravity limits. Do not exceed the maximum axle or wheel loads. Failure to adhere to the maximum Center of Gravity limits, axle loads and wheel loads, may lead to an accident with injury or death.

5.1.2. Extreme permissible positions of center of gravity

Y-axis:	Never exceed the maximum side to side difference of the laden / unladen vehicle of 4%. Do not exceed the maximum permissible wheel or axle loads.
---------	--

Maximum Center of Gravity heights: Measured from the ground

Gross vehicle weight Rating (GVWR)	Center of gravity heights, z-axis
8,550 lbs	1300 mm [51.2 in]
9,990 lbs	1300 mm [51.2 in]
11,030 lbs	1300 mm [51.2 in]

5.1.3. Center of gravity Chassis Cab

Center of gravity of a factory Chassis Cab at curb weight (CW) without options.

Chassis Cab wheelbase mm / [inch]	Center of Gravity x / y / z CG [mm]	Center of Gravity x / y / z CG [in]
3665 / [144]	1203 / 0 / 650	47.3 / 0 / 25.6
4325 / [170]	1356 / 0 / 650	53.3 / 0 / 25.6

5.1.4. Vehicle dimensions Chassis Cab

Maximum Chassis Cab vehicle width:

Mirror FS2 (standard)	Body width max. [mm / in] 2,438 / 96
-----------------------	--------------------------------------

Body height max: Never exceed the max CG height	Never exceed the body height of 2,160mm / 85in based from body floor
---	--

Wheelbase mm / [inch]	Max. body length Body length [mm/in/ft]
3665 / [144]	3,942 / 155.2 / 13.0
4325 / [170]	194.1 / 16.2

Attention: For emission certification reasons box bodies mounted on Sprinter Cab-Chassis need to feature either a wind deflector or a nose cone.

5.2. Chassis limiting values

5.2.1. Permissible axle loads

Warning

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 then lose control of the vehicle and cause an accident and may cause serious injury or death.

In addition, overloading could damage the suspension system and load-bearing parts.

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

5.2.2. Approved tire sizes

Gross vehicle Weight [lbs]	Rim	Tire size	Load Index
8,550	6.5Jx16	245/75R16	120/116
9,990	5.5Jx16	215/85R16	115/112
11,030	5.5Jx16	215/85R16	115/112
10,140	8.5Jx16	285/65R16	128
10,140	5.5Jx16	205/75R16	110/108

5.2.3. Diameter of turning circle

Wheelbase (mm / in)	Diameter of turning circle (ft) curb to curb / wall to wall
3665 / 144	45.2 / 47.6
4325 / 170	52.5 / 54.6

5.2.4. Modifications to the Axles

No modifications whatsoever may be made to the suspension or the axles.

5.2.5. Modifications to the steering system

On no account may any modifications be made to the steering system (→ Chapter 5.1.1)

5.2.6. 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.

5.2.7. Modifications to springs, spring mountings/shock absorbers

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 optional equipment. We recommend the use of standard Mercedes Benz SPRINTER & Freightliner SPRINTER parts. On no account should modifications be made to the spring mountings (→ Chapter 8.1.2)

5.2.8. Wheel alignment

No modifications whatsoever may be made to wheel alignment settings (→ Chapter 8.1.5)

5.3. Body shell limiting values

5.3.1. Modifications to the body shell

Refer to the “Modifications to the basic vehicle” section (→ Chapter 8).

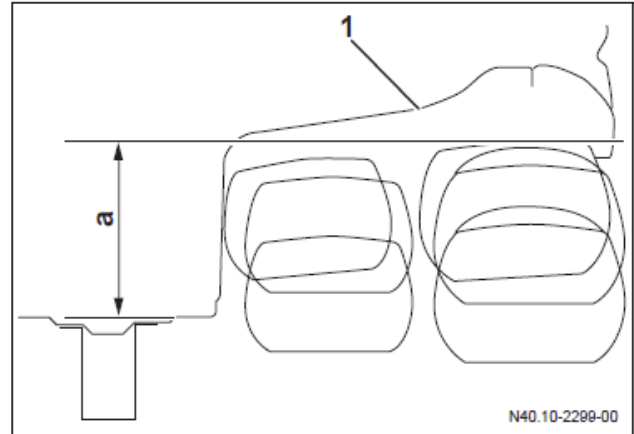
- No modifications whatsoever may be made to the cross-member structure from the front of the vehicle back to, and including, the B-pillar.
- On no account should modifications be made to the rear door opening including the roof area
- In the event of modifications to the load-bearing structure, the total equivalent rigidity of the structure fitted by the Upfitter 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 sidewall of the panel van or the passenger van, the rigidity of the modified body must be equal to that of the basic vehicle.

5.3.2. Limiting values of the vehicle frame

If the frame is extended, the material of the extension element must have the same quality and dimensions as the standard chassis frame (→ Chapter 8.2.3).

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

5.4. Wheel well lowering for Cargo van



Gap requirement

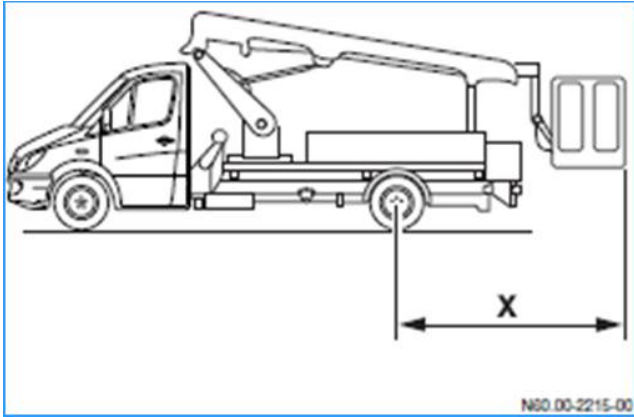
- 1 Contour of standard panel van wheel well
- a Minimum distance from frame flange to wheel well contour.
- a - w/o snow chains = 210mm = 8.26in
- a - with snow chains = 240mm = 9.45in

5.4.1. Vehicle overhang

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

Maximum overhang lengths	
Wheelbase l mm / [inch]	Overhang length mm / [inch]
3665 / [144]	1830 / [72.0]
4325 / [170]	2160 / [85.0]

Extensions to overhang lengths may make it necessary to reduce the maximum permissible trailer load or tongue weight. In such cases, we recommend that you consult VANS ENGINEERING SUPPORT (→ Chapter 1.3).



5.4.2. Attachment points on the frame

Attachment to the frame must be carried out as described in the “Attachment to the frame” section (→ Chapter 8.2.2)

The body must be secured to the basic vehicle by means of all body consoles fitted at the factory or by means of additional body consoles.

The body consoles must be secured using two bolts for each body console.

5.4.3. Vehicle roof/roof load

Maximum roof loads		
Standard roof Cargo kg [lbs]	High roof Cargo kg [lbs]	Chassis Cab kg [lbs]
300 [660]	150 [330]	100 [220]

Do not modify or remove roof bows structural parts. The connection between the roof bow and the sidewall must be of sufficient bending resistance.

Wheelbase mm / [inch]	Quantity required
3665 / [144]	> 5 roof arches
4325 / [170]	> 6 roof arches

Roof arches	Position
1	to the rear of the front doors (B-pillar)
2	at the center of the load compartment sliding door (between the B- and C- pillars)
3	in the center 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 1 per roof arch (mm)
< 250	> 40 000
< 400	> 65 000
< 550	> 86 000

NOTE: Sprinters equipped with Cross Wind Assist with a large overhang and or increased roof height may limit the performance of the Cross Wind Assist system. For more information please consult with Vans Engineering Support.

5.5. Modifications of engine peripherals / drive train

5.5.1. Fuel system

Do not modify fuel system (→ Chapter 8.3.1)

5.5.2. Modifications to the engine/drive train components

- Do not modify the engine air intake
- Do not modify the drive shaft
- Do not retrofit any engine speed regulation equipment, other than OEM equipment.
- Do not modify the exhaust system, exhaust gas after treatment components (diesel particle filter, catalytic converter, Lambda probe, etc.)

5.5.3. Engine cooling system

Do not modify the cooling system including but not limited to radiator, radiator grille, air ducts, etc. (→ Chapter 8.3.4)

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

- at least 11 dm² [170 in²] for the front grille (radiator and condenser)
- at least 7dm² [109 in²] for the opening in the bumper (charge-air cooler flow)

5.6. Modification to the interior

5.6.1. Modifications to airbags and belt tensions

Warning

Do not modify the airbag system or the belt tension system.

Modification to or work incorrectly carried out on a restraint system (seat belt and seat belt anchorages, belt pre-tensioner or airbag) or its wiring could cause the restraint systems to malfunction. This means, for example, that airbags or belt tensions may be activated inadvertently or may fail in the event of an accident even though the rate of deceleration exceeds the deployment threshold and may cause serious injury or death.

- Do not modify the airbag components or the vicinity of airbag components and sensors.
- Do not modify the roof trim or its attachment if the vehicle is equipped with window bags.
- Stay clear of the airbag deployment areas (→ Chapter 8.4.2)
- Do not modify areas around the airbag control unit

More information is contained in the “Modifications to the basic vehicle” section (→ Chapter 8).

5.6.2. Modifications to seats

Warning

It is not permitted to modify the seats or mount seats on the wheel wells. In the event of an accident, the seats could become detached from their anchorages and may cause serious injury or death.

More information is contained in the “Modifications to the basic vehicle” (→ Chapter 8) and “Modifications to the interior” sections (→ Chapter 9.3).

Any retrofitted rear bench seat with two- or three-point seat belts must comply with the FMVSS/CMVSS requirements.

5.7. Limits to Electrics / Electronics

Refer to the “Electrics / Electronics” section
(→ Chapter 7)

5.7.1. Vehicle Marker and Clearance lamps

Vehicle marker and clearance lamps are required by law on all vehicles with total width of 80 inch and above according to FMVSS/CMVSS standards.

5.7.2. Retrofitting electrical equipment

All equipment fitted must meet FMVSS standards.

Comfort may be impaired in individual cases.

5.7.3. Mobile communication systems

Do not exceed the maximum transmission output

Waveband	Maximum transmission output (W)
Short wave < 50 MHz	100
4 m band	20
2 m band	50
Trunked radio / Tetra	35
70 cm band	35
GSM	10
3G	10
UMTS/LTE	10

5.7.4. CAN bus

Do not modify 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.

5.7.5. Electronic Stability Program

Do not modify the location, position and mounting of the ESP yaw rate sensor.
Do not modify the wiring or ESP components.
Do not modify the wheel base.

5.8. Design Limits for additional equipment

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

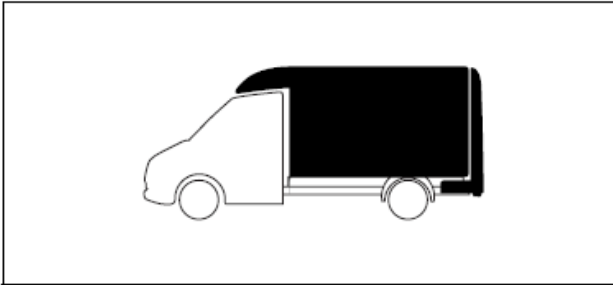
- The operation of vehicle components must not be adversely affected
- The clearance to moving vehicle parts must be guaranteed in all driving situations.
- Please refer to option code N62 and N63.

5.9. Design Limits for attachments

The maximum load capacity of a lifting platform is 500kg [1100 lbs] on a Cargo Van model and 1000kg [2205 lbs] on a Chassis Cab. Mounting in accordance with the “lifting platform” section (→ Chapter 8.6.6) is imperative.

5.10. Design Limits for the body

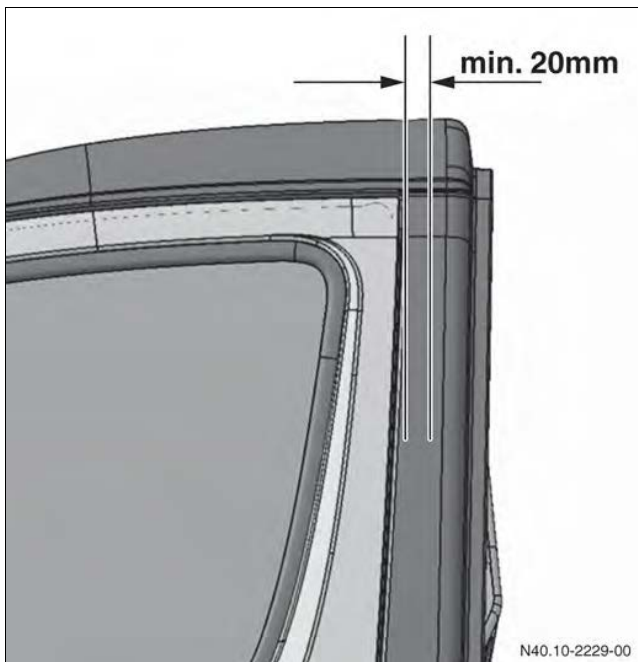
Refer to the “Design of bodies” section.



NOTE: The standard fuel filler cap must not be removed or covered with any "blocking" parts

NOTE: The minimum distance between the back of the cab and an adjacent body must be > 50 mm.

NOTE: For safety reasons 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 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

5.10.1. Design Limits of the mounting frame

Required moment of resistance of mounting frame:

Up to maximum standard wheelbase	30 cm ³
----------------------------------	--------------------

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

For further information about mounting frames for dump bodies see (→ Chapter 9.1)

Minimum moment of resistance required for assembly frame Wx1 [cm³]

Design	Platform/case	Dumper/lifting work platform	Loading crane
8550 lbs	17 ²	30	40
9990lbs /11030lbs	30 ²	40	40

Material quality of specified frame made of steel

Material	Tensile Strength (N/mm ²) Yield Strength (N/mm ²)
H240LA (DIN EN 10268-1.0480)	>240 260-340
S235JRG2 (DIN EN 10025-1.0038)	340-510 >235

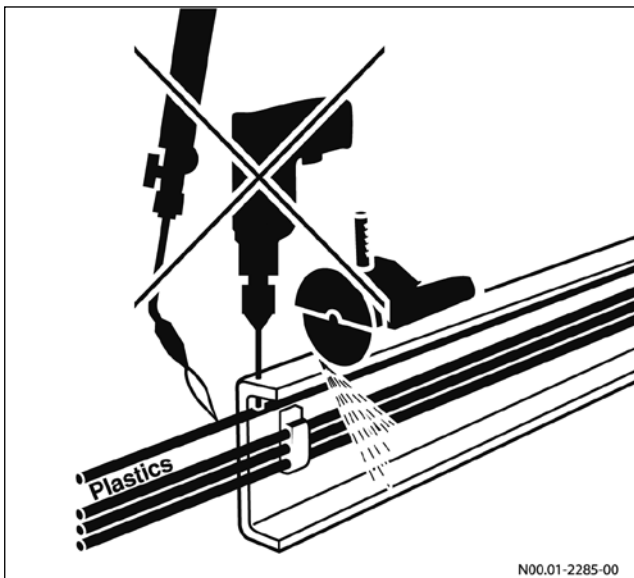
6. Damage prevention

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

Comply with all FMVSS/CMVSS regulations and laws.

6.1. Brake hoses / cables and lines

Cover plastic lines and brake hoses before carrying out any welding, drilling and grinding work or before working with cutting discs. If necessary, the plastic lines and brake hoses 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 the brake hoses. Lines must be protected from heat by means of insulation.

Warning

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 and may cause serious injury or death.

6.2. Welding Work

Warning

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 that may cause serious injury or death.

For this reason, the following safety precautions must always be observed during any work involving welding.

- Welding work on the frame may only be carried out by trained personnel and with prior approval of VANS ENGINEERING SUPPORT.
- Do not weld 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 ground terminal directly to the part being welded. Do not connect the ground 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 ground contact clamp of the welding unit.
- Before welding operations in the vicinity of the seat belts, airbag sensors or the airbag control unit, these components must be removed for the durations of the work. You will find important information about handling, transporting and storing airbag units in the "Interior" (→ Chapter 8.4)
- Before welding, cover springs and air bellows to protect them from welding spatter. Do not touch springs with welding electrodes or welding tongs.
- Cover the fuel tank and fuel system (lines, etc.) before carrying out welding work.
- Use only completely dry lime basic jacket electrodes (2.5 mm diameter).
- The maximum current maybe 40 A per mm of electrode diameter.
- Weld only with electrodes connected to the positive pole of a direct current source. Always weld from bottom to top.

- MIG welding is permissible
- Only use welding wires with a thickness of between 1 and 1.2mm.
- 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.
- Avoid welds in bends
- There must be at least 15 mm [0.6 inch] between the weld and the outer edges.

You will find further information about welding operations in the “Planning of bodies” section (→ Chapter 4), “Modifications to the basic vehicle” section (→ Chapter 8) and the “Body shell” section (→ Chapter 8.2). More information can be found in the SPRINTER Repair Manual.

Warning

Welding in the vicinity of the restraint systems (airbag and belts) can cause these systems to no longer function correctly. Welding is therefore not permitted in the vicinity of the restraint systems. Welding near restraint system components may cause serious injury or death.

6.3. Corrosion protection

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 VANS ENGINEERING SUPPORT may be used for anti-corrosion protection measures performed.

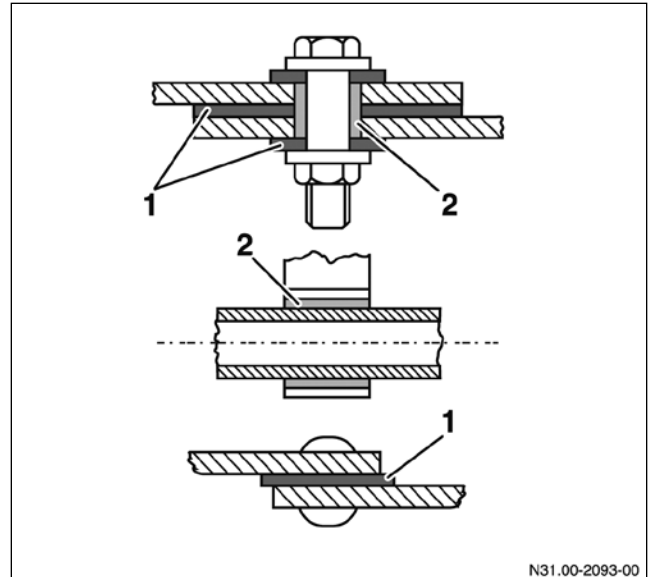
Planning Measures

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 noble 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 minimized by selecting suitable materials.

Preventing contact corrosion by means of electrical insulation



Preventing contact corrosion

1. Insulating washer
2. Insulating sleeve

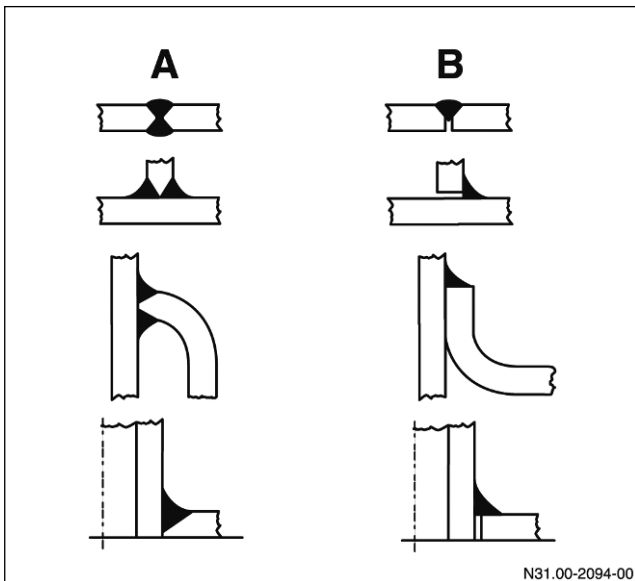
Contact corrosion can be prevented by using electrical insulation such as washers, sleeves or bushings.

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 by using 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. galvanization, painting or zinc coating applied by flame).

After all work on the vehicle is completed:

- 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

6.4. Painting work

Paintwork damaged by the Upfitter must be repaired by the Upfitter.

Observe the following points:

- Daimler AG quality standards for initial painting and paintwork repairs must be adhered to.
- Only painting materials tested and approved by Daimler AG paint may be used for any paintwork which may be necessary.
- The Upfitter 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 SPRINTER & Freightliner SPRINTER paint numbers from any Mercedes-Benz SPRINTER & Freightliner SPRINTER Service Center.

Mask the following areas before painting:

- Sealing surfaces
- Windows
- Contact areas between wheels and wheel hubs
- Contact areas for wheel nuts
- Vents on transmission, axles, etc.
- Disc brakes
- Door Locks
- Door retainers in the rear door hinges
- Contact surfaces on the guide rails for the sliding doors
- Door retainers and opening limiters in the center guide rails
- Moving parts of the sliding door carriage
- Airbags and seat belts
- Parktronic sensors (→ Chapter 7.9.8)
- Collision Prevention Assist sensor
- Blind Spot Assist sensor

For drying the paint, the object temperature must be maximum 60 °C [140°F] and the drying time must be 30 min. Control units or other components can be damaged at higher temperatures.

6.5. Mask

Warning:

Before towing, please make sure that you read the "Towing" section in the detailed Owner's Manual. You could otherwise fail to recognize dangers, which may cause serious injury or death.

Failure to observe the instructions in the Owner's Manual can result in damage to the vehicle.

6.6. Storing and delivery of 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 (→ Chapter 4.9.1).

Delivery

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 delivered.

7. Electrics/Electronics

7.1. General Information

Warning

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

Malfunctions in the electronic systems could seriously jeopardize the operating safety of the vehicle.

Service or modifications at electronic components must be carried out by a qualified special workshop having the necessary specialist knowledge and tools to carry out the work required.

We recommend that you use an authorized Mercedes-Benz SPRINTER or Freightliner SPRINTER Service Center 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 because it may cause an accident with serious injury or death.

NOTE: A positive total charge balance must be ensured when additional electrical components are installed.

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

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

- Electrical and electronic components must fulfill the test requirements of ISO 16750.
- Observe the directives in (→ Chapter 7.3) when installing additional batteries.
- Cables routed in the vicinity of exhaust systems must be insulated against high temperatures (→ Chapter 8.3.3)
- Cables must be routed in such a way that there are no chafing points.
- 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 (→ Chapter 6.3).
- Observe the Owner's Manual

You can obtain more information from VANS ENGINEERING SUPPORT. (→Chapter 1.3).

7.2. 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.

Electromagnetic Interference EMI occurs in the vehicle electrical circuits because of the various incompatible components. At Daimler AG, 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).

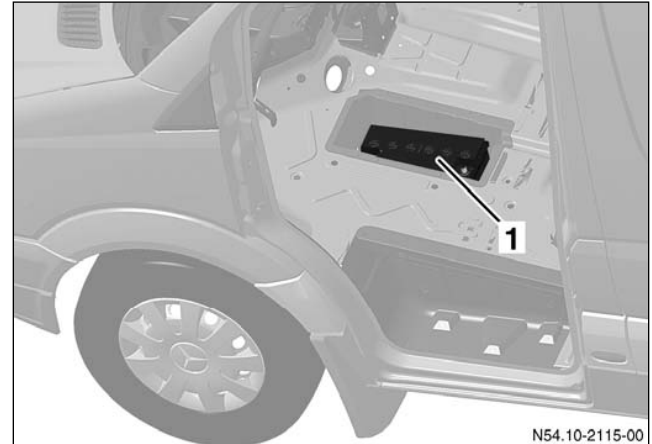
When retrofitting electric or electronic systems, they must be tested for electromagnetic compatibility and this must be documented. The equipment must possess type approval.

The following standards provide information on this:

- CISPR 12
- CISPR 25
- ISO 7637
- ISO 10605
- ISO 11451
- ISO 11452
- MBN10284
- EC Directive 72/245/EEC
- ECE-R 10

7.3. Battery

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



Location of the main battery

A 25 AMP current draw requires the use of the reinforced battery. An auxiliary battery (Option E28) must be used for more than 25 AMP current draw.

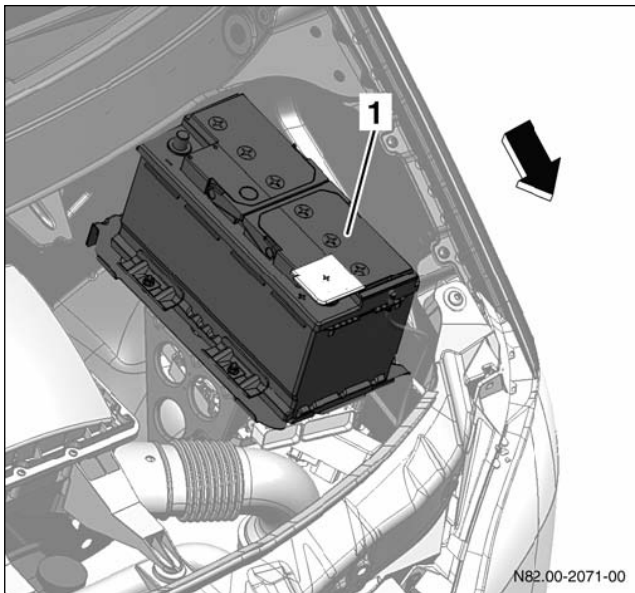
Additional Information

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

7.3.1. Retrofitting an additional battery

Do not connect Batteries with a capacity over 100 Ah directly to the vehicle's electrical system due to potential 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 auxiliary battery

- 1 Auxiliary battery
- Arrow Front of vehicle

Additional batteries must be connected to the vehicle on-board electrical system using a suitable cut-off relay and fuse. You can obtain more information and a design proposal from the department responsible. When installing an additional battery, ensure that the same type of battery is used as the starter battery.

If the auxiliary battery is located in the passenger compartment, battery gases must be vented to the outside via a central vent hose.

The auxiliary battery must only be fitted in conjunction with a cut-off relay and fuses suitable for the charge current.

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 auxiliary battery may only be used to power auxiliary components such as the auxiliary heating,

loading aids or electrical equipment in motor caravans (fridge, etc.).

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

7.3.2. Battery maintenance and storage

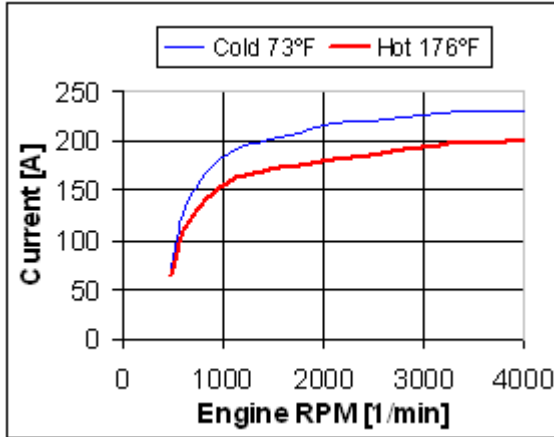
Batteries must be checked regularly for voltage loss (self- discharge) even when removed. Only the electrolyte level check is not required with low-maintenance batteries.

You will find information on battery maintenance and storage in the "Planning of bodies" section (→ Chapter 4).

7.3.3. Alternator

OM642- 220 Amp - Alternator

Values are estimates and can differ slightly from manufacturer.



Engine RPM (1/min)	Current Cold 73°F (A)	Current Hot 176°F (A)
650	137	116
700	149	125
800	162	137
900	175	148
1000	183	154
1200	194	165
1400	201	169
1500	203	171
1600	205	173
1800	210	177
2000	215	180
2500	222	188
3000	226	193
3500	230	198
4000	231	199

NOTE: A new generation of regulators is used in the Sprinter. The alternator regulator is equipped with a LIN (Local Interface Network) interface. The characteristics of the LIN alternators are fixed in the engine control unit. For this reason aftermarket alternators cannot be retrofitted. As of model year 2010 w. engine type OM642 (6 cylinder) a 220 Amp alternator (STD) is available.

As of model year 2014 w. engine OM651 (4 cylinder) a 200 Amp alternator (STD) is available. An optional 250 Amp alternator (code M60) is available.

No D+ (engine running positive signal) output is available at alternator with LIN Bus technology, only at the Upfitter connector EK1 (see Chapter 6.3.1.) under driver seat.

F57 (300A) Alternator Fusing

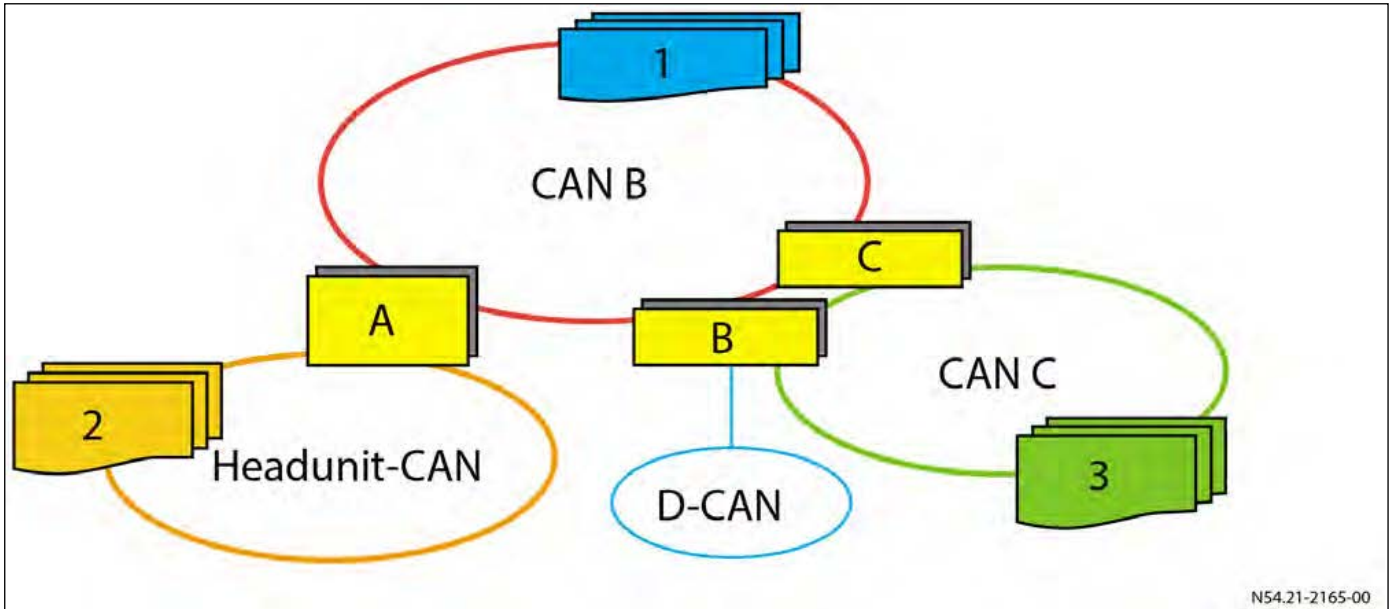


- The alternator wiring harness is fused with a 300A. The fuse is integrated in the wiring harness
- The fuse location is at the rear of the engine at bell house

In case a short occurs and the fuse blows, then the alternator wiring harness has to be completely replaced!

7.4. Interfaces

7.4.1. CAN bus and networking



1	2	3
I-CAN = interior CAN (CAN B, 83.333 kBit/s)	Head unit CAN	M-CAN = engine CAN (CAN C, 500 kBit/s) D-CAN = diagnostics CAN (500 kBit/s)
Tire pressure monitor ¹ Electronic restraint system Overhead control panel ¹ Signal acquisition and actuation module Door control unit Fuel-fired heater booster ¹ Upper control panel Trailer control unit ¹ Parktronic ¹ Programmable special module ¹ Air-conditioning control ¹ PTC heater booster ¹ Auxiliary heating, water ¹ Air suspension ¹	Navibox	Jacket tube module Electronic selector lever module Transmission control unit Engine control unit Diagnostics interface Automatic headlamp range control ¹ Multi-purpose camera ¹ Blind Spot Assist, master RR ¹ Blind Spot Assist, slave FR/FL/RL ¹ Forward Collision Warning ¹ ESP/Adaptive Brake Transfer case ¹ Parktronic ¹

¹ Optional 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

Warning

As all components are networked and internally monitored. Do not connect to or modify components on 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 and may cause serious injury or death.

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 malfunction memory.

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

You can obtain more information from an authorized SPRINTER Service Center or VANS ENGINEERING SUPPORT .

7.4.2. 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 [221°F] may be used. Connections must be made by qualified personal.

The electrical wire harness must be dimensioned according to the expected current drawn and protected with fuses.

Please use the following table as reference with an insulating limit temperature of > 105 °C [221°F].

Max. permanent current intensity (A)	Fuse rating (A)	Conductor cross-section (mm ²) [AWG]	
0 - 4.9	5 ¹	0.5	20
5 - 9.9	10 ¹	1	17
10 – 18	20 ¹	2.5	13
19 – 28	30 ¹	4	11
29 – 35	40 ²	6	9
36 – 48	50 ²	10	7
49 – 69	70 ²	16	5
70 – 98	100	25	3
99 – 123	125	35	1
124 – 148	150	50	0 (1/0)

¹ Shape C; DIN 72581 blade connector

² Shape E; DIN 72581 blade connector

7.4.3. 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 tear, impact and heat.

7.4.4. Control Switches

There are a total of eight switch locations available for additional special purpose bodies and equipment.

7.4.5. Retrofitting electrical equipment

Please observe the following if auxiliary electrical components 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 onboard network.
- Do not connect additional components to fuses already assigned
- Do not connect additional wires (e.g. with insulation piercing devices) to existing wires.
- Provide components with adequate protection by means of additional fuses.

All equipment fitted must be tested in accordance with Electromagnetic Compatibility. Additional electrical components must be connected using the aux electrical connector (EK1) available from the factory as described in the "Power supply" section.

If the vehicle's electronics are modified or additional equipment is installed incorrectly, this may impair operating safety, cause damage to the vehicle's electrical system or the complete vehicle, and invalidate the vehicle's warranty/certification.

7.4.6. Retrofitting an alternator

If additional electrical components are retrofitted, the increased power requirement can be met by fitting an auxiliary alternator.

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

Alternator voltage 14.3 V			
Code	I (A)	OM642	OM651
M40	200	-	Standard
M46	220	Standard	-
M60	250	-	optional

If additional equipment is fitted, factory-fitted power take-offs must be used (→ Chapter 8.5.3).

For retrofitting one additional alternator, we recommend option N62 from the factory as optional equipment.

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

- Do not install an aux alternator that can impair vehicle parts or their function.
- The battery must have sufficient capacity and the alternator must generate sufficient power.
- The alternator circuit must be provided with additional fuse protection.
- The additional pulley, option N62, is available from the factory as optional equipment for driving aux alternators.
- Electrical lines must be routed correctly (→ Chapter 7.3.5)
- 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 (→ Chapter 7.3.3).
- 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 delivery of the vehicle.

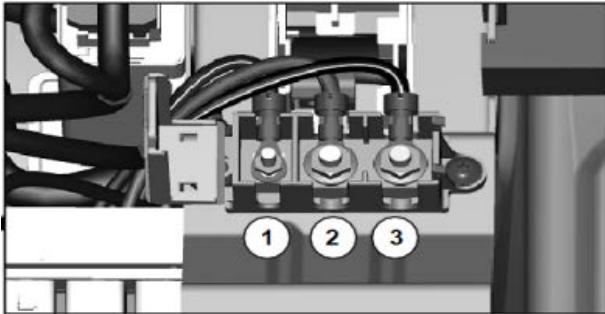
A new generation of regulator is used in the new SPRINTER. The alternator regulator is equipped with a LIN (Local Interface Network) interface.

The characteristics of the LIN alternators are fixed in the engine control unit – for this reason the **OEM alternator cannot be replaced by an aftermarket alternator.**

No D+ (engine running positive signal) output available at alternator with LIN Bus technology, only at Bodybuilder socket EK1 under driver seat.

7.4.7. Power supply

Additional electrical components must be connected using an auxiliary electrical connector (EK1) standard from the factory. The electrical connector is installed inside the driver's seat base (at the front, on the left-hand side of the vehicle) and has three terminals:

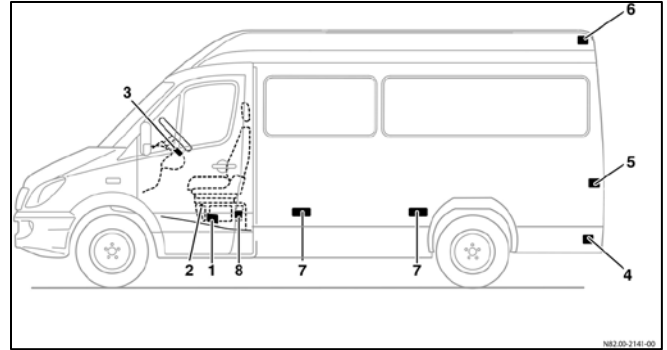


Terminal	U [V] / I [A]	wire color
1 st power with engine running D+	12V / 10A	blue/yellow
2 nd battery direct power 30	12V / 25A	red/gray
3 rd ignition power 15	12V / 15A	black/yellow

When installing electrical aftermarket equipment with an AMP draw of more than 25A it is necessary to use the optional aux battery 12V/100Ah (CODE E28).

7.4.8. Interface overview

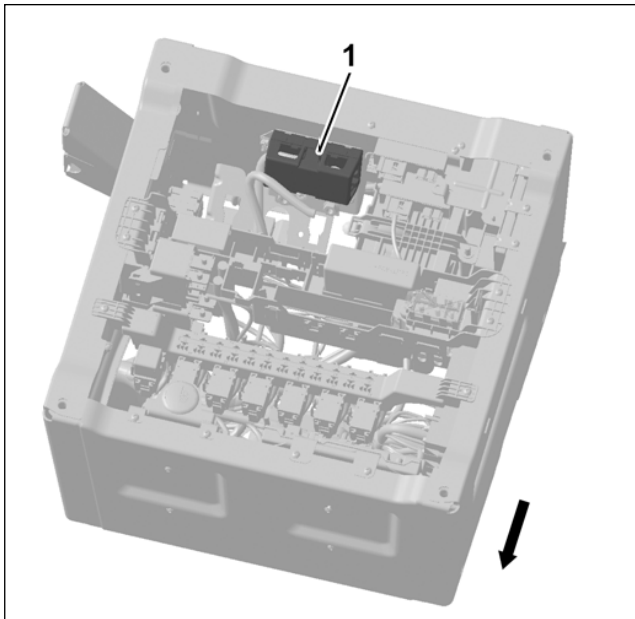
The electrical interfaces available as special equipment on the vehicle are depicted in the illustration below:



#	Option	Description
1	EK1	Auxiliary electrical connector (standard)
2	E46	12 V socket in instrument panel (max. 15 A) (standard)
3	L72	Connector for body int. lights (Chassis Cab only)
4	E40	Electrics for trailer power socket
5	L76	Extended tail lamp wiring harness (Chassis Cab only)
56	L77	AUX 12 V Plug Rear Comp (Van only)
67	LB2	Additional electrical equipment for turn signal lams
8	E28	Fuse box tapping point

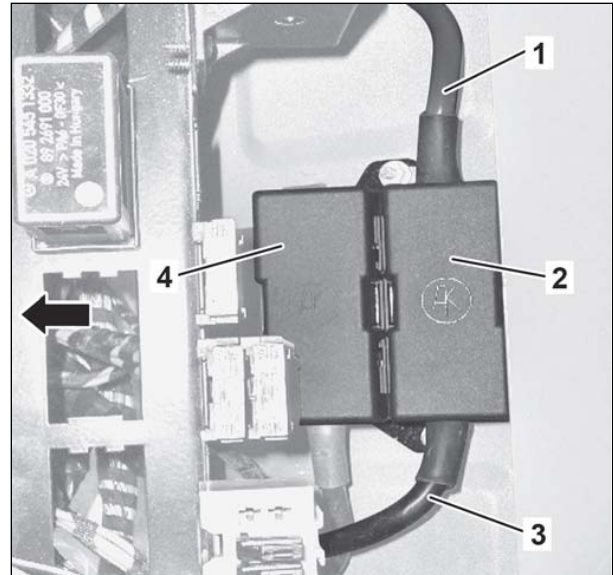
7.4.9. Power supply Aux Battery

If a factory supplied auxiliary battery (option E28) is fitted a connector terminal is already fitted inside the driver seat. When using this terminal, no necessary wire routing from the aux battery is required.



Driver seat pedestal

1	connector terminal
Arrow	driving direction

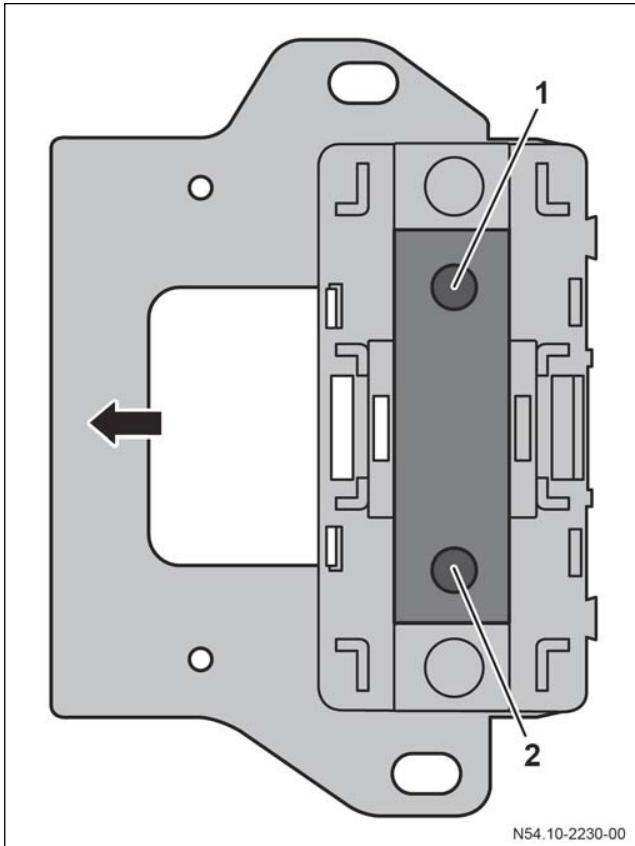


Example fuse box layout

1	wire from cut-off relay
2	Fuse box
3	wire to aux battery
4	additional fuse box (option EV3 only)
Arrow	driving direction

The tapping point for auxiliary consumers is the terminal in the fuse box with a direct line upstream of 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.

Fuse box ex factory with aux battery (E28)



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 suit-able fuse as per ISO 8820 SF51.

Fuse box (opened)

1	wire from cut off relay
2	12V take off from aux battery
Arrow	driving direction

Determining the tapping point through measurement

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

7.4.10. Speed Signal

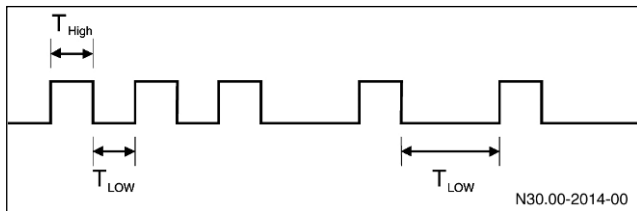
The “Highline” and “Lowline” instrument clusters output an electronic speed signal at pin 9 of the instrument cluster connector.

The speed signal (positive to ground) 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 ground and battery voltage and is not monitored. The signal is output at 4 pulses per meter.

The pulse width is 4 ms.

At 112.5 km/h [70 miles/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 ($I_{max} = 20 \text{ mA}$):

$T_{high} \quad U_a \geq 8V$
 $T_{low} \quad U_a \leq 1V$

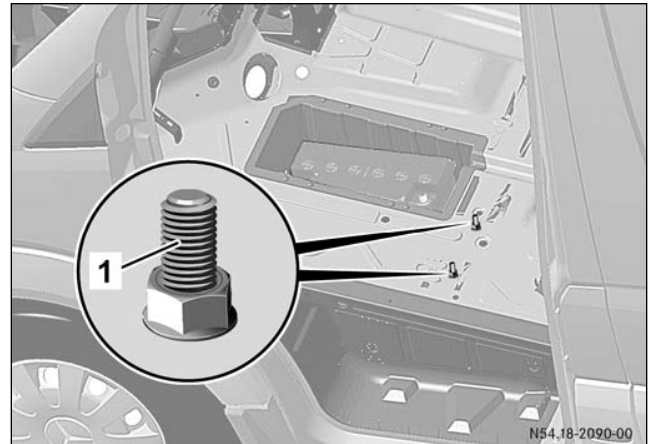
7.4.11. Ground Connections

The ground bolts provided by the OEM for retrofitting electrical attachments or installations must be used to ensure the optimum ground connection with the basic vehicle. There are two M6 ground bolts in the seat base of the co-driver’s seat; there is an additional M6 ground bolt on the underside of the vehicle on the cross member to the front of the rear axle.

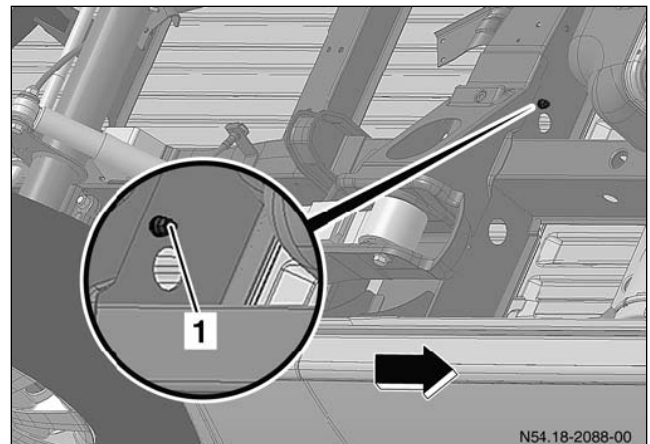
No more than 4 cable connectors may be screwed onto one ground bolt.

- The nuts must be tightened to a torque of 6 Nm / [4.4lft-lbs]
- The use of any other ground bolts may lead to malfunctions in safety systems.
- The ground bolts of the safety systems must not be used for bodies.

For other requirements, please consult with VANS ENGINEERING SUPPORT (→ Chapter 1.3)



Cab ground connection (inside driver’s seat base)
 1 ground bolt connection

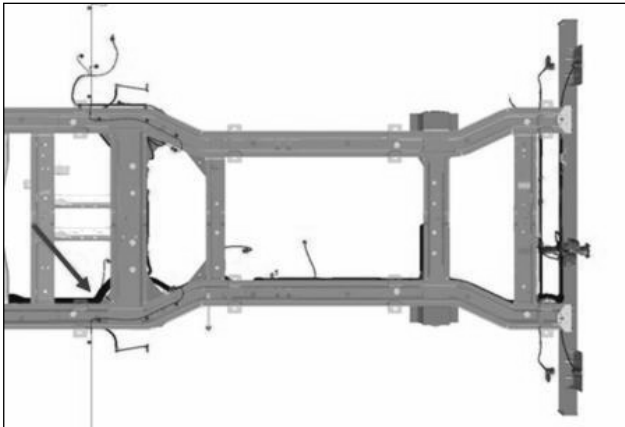


Frame ground connection in front of rear axle (8550 GVWR)

- 1 Ground bolt connection
 Arrow Front of vehicle



Chassis Cab Ground Terminal



Location of Chassis Cab Ground Terminal

7.5. Lighting

7.5.1. Adjusting the Headlamps

The headlamp basic setting must be observed (see vehicle identification plate). Only check the headlamp setting with the vehicle unloaded (ready to drive—full tank and with the driver or 165 lbs load).

- Park the vehicle on a level, horizontal surface.
- Align the headlamp beam adjuster and the vehicle perpendicular to each other.
- Correct the tire pressures (refer to the tire pressure table).
- Switch on the headlamps.
- Check each headlamp separately; when doing so, cover the other headlamp and lights.

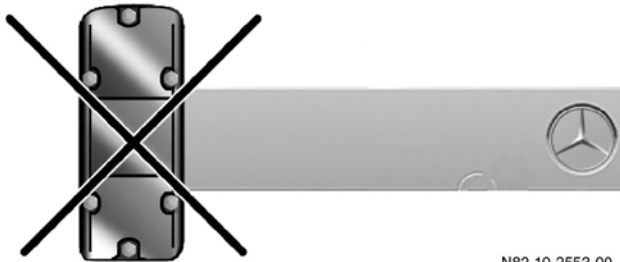
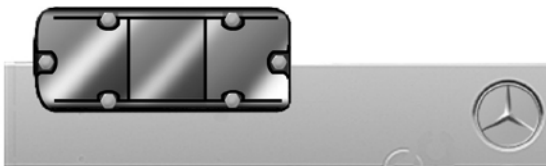
The light-dark boundary of the low-beam headlamp at a distance of 10 m [32.8ft] can be calculated from the height of the headlamp (center of headlamp to ground) minus the specified headlamp basic setting.

Bi-xenon headlamp basic setting

The basic setting on vehicles with bi-xenon headlamps must be adjusted by an authorized SPRINTER Dealer using Xentry.

Headlamp basic setting:

1% = 10 cm, 1.5% = 15 cm, 2% = 20 cm
[1% = 3.9 in, 1.5% = 5.9 in, 2% = 7.9 in]



N82.10-2553-00

Warning

There is a risk of fatal injuries from the high voltage in the xenon headlamps. Do not touch any components under high voltage which may cause serious injury or death.

On no account may persons with electronic implants (e.g. pacemakers) carry out any work on xenon headlamps which may cause serious injury or death.

7.5.2. Tail lamps

Observe FMVSS/CMVSS standards.

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

Option	description	Description/function
L90	Omission of tail lamps	Possible to retrofit other lamps and turn signals; the connectors and wiring harness are retained
L76	Tail lamp wiring	The lengthened tail lamp wiring harness approx. 2m [6 ft]) acts as provision for retrofitting tail lamps in a different location
L77	Additional electrical equipment for turn signal lamps	On Chassis Cab the additional wiring at the vehicle rear end is provided for additional turn signal lamps on the body.

NOTE: Always install the rear tail lamps horizontally for Sprinter Cab – Chassis & Cutaway (FW1, F28 & FA1).

7.5.3. Marker Lamps

Vehicle clearance lamps/identification lamps
Clearance lamps increase passive safety and are required by law on vehicles with a width of 80 inches and wider. The 5 clearance lamps/identification lamps are standard equipment.

7.5.4. 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 may be installed.

On Chassis Cab starting MY2009 the lamp out feature is disabled.

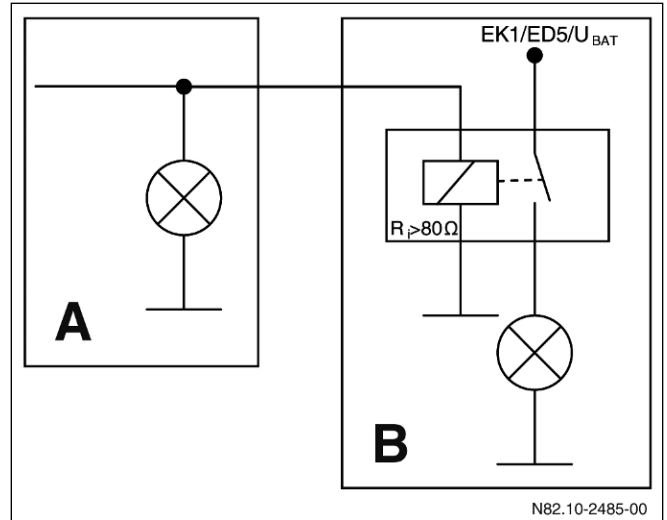
Lamp monitoring

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 fault entry must be addressed by an authorized Mercedes Benz SPRINTER & Freightliner SPRINTER service dealer with a Xentry.

Additional Lamps

Additional lamps must be connected via the PSM or a separate cubic relay. A standard cubic relay ($R_i > 80 \text{ Ohms}$) can optionally be connected in parallel with the exterior lamps (with the exception of the third brake lamp, turn signals, license 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 builder

NOTE: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.

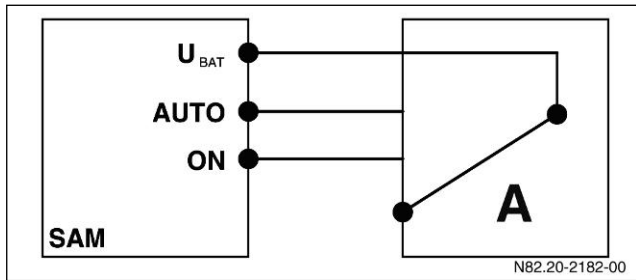
NOTE: The third brake lamp is an LED with a rating of approximately 1.8 W and cannot be replaced by an incandescent bulb.

7.5.5. 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).

Monitoring is only carried out for short circuits, maximum load 80W. Lamps are normally switched on dimmed. Dimming must be deactivated in the SAM if fluorescent lightning or load relief relays are used. This is achieved by means of the "Working Lamps" option (Option L68).

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

7.5.6. Rain-light sensor

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

The standard ceiling light has to be replaced by an overhead console with lights. The overhead control panel (DBE, Option LD0) must also be fitted (contains the interface).

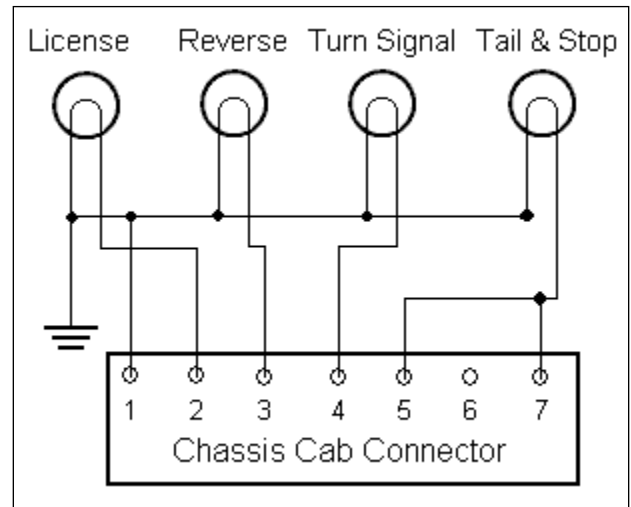
7.5.7. Aftermarket tail light installation

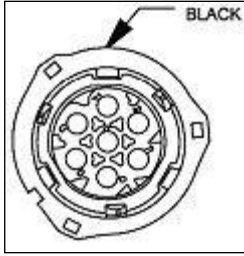
When installing aftermarket tail lights it is necessary to have Lamp out Recognition disabled.

This example was done with readily available aftermarket sealed polycarbonate lens & housing with incandescent dual filament bulb. The Stop, Turn and Backup light had 2.1 Amp @ 12.8 V and the Tail Light had 0.48 Amp @12.8 V.

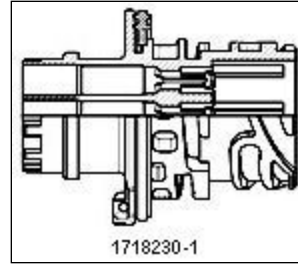
Note:

Verify that the lower draw Tail lights are hooked up to the correct wire otherwise rapid flashing will occur. (Sometimes battery needs to be disconnected to reset.)





Chassis Cab Connector



Male Connector

LAMP-TAIL-LEFT

Cavity	Color	Function	max. Amp	Extension Cable (L76) Color
1	BR	Ground		BR
2	GY/DG	License Light	1.0A	DG
3	WT/DB	Backup Light	2.4A	WT/DB
4	BK/WT	Turn Signal	2.1A	BK
5	BK/RD	Stop Light	2.4A	RD
6	GY/BR	Fog Light	N/A	GY/BR
7	GY/BK	Tail Light	1.0A	GY

LAMP-TAIL-RIGHT

Cavity	Color	Function	max. Amp	Extension Cable (L76) Color
1	BR	Ground		BR
2	GY/DG	License Light	1.0A	DG
3	WT/DB	Backup Light	2.4A	WT/DB
4	BK/DG	Turn Signal	2.1A	BK
5	RD/BK	Stop Light	2.4A	RD
6	-	-	-	GY/BR
7	GY/RD	Tail Light	1.0A	GY

NOTE: Wire colors on CODE L76 "Tail Light Extension Cable" have different colors (see tables).

Cable Color Abbreviations

BR	Brown
GY	Grey
DG	Dark Green
WT	White
DB	Dark Blue
BK	Black
RD	Red

Fitting male connector: company Tyco
(www.tycoelectronics.com)
Connector: 1718230-1
Terminal: 1703014-1

After market LED tail lamps

Prior to making any modification to or installing any equipment in or on a Sprinter Series 906, please consult with Upfitter Management Vans for additional and updated information.

Note: This segment is to inform all Final Stage Manufacturers using Sprinter Cap-Chassis, Cutaway (Options F28 & FA1, FW1) & Stripped Chassis (Option F50) model year 2007 & newer vehicles with retrofitted after market LED tail lamps installed according to the BEG for Sprinter 2015 and earlier, that certain conditions such as outage of LED turn signal lamps, may lead to non-compliance with FMVSS / CMVSS 108.

The installation of a resistor in conjunction with after market LED tail lamps may disable the rapid flashing of the control light in the instrument cluster that provides notice a LED tail lamp is out, leading to the aforementioned non-compliance.

If you have questions or need further information, please reach out to:

UPFITTER MANAGEMENT VANS USA / Canada

Department:	UPFITTER MANAGEMENT VANS
Contact:	Via website
Website:	www.UpfitterPortal.com

7.6. Mobile communication systems

If mobile communication systems (e.g. telephone, CB radio) are retrofitted (→ Chapter 5.7.3), 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 regarding electromagnetic compatibility.
- The ring-shaped MOST network uses a fiber-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 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.

NOTE: Do not kink the fiber-optic cable. The minimum bending radius is 25 mm [1.0 inch].

7.6.1. Equipment

- The maximum transmission output (PEAK) at the base point of the aerial must not be exceeded the following values.

Waveband	Maximum transmission output (W)
Short wave < 50 MHz	100
4 m band	20
2 m band	50
Trunked radio / Tetra	35
70 cm band	35
GSM	10
3G/UMTS/LTE	10

Do not install mobile communications systems and brackets in the deployment area of the airbags (→ Chapter 8.4.2).

- 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 equipment must be protected from humidity and severe mechanical vibrations; the permissible operating temperature must be observed.

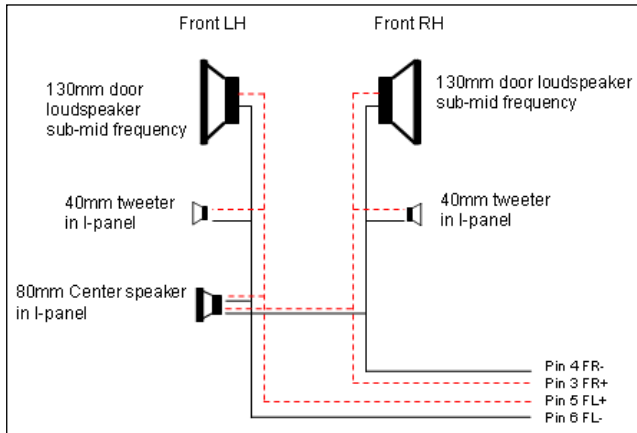
7.6.2. Connecting and routing the wiring for the radio antenna

- 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 ground connection to the body (aerial equipment).
- The antenna 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 ground.
- Route the antenna cable in such a way that it is not kinked or pinched.

7.6.3. Radio

5 Front Speakers (EL8)

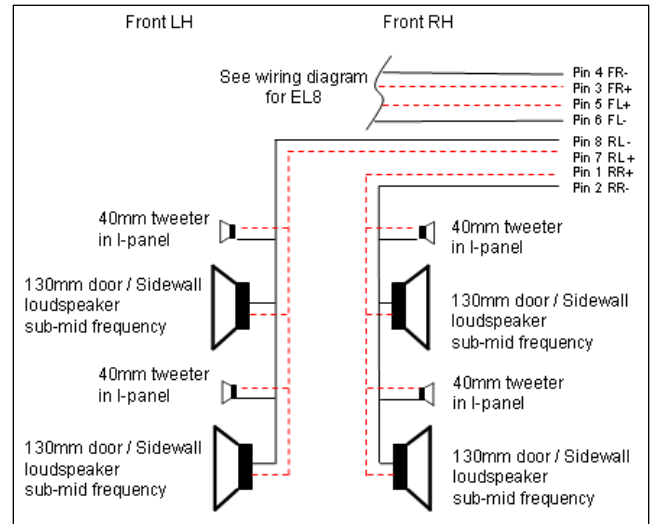
This option includes a two-way loudspeaker system plus one center speaker. One mid-range woofer is fitted in the driver's door and one is fitted in the co-driver's door. The center speaker and the tweeters are integrated in the instrument panel. (Standard on cargo vans and chassis-cab with radio prep CODE ER0)



5 Front Speakers – Wiring Diagram (EL8)

5 Front, 8 Rear Speakers (EL9)

Two-way loudspeaker system: the 5 front speakers are extended with a further four tweeters and four mid-range woofers fitted in the sidewall/sliding door and in the left and right-hand rear side paneling in the passenger compartment. (Standard on passenger van with radio and passenger van radio prep CODE ER0)



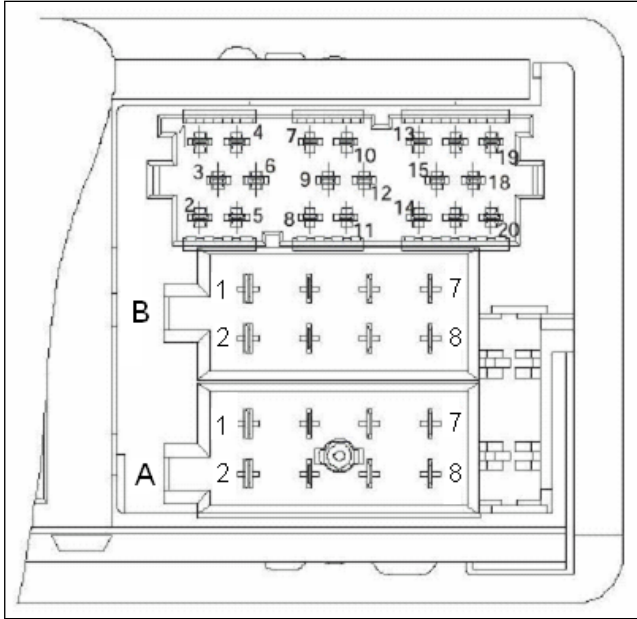
5 Front, 8 Rear Speakers – Wiring Diagram (EL9)

CODE ER0 pin layout radio connector

- A1 no connection
- A2 no connection
- A3 no connection
- A4 KI30 (+12V battery direct power)
- A5 switch `Antenna`
- A6 terminal 58D (display illumination)
- A7 terminal 15R (ACC accessory power on)
- A8 KI31 (Ground)

- B1 Loud Speaker rear right +
- B2 Loud Speaker rear right -
- B3 Loud Speaker front right +
- B4 Loud Speaker front right -
- B5 Loud Speaker front left +
- B6 Loud Speaker front left -
- B7 Loud Speaker rear left +
- B8 Loud Speaker rear left -

NOTE: If the radio was not setup for the eight rear speakers from the factory, a dealer must update the radio programming by activating a fader to activate the rear loudspeaker terminals.



Rear View of Radio

Antenna Relocation

When relocating the roof antenna use:
 Antenna hole plug: A 906 820 01 12
 The plug is black and will be screwed onto the factory location. An extension cable for the antenna wiring (local supply) can be used to relocate the antenna. The antenna has to be properly grounded.

CODE ER0 Preparation for Radio Retrofit

Pre-installation for radio

Pre-wiring (12 V) for retrofitting a (commercially available) radio, plus short-range interference suppression and a flexible stub antenna on roof. Chassis Cab and Cargo Vans have 5 front loudspeakers (EL8), Passenger Vans come with 5 front and 8 rear loudspeakers (EL9).

NOTE: The pre-installation for radio does not support CAN/MOST technology. After market radios will not work with highline steering wheel and cluster. Additional wiring must be retrofitted in order to retrofit a factory supplied radio. Without this wiring, functions such as recognition of the key position (radio continues to operate after the ignition key has been removed etc.) as well as control of the radio via the multifunction steering wheel and display of radio information in the instrument cluster are not supported.

As the factory-supplied radios are larger than the DIN slot, the radio opening must also be replaced when retrofitting a factory-supplied radio.



Preparation for Radio Retrofit

7.7. Electronic ignition switch (lock) (EZS)

7.7.1. General Information

- The processes involved in the access authorization 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 radio remote control key is achieved by inductive energy transmission.
- When the radio remote control values are transmitted to the drive authorization system III (FBS III), the electronic steering lock (ELV) and the engine control units are released.
- When the radio remote control key is removed, the ELV is locked if the last recorded speed signal was <3 km/h [1.86 mph] and the key is withdrawn by at least 4 mm. If the last recorded speed signal was >3 km/h [1.86 mph], the ELV is only locked if the door contact switch signals that the driver's door has been open for longer than 1 second.
- The radio remote control key activates the individual terminals (15, 15R) depending on the position in the ignition lock to which it is turned.
- The radio 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 radio 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 systems.
- The diagnostics CAN acts as a central diagnostic interface with all control units with diagnostics capability.
- An HF receiver is integrated.
- Where control units are networked, the electronic ignition switch 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.

7.7.2. Central locking/rescue vehicle

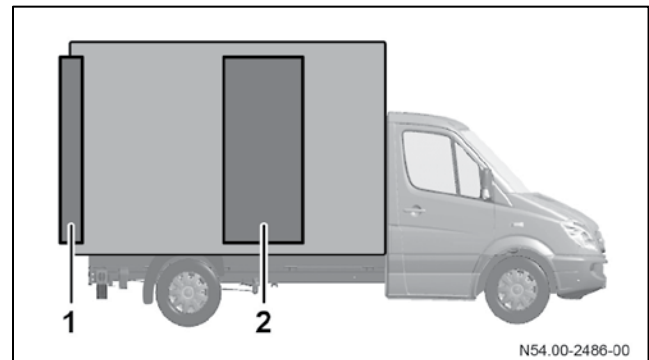
To guarantee faultless operation, it is only permitted to use central locking elements supplied by Daimler AG. If these cannot be used, please consult with VANS ENGINEERING SUPPORT (→ Chapter 1.4) for further information. By means of EZS variant coding, the doors can be programmed to be present or not present. Activation of automatic locking using Xentry Kit.

- Speed (adjustable, default 15 km/h [9.4 mph]).
- Ignition ON
- Automatic locking when last open door is closed (post function)

Deactivating automatic locking using Xentry on emergency vehicles it is possible to deactivate automatic central locking. This is a function that can be set by means of variant coding in the electronic igniting switch (EZS) using the Xentry Kit. You can obtain further information from VANS ENGINEERING SUPPORT (→ Chapter 1.4).

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.

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 recognize 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 Xentry. 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 Xentry, e.g. at a Sprinter service center.

Advantage:

Parameterization and installation of a PSM is not required.

Conditions:

Locks with a feedback function must be used.
The use of original Sprinter locks is recommended.
Max. three additional doors (right door, left door, rear doors) are possible.

Rescue vehicle fittings

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

Right-hand sliding door “not present”

Left-hand sliding door “not present”

Rear door “not present”

Common enable for control circuits 1 and 2

Co-driver’s door “not present”

7.8. Windows and doors

7.8.1. 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.

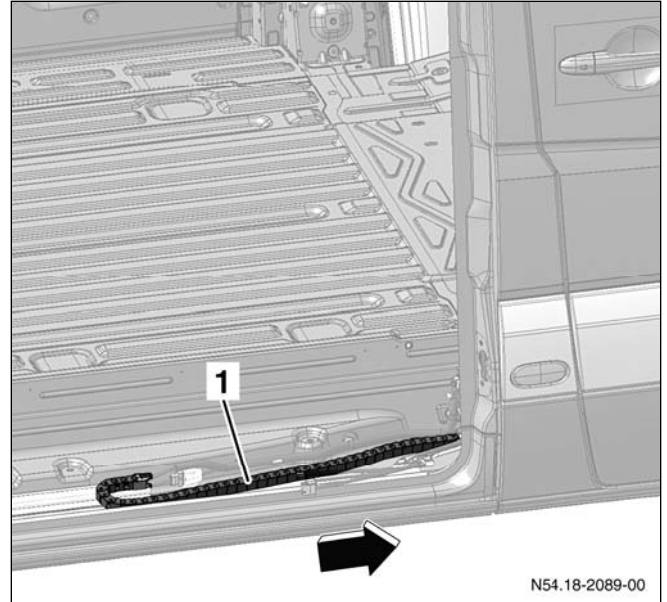
7.8.2. Load compartment sliding door

The electrical components of the cargo compartment sliding door on the new Sprinter - BM 906 are connected to the on-board electrical system via a fixed electrical connection in the form of a cable track (drag chain).

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 Upfitter following consultation with VANS ENGINEERING SUPPORT (→ Chapter 1.4).

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

7.8.3. Sliding sunroof

An OEM 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 6m [19.5ft].

7.8.4. Windscreen wipers

We recommend the use of genuine OEM wiper motors. If necessary, a second wiper motor can be connected via a load relief relay ($R_i > 80 \text{ Ohms}$). The wiper motor must be connected to the signal acquisition and actuation module (SAM) by means of a read back line. If only one wiper motor is connected, the SAM stores a fault in the malfunction memory.

7.8.5. 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 switched and can be routed if required.

The design of the outside mirror (with or without Blind Spot Assist) must be observed.

7.8.6. 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.

7.9. Driving assistance systems

7.9.1. 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 coasting, 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 (over steering or under steering), The system produces a stabilizing counteraction by applying the brakes on individual wheels.

Warning

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

- Modifications to the permissible gross vehicle weight
- Modifications to the wheelbase
- 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 of the body.
- Changes to the position of components
- Modifications to the suspension
- Modifications to wheels and tires
- Modifications to the engine
- Modifications to the steering system
- Modifications to the brake system
- Conversion to a semi-trailer 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 then lose control of the vehicle and cause an accident.

7.9.2. Crosswind Assist (> MY15)

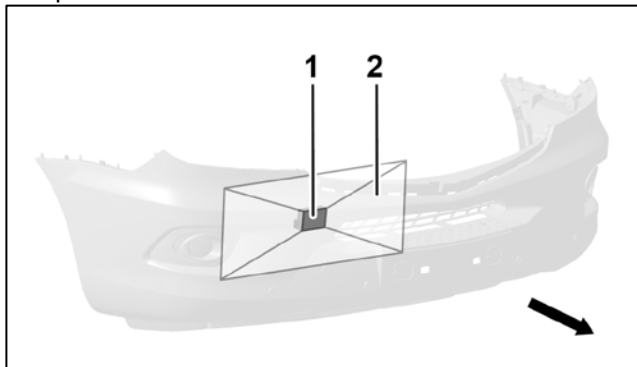
The Crosswind Assist function detects the influences of the crosswind (track offset) through the available ESP components and counteracts by applying brakes on individual wheels with the help of ESP.

Any work on the vehicle body which increases the projected lateral area is only allowed to a limited extent and after consultation with VANS ENGINEERING SUPPORT.

Increasing the Sprinter's projected lateral area can lead to adverse parameters, which may influence the function of the Crosswind Assist System. Crosswind Assist cannot be deactivated.

7.9.3. Collision Prevention Assist

The sensor of the Collision Prevention Assist is positioned laterally offset and integrated in the front bumper.



Position of the Collision Prevention Assist sensor

1 Position of sensor

2 Signal funnel

Arrow Front of vehicle

To ensure that the correct performance of the system, never make the following changes:

- Never change the position of the sensor
- Never attach additional components that can shield the area of or around the sensor. If necessary, the sensor can be deactivated.

Collision Prevention Assist can be deactivated using a button on the operating panel.

Warning

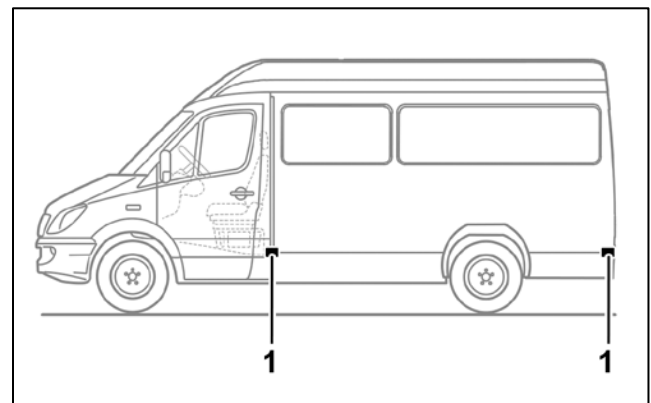
Depending on the version and thickness, paints or film coating can cause damping of radar waves. This could lead to malfunction or system failure. The driver could lose control of the vehicle and cause an accident.

The area of or around the sensor must not be painted or covered with a film.

NOTE: If the front end of the vehicle is damaged, please get the settings and functioning of the radar sensor checked at a qualified specialist workshop, e.g. at a Sprinter service center. This also applies to mild collisions at low speeds, where no damages to the front end of the vehicle are visible.

7.9.4. Blind Spot Assist

The sensors of Blind Spot Assist are installed behind the rub strip in the B-pillar and to the side behind the rear bumper in the body shell. The signal is transmitted to the driver by means of a luminous symbol in the outside mirrors.



Positions of sensors of Blind Spot Assist (schematic)

1 Position of sensors

Location symmetrical to the vehicle's longitudinal axis

To ensure the correct performance of the system never make the following changes:

- Never change the position of the sensors
- Never remove or modify detachable parts in the area of the sensors
- Never install detachable parts that can shield the area of or around the sensor
- Making modifications to the outside mirror
Clips may only be used once.

Blind Spot Assist can be deactivated using a button on the operating panel.

Warning

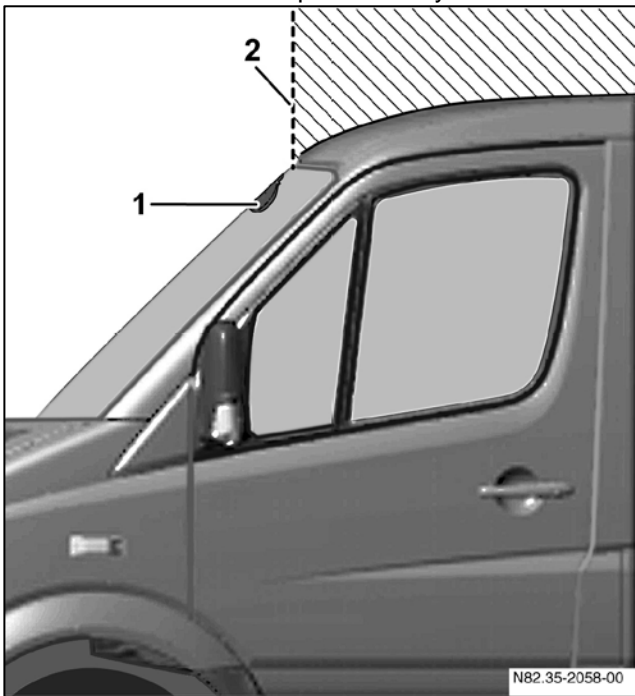
Depending on the version and thickness, paints or film coating may absorb radar signals. This may lead to malfunction or system failure. The driver could lose control of the vehicle and cause an accident.

The area of or around the sensor cannot be painted or covered with a film.

NOTE: If the trim areas of the sensors are damaged, please have the system and function of the radar sensors checked at a qualified specialist workshop, such as an authorized Sprinter Service Center. This is also applicable to mild collisions at low speeds, where no damages in the areas of the sensors are visible.

7.9.5. Highbeam Assist and Lane Keeping Assist

NOTE: On vehicles with bodies that protrude beyond the limit shown below (e.g. camper vans with alcove bodies), the function of the rain/light sensor may be impaired. We therefore do not recommended to install Highbeam Assist and Lane Keeping Assist on vehicles with bodies that protrude beyond this limit.



Limit for bodies on vehicles with rain/light sensor

- 1 Camera
- 2 Body limit

Warning

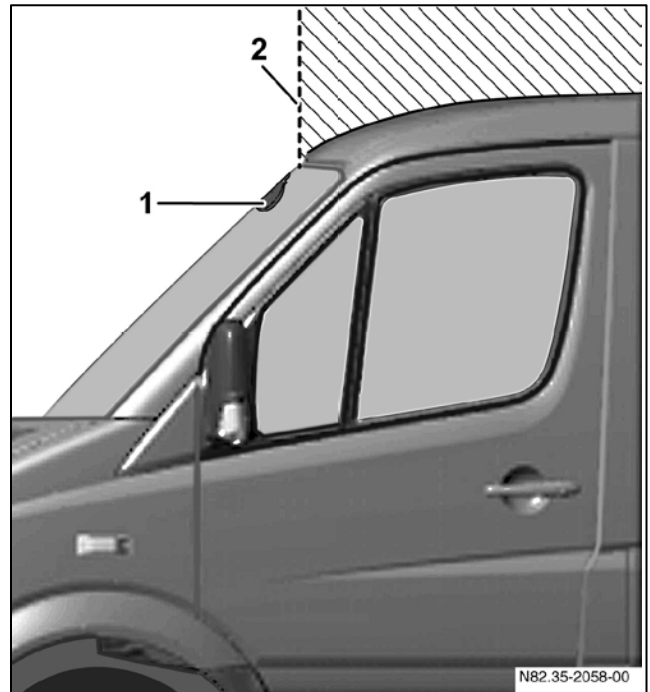
Never relocate or modify the position of the camera or the surrounding area (e.g. changing the standard windscreen). Otherwise the camera may not be able to function properly.

In case of modifications to the vehicle that lead to a change in the angle, e.g. increase in weight or replacement of suspension strut, the camera must be re-calibrated. Have the re-calibration carried out as soon as possible at a qualified specialist workshop possessing the required expertise and tools in order to perform the necessary work. Daimler AG recommends that you use an authorized Sprinter Service Center for this purpose.

Highbeam Assist can be deactivated via a menu in the instrument cluster and Lane Keeping Assist can be deactivated using a button on the operating panel.

7.9.6. Rain /light sensor

NOTE: On vehicles with bodies that protrude beyond the limit shown below (e.g. camper vans with alcove bodies), the function of the rain/light sensor may be impaired. It is therefore, not recommended to install a rain / light sensor on vehicles with bodies that rotrude beyond this limit.



Limit for bodies on vehicles with rain/light sensors

- 1 Rain/light sensor
- 2 Body limit

Warning

Never modify or relocate the rain / light sensor or the surrounding area (e.g. changing the standard windscreen). Otherwise the rain/light sensor may no longer function correctly.

It is only permitted to fit the rain/light sensor (code JA5) with windscreens available as standard or as special equipment. There is otherwise a risk of malfunction.

The overhead control panel (OCP) must also be considered (contains the interface).

7.9.7. Tire pressure monitoring system

Warning

Do not carry out any modifications in the grey-shaded areas of the vehicle substructure (see illustration). Otherwise, the function may be compromised by the effect of reflections. This might result in the driver being unaware of any tire pressure loss, and could cause an accident that may cause serious injury or death. Furthermore the vehicle will lose its certification.

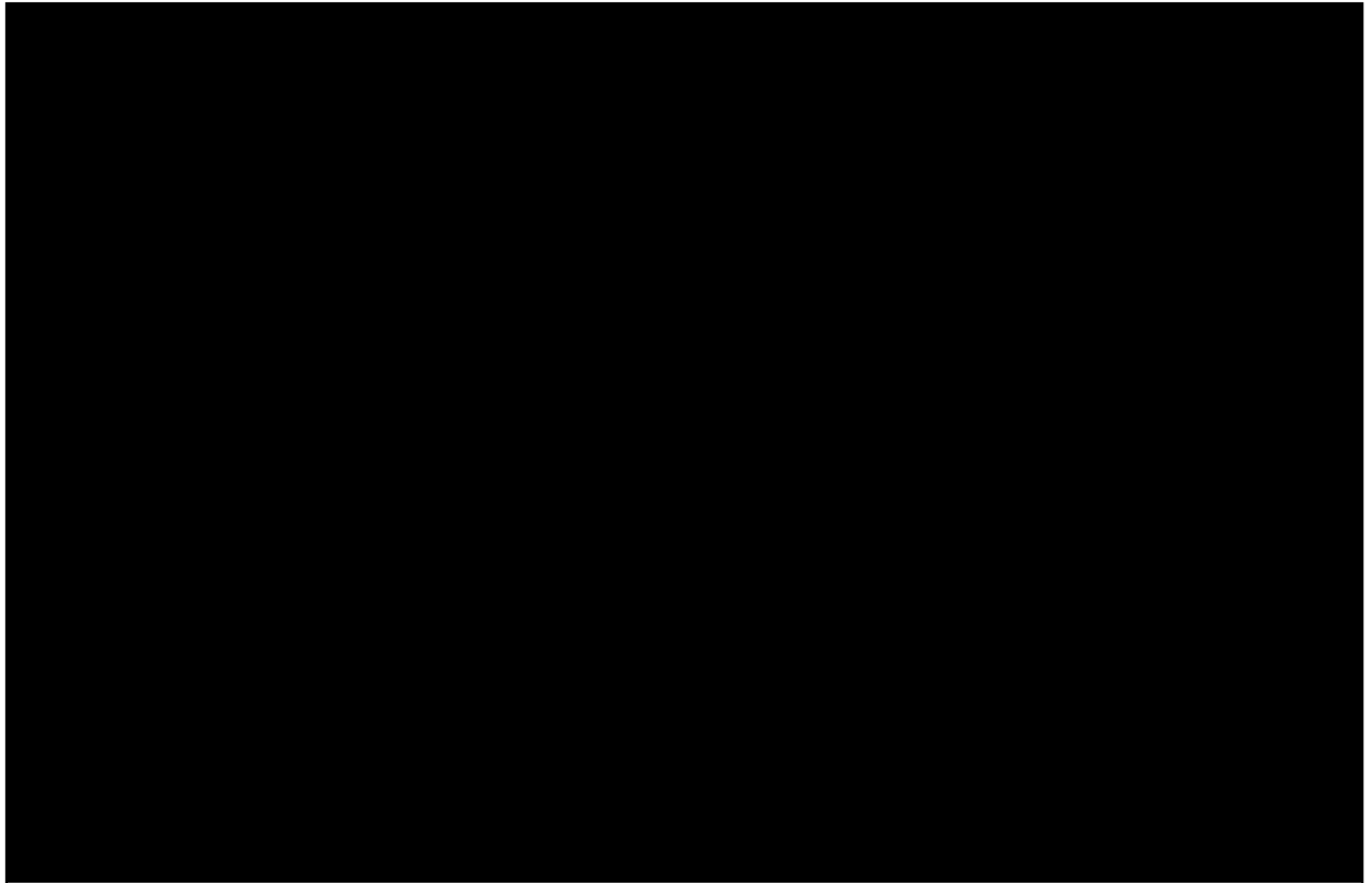
Tire Pressure Monitoring System is only available on Mercedes Benz SPRINTER & Freightliner SPRINTER 2500.

Correct operation of the tire pressure monitor, or Tire Pressure Monitoring Systems (TPMS), can only be guaranteed if no modifications are made to the underbody (as the effect of reflections cannot be correctly evaluated).

Modifying the vehicle substructure may adversely affect the tire pressure monitoring system.

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

The antenna position for the rear axle is to the rear on the underbody between the wheels (Cargo Van and Passenger Van). You can obtain more information about the tire pressure monitoring system from VANS ENGINEERING SUPPORT (→ Chapter 1.4).



Restricted area for tire pressure monitoring system. TPMS only available on 2500 SPRINTERS. Picture above reflects 2500 SPRINTER Chassis-Cab for illustration purposes only.

7.9.8. Parktronic

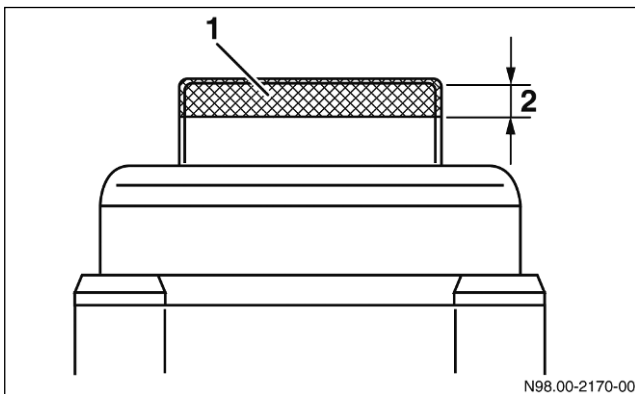
- If approved attachments are retrofitted, it is necessary to have Parktronic coded with the appropriate parameter record by Daimler AG.
- After market painting of the bumper is not permitted with the Parktronic ultrasonic sensors fitted. The coat of paint impairs the emission and reception of the ultrasonic 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 colors are available from your authorized SPRINTER Dealer.

To avoid impairing sensor operation the maximum thickness of paint on the cover cannot exceed 120µm. This also includes repeated painting applications and the coat of cathodic dip paint. The paint coat thickness is between 12µm and 25µm.

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

It is essential that not only the cover itself but also the cylinder edge of the sensor cover be coated with paint evenly all the way around 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 electro primed, the paint must not be removed by chemical means as this could damage the cataphoretic electro primer 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 hitch, overhangs of bodies, wheel carriers, steps, brush guards).

7.10. Signal acquisition and actuation module (SAM)

The power circuit on the new SPRINTER – BM 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.

7.11. Parametric special module (PSM)

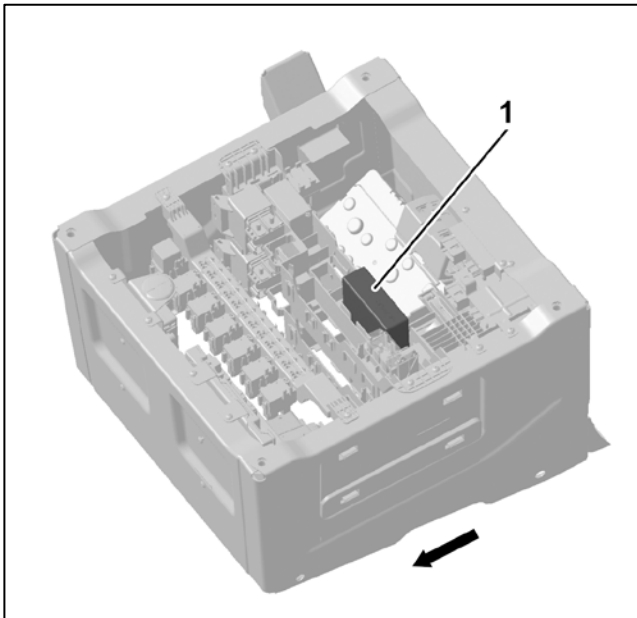
The networking of the various control units and components is not achieved through analogue means with wiring but digitally using multiple networks. The term “networking” refers to the interaction between different control units.

- Two high-speed Controller Area Networks (HS CAN and engine CAN)
- One diagnostic 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.

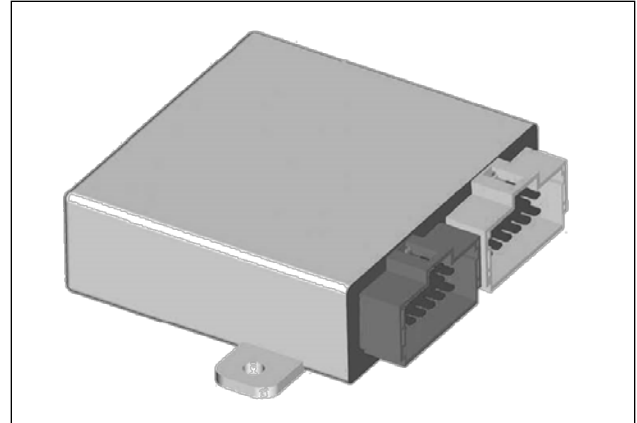
The PSM was developed to give Upfitters access to individual types of CAN bus data. The PSM is the gateway to the CAN Bus. The PSM can be used to read and program vehicle functions.

The PSM is available with option code ED5 and can be retrofitted.



PSM location inside the driver's seat pedestal

Arrow Front of vehicle



PSM Module

The PSM is able to read messages of the various bus data and translate them into signals. The outputs provide high, low or PWM (Pulse Width Modulation) signals or forward them to a specific body manufacturer CAN (ISO11992-3). The electronics installed by the body manufacturer then have access to the necessary signals.

Warning

The wiring on the vehicle cannot be tapped, as this would lead to failure messages from other control units on the CAN bus.

The PSM provides a defined, diagnostic-compatible and EMC (Electro Magnetic Compatibility) -tested interface between the vehicle and the body.

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

Example:

The engine control unit sends the speed information to the PSM. The PSM converts speed information into a PWM 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 (option code M53 or MT4 required).

NOTE: When writing a standard coding, all previous parameters are deleted. We recommend a PSM data backup.

A PSM program is uploaded by using the dealer Xentry Kit. Information about this can be obtained from your authorized SPRINTER dealer or UPFITTER MANAGEMENT VANS.

Customized PSM Software Programs can be requested directly by completing the PSM Request on the Contact Form at www.UpfitterPortal.com.

Warning

Under no circumstances is an exchange of PSM software between upfitters or dealers allowed

Any Authorized Sprinter Dealer, Sprinter Preferred Upfitter or Non-Preferred Upfitter that receives a PSM program will be cataloged and a record of the distribution will be kept.

7.11.1. Inputs/Outputs

Inputs:

A total of 10 inputs are available: 3 high active, 3 low active and 4 analog. The analog inputs can also be used as digital inputs.

Input devices can be:

- Switch
- Pushbutton

Outputs:

A total of 20 Outputs are available: this includes terminal 30 (+12 volt) and ground switch.

Outputs values are in the range of 0.5A and 10A. All outputs are internally fused.

General information

- 1 Short-circuit detection
- 2 In the case of high-side outputs, the PSM provides (+12V). The consumer load must be connected to the body ground or battery ground.
- 3 In the case of low-side outputs, the PSM provides (Ground)

7.11.2. Parameterization with Logic Blocks

PSM outputs and certain vehicle functions can be controlled by logical combinations of vehicle (CAN) signals and or switches.

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.

Logic contributions include:

- a) AND
- b) NAND (**not and**)
- c) OR
- d) NOR (**not or**)
- e) XOR (**exclusive or**)
- f) XNOR (**exclusive not or**)

Logic Blocks include:

- Timer Block
- Counter Block
- Flip Flop Block
- Threshold Switch
- Hysteresis Block

Logic combinations and logic blocks can be combined to reflect the desired function

Example:

The hazard warning buzzer turns on if

- a switch is activated
- the parking brake is not activated
- and the vehicle is in "Gear"

7.11.3. Bodybuilder-CAN

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

- High-speed CAN Class C
- Extended CAN identifier (29-bit)

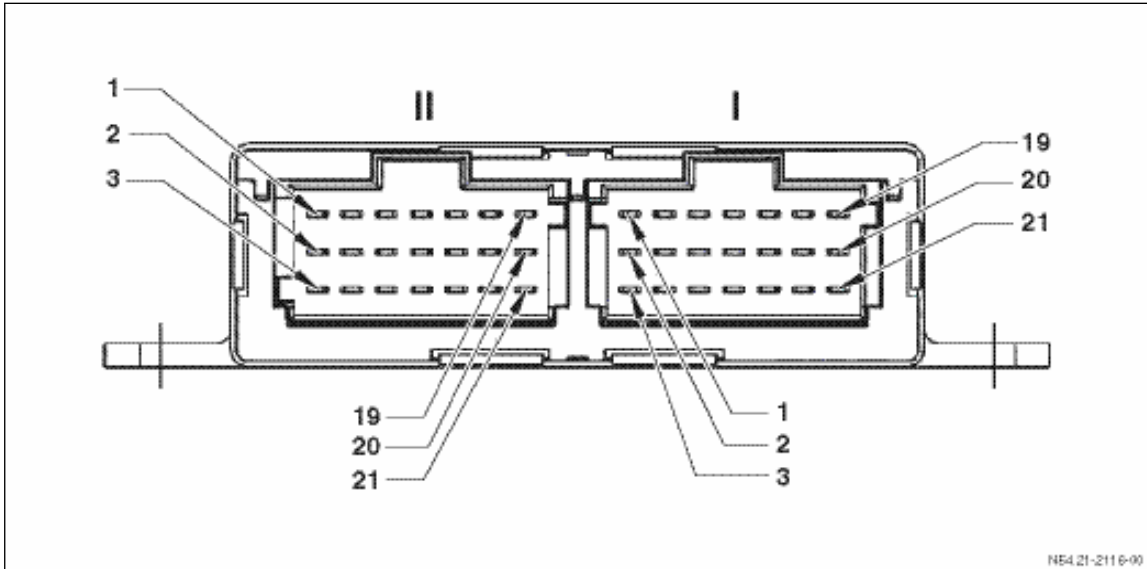
Baud rate can be changed between 500 kBit/s, 250 kBit/s and 125 kBit/s

Signal format: Intel (LSB first)

All bus contents can be activated separately and independently of each other through parametrization:

- FMS (send direction only)
- ISO11992-2 and 3 (abridged)
- Freely assignable messages (J1939)

7.11.4. Contacts and pin allocation



II Connector 2

- 1 Pin 1
- 2 Pin 2
- 3 Pin 3

I Connector 1

- 19 Pin 19
- 20 Pin 20
- 21 Pin 21

Connector 2

No.	Application	
1	Input 6	low-active
2	Input 4	low-active
3	N/A	
4	Input 1	high-active
5	Input 5	low-active
6	Input 2	high-active
7	Input 3	high-active
8	Input 7	analog
9		
10	Input 9	analog
11	Input 8	analog
12		
13	Output 1	H-bridge / 5A
14	Input 10	analog
15		
16	Output 2	H-bridge / 5A
17	Output 20	negative / 0.5A
18		
19	Output 19	negative / 0.5A
20		
21		

Connector 1

No.	Application	
1	Not assigned/reserve	
2	Output 18	Negative / 0.5A
3	N/A	
4	Output 7	Positive / 5A
5	Output 17	Negative / 0.5
6	N/A	
7	Output 8	Positive / 5A
8	Output 9	positive, PWM compatible / 1A
9	Output 16	Positive / 0.5A
10	Output 5	positive, wake-up capability / 5A
11	Output 10	positive, PWM-compatible / 1A
12	Output 15	Positive / 0.5A
13	Output 6	positive, wake-up capability / 5A
14	Output 11	Negative / 1A
15	Output 14	Positive / 0.5A
16	Output 3	positive, wake-up capability / 10A
17	Output 12	negative / 1A
18	N/A	
19	Output 4	positive, wake-up capability / 10A
20	Output 13	Positive / 0.5A
21	N/A	

7.11.5. PSM signals

Vehicle status	
Outputs	
	Clamping device
	Circuit 15R
	Circuit 15
	Terminal 50
	Terminal 61
	Emergency lighting switched on
	Hand brake applied
	Front interior lights switched on
	Rear interior lights switched on
	Vehicle moves
	* Battery voltage from EZS [EIS] electronic ignition switch
	* Outside temperature
	* Interior temperature
	* Vehicle speed
	* Fuel tank level

CAN	
Outputs	
	Selector lever in position "R"
	Selector lever in position "P"
	Selector lever in position "D"
	Selector lever in position "N"
	Anti-theft alarm system "armed"
	AC compressor switched on
	Crash signal received
	Audio muting
	Active starter lockout
	Motion detector has detected motion
	* Engine temperature

* Signals that can only be used to trigger outputs and can not deliver actual values.

Central locking	
Outputs	
	Left front door open
	Right front door open
	Sliding door or left crewcab hinged door open
	Tailgate or rear-end door open
	Left sliding door unlocked
	Right sliding door unlocked
	Tailgate or rear-end door unlocked
	Right front door unlocked
	Left front door unlocked
	Load compartment unlocked
	Cab unlocked
	Load compartment and cab unlocked
	Load compartment locked
	Cab locked
	Load compartment and cab locked
	Engine Hood is open
Inputs	
	Unlock vehicle
	Lock vehicle
	Unlock front doors
	Lock front doors
	Unlock load compartment
	Lock load compartment

Illumination and signaling horn

Outputs	
Front fog lamp switched on	
High beam switched on	
Signaling horn operated	
Side lights switched on	
Low beam switched on	
Rear fog lamp switched on	
Hazard warning flasher (light phase) active	
Left turn signal (light phase) active	
Right turn signal (light phase) active	
Light sensor "Night"	
Daytime running lamps active	
Brake lights actuated	
Inputs	
Switch on front fog lamps (alarm)	
Switch on high beams (alarm)	
Synchronous flashing of front fog lamp and high beams (alarm)	
Switch on hazard warning flasher(alarm)	
Signaling horn operated	
Switch on left flasher	
Switch on right flasher	
Switch on high beam	
Switch on headlamp flasher	
Switch on hazard warning flasher	
Switch on buzzer	
Switch on front interior lights	
Switch on rear interior lights	
Switch on standing lights	
Switch on low beams	
Switch on fog lamps	
Switch on rear fog lamp	
Switch on signaling horn (alarm)	

PWM signals (Pulse Width Modulation)

Outputs	
Wheel speed	
Engine speed	
Vehicle speed	
Outside temperature	
Inside temperature	
Display dimming	

Indicators and warning indicators

Outputs	
"Brake wear" indicator lamp switched on	
"Coolant level too low" warning lamp switched on	
"Washer fluid level too low" indicator lamp switched on	
"Brake fluid level too low" indicator lamp switched on	
Left low beam defective	
Right low beam defective	
Center high-mounted brake lamp defective	
Left stop lamp defective	
Right stop lamp defective	
Left turn signal lamp	
Right turn signal defective	
Left high beam defective	
Right high beam defective	
License plate lamp defective	
Rear fog lamp defective	
Left front fog lamp defective	
Right front fog lamp defective	
Left front parking lamp defective	
Right front parking light defective	
Backup light defective	
Left tail lamp defective	
Right tail lamp defective	
Left side-marker lamp defective	
Right side-marker lamp defective	
Clearance illumination defective	
Tank fill level in RESERVE	

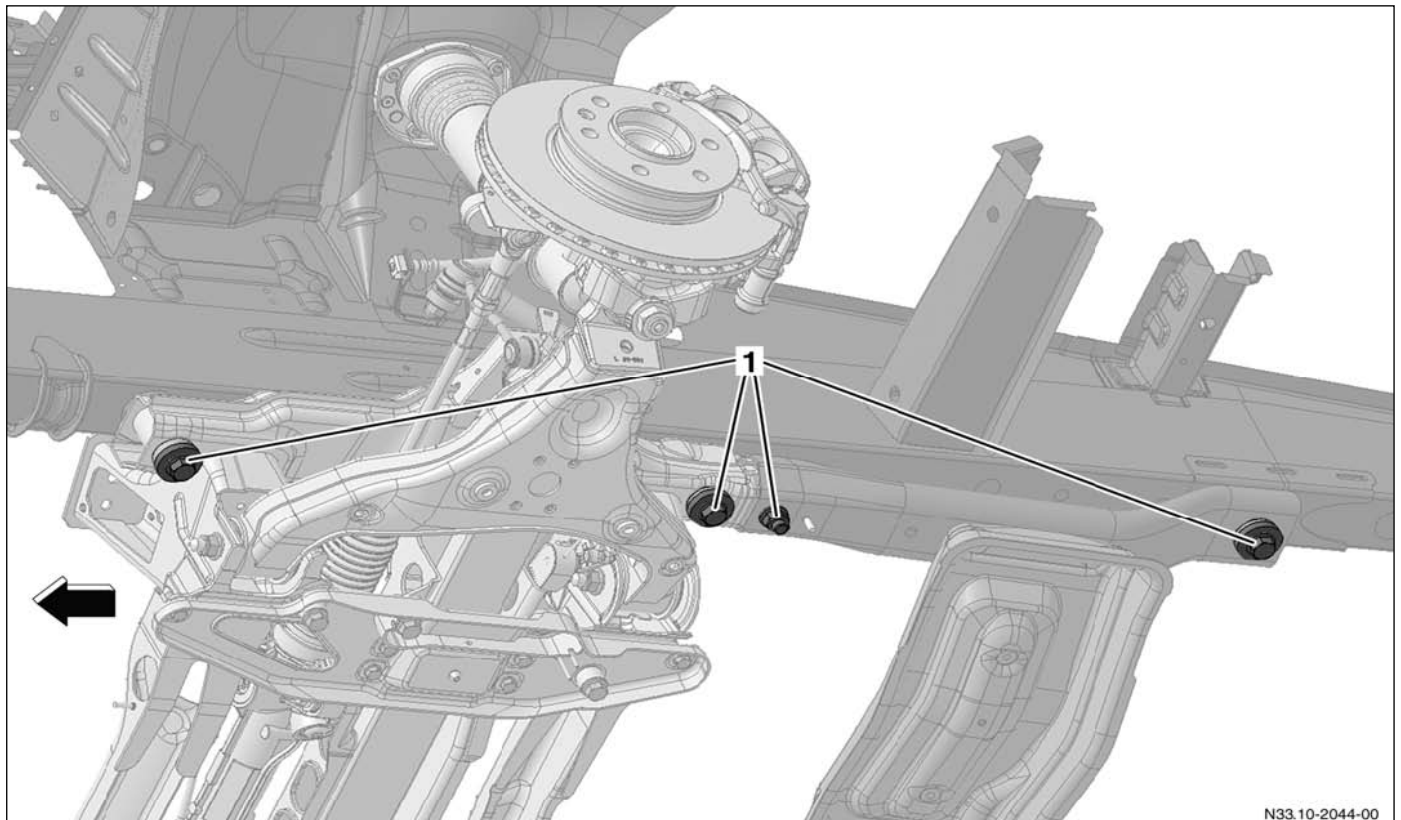
7.11.6. Signal acquisition and actuation module (SAM)

The power circuit on the SPRINTER 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.

8. Modifications to the basic vehicle

8.1.1. General information on the suspension

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



Front axle

1 Bolting points on the front axle

This is especially valid for:

- Front transverse link: Do not modify wheel position values
- Do not modify or use the front axle to mount additional equipment or make other modifications.

Arrow Front of vehicle

- Rigid rear axle: do not modify rear axle.
- Brakes: do not modify the brake system
- Do not modify: equipment, sensors, line routing for ESP/ABS.

Warning

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

Warning

Do not change 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 may lose control of the vehicle and cause an accident that may cause serious injury or death. Parts must be refitted in accordance with MB after sales service instructions and using suitable standard parts. We recommend the use of genuine MB SPRINTER parts.

- 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.
- The settling behavior of bolted connections must be observed.

Information is available from any authorized SPRINTER Service Center. Additional tensioned parts must be of equal or greater strength than the preceding tensioned assembly.

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

We recommend the use of standard MB SPRINTER parts.

In order to prevent tire wear, a change in the standard wheel alignment values (camber, toe-in) at the front axle can be economical in the case of vehicles with increased curb weight due to body or equipment. This affects, for example, recovery vehicles, fire-fighting vehicles, ambulances, semi-trailer tractors, workshop vehicles or campers. For a planned change in the standard wheel alignment values, consulting a Sprinter partner is recommended. Based on the exact axle load conditions of the complete vehicle, the Mercedes-Benz partner can determine the ideal camber and toe-in values based on the workshop documents stored in the Workshop Information System (WIS).

The same applies to fully laden vehicles, as it can be assumed that the maximum permissible axle loads are mainly marginally utilized here as well

8.1.2. Springs/shock absorbers/anti-roll bars

Modifications to springs, shock absorbers and anti-roll bars can only be made in the combinations specified by Daimler AG on the front and rear axle.

You can obtain more information UPFITTER MANAGEMENT VANS (→ Chapter 1.4)

We recommend the use of genuine MB SPRINTER 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 and shock absorbers be used if they do not correspond to the characteristics of standard parts or parts obtainable as optional equipment. We recommend the use of standard MB SPRINTER parts.

Warning

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 optional equipment. Otherwise, this system may no longer work correctly and could ultimately fail. The driver may lose control of the vehicle and cause an accident that may cause serious injury or death. Refer also to the optional equipment Information (→ Chapter 4.10).

8.1.3. Brake system

Warning

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, the driver may lose control of the vehicle and cause an accident that may cause serious injury or death.

Have work on brake shoes, lines and cables only carried out by an authorized SPRINTER dealer.

Routing lines

Warning

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 the driver may lose control of the vehicle and cause an accident that may cause serious injury or death.

Routing lines along the brake hoses

- No other lines may be attached to the brake hoses.

Brake cable for the parking brake

- Do not modify the length of the brake cable.

Disc brakes

- Do not impair cooling by attaching spoilers below the bumper, additional hub caps or brake disc covers, etc.

Warning

Do not modify air inflow and air outflow of the brake system. Any modifications may result in these systems not functioning correctly and ultimately failing. The driver may lose control of the vehicle and cause an accident that may cause serious injury or death.

Brake system overheating will not only impair braking ability, it can also cause tire damage. For this reason, make sure that there is a sufficient supply of cooling air at all times.

Warning

Do not modify brake system components e.g. discs, calipers, sensors, etc. Any modifications to brake components may result in these systems not functioning correctly and ultimately failing. The driver may lose control of the vehicle and cause an accident that may cause serious injury or death.

8.1.4. Air suspension

You can obtain information on retrofitting air suspension from VANS ENGINEERING SUPPORT.
Warning

Always ensure that the air suspension is operating correctly. Pls. consult and observe instructions in the operator's manual provided by the air suspension system supplier. Never use springs and shock absorbers that do not correspond to the characteristics of standard parts, certified components or parts obtainable as special equipment. This applies in particular to the retrofitting of air suspension to the front axle. Otherwise, the vehicle's adaptive ESP may no longer work correctly and could ultimately fail. The driver could lose control of the vehicle and cause an accident that may cause serious injury or death.

8.1.5. Wheels and tires

Warning

Only fit tires of a type and size approved for your vehicle and observe the tire load-bearing capacity required for your vehicle and the tire speed index. In particular, comply with FMVSS/CMVSS regulations concerning the approval of tires. These regulations may define a specific type of tire for your vehicle.

If you have other wheels fitted:

- The brakes or components of the suspension system could be damaged
- Wheel and tire clearance can be no longer be guaranteed
- The brakes or components of the suspension system can no longer function correctly

The driver may lose control of the vehicle and cause an accident that may cause serious injury or death.

Gross vehicle Weight [lbs]	Wheel	Tire size	Load Index
8,550	6.5Jx16	245/75R16	120/116
9,990	5.5Jx16	215/85R16	115/112
11,030	5.5Jx16	215/85R16	115/112
10,140	8.5Jx16	285/65R16	128
10,140	5.5Jx16	205/75R16	110/108

The Upfitter must ensure the following:

- There must be sufficient space between the tire and the mudguard or wheel housing even with snow chains fitted and the suspension completely compressed (allowing for axle twist). The relevant data (→ Chapter 8.2.6) must be observed.
- It is only permissible to fit approved tire sizes see the vehicle documents, 2D drawings website (→ Chapter 1) or the table below.
- It is only permissible to fit approved wheels with the correct dimension & load rating document.

You can obtain more information about tires and wheels from any authorized SPRINTER dealer or in the "Optional equipment" section (→ Chapter 4.10).

8.1.6. Spare wheel

The new SPRINTER – BM 906 is equipped with a spare wheel. When mounting a spare wheel, observe the following:

- Fit 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.

8.2. Body shell / Body

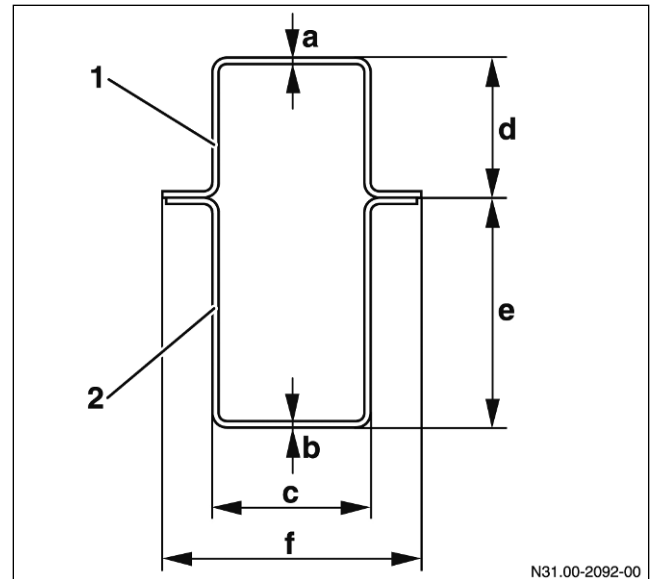
8.2.1. General information on the body shell/body

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

Observe the following:

- The TPMS (Tire Pressure Management System) may malfunction if modifications are made in the direct proximity of the aerials and wheels.
- Do not modify the cross member structure from the front of the cross member through to the rear of the B-pillar.
- Do not modify the rear door opening or to the roof area.
- The clearance for the fuel filler neck, fuel tank and fuel lines must be maintained.
- Avoid sharp-edged corners.
- Do not drill holes in or perform welding work on the A-pillar or B-pillar.
- Do not cut in the C or D-pillar (rear door opening), including the associated roof arch.
- Do not exceed the maximum permissible axle loads.
- Trailer connections must be checked for correct operation.
- If a trailer hitch is installed, the necessary reinforcements must be present.
- 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.

Cross-sectional dimensions of longitudinal frame members. (mm)



Dimensions of the upper chord and lower chord

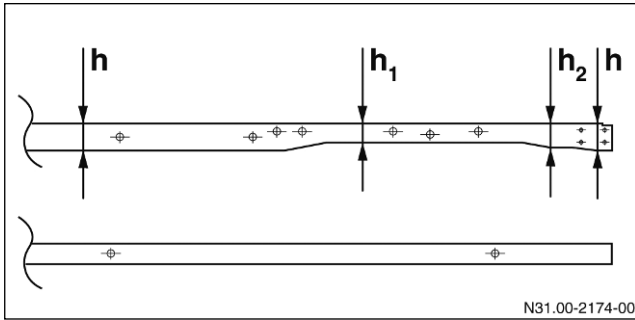
- 1 Upper chord
- 2 Lower chord

Model	a	b	c	d	e	f
3500 Chassis Cab	3	3	70	80	120 100 ¹	126
2500 Cargo Van		1.5	70	-	120 85 ¹	93
3500 Cargo Van		3	70	-	120 100 ¹	118

Dimensions in [mm]

¹ In the area of the rear axle

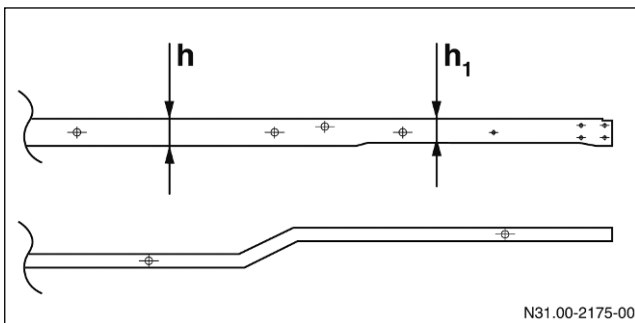
8,550 Longitudinal frame member



Dimensions of the lower chord of the longitudinal frame member

h	120 mm
h1	85 mm
h2	110mm

9,990 & 11,030 longitudinal frame member



Dimensions of the lower chord of the longitudinal frame member

h	120 mm
h1	100 mm

Welding work on the body shell

Welding work may only be performed by skilled personnel.

You will find further information about welding operations in the “Planning of bodies” (→ Chapter 4), “Damage prevention” (→ Chapter 6) and “Body shell” (→ Chapter 8.2) sections and in the SPRINTER Repair Manual.

Do not weld upper and lower chords of the chassis frame. Plug welding is only permissible in the vertical webs of the longitudinal frame member, contingent upon approval from UPFITTER MANAGEMENT VANS. Do not perform any welding work in bends.

Warning

Unauthorized 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 they might fail completely and in case of an accident may cause serious injury or death. For this reason, do not weld or drill near air bags.

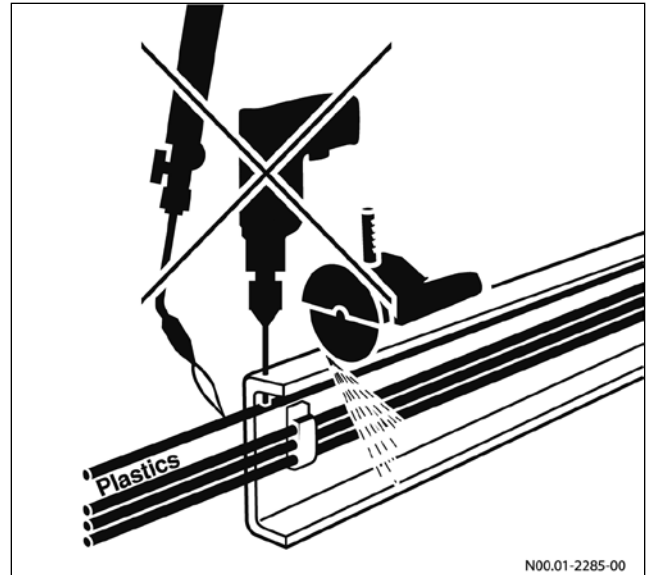
Drilling work on the frame

Existing holes in the longitudinal frame member result from the production process and may only be used if approved by UPFITTER MANAGEMENT VANS (→ Chapter 1.4).

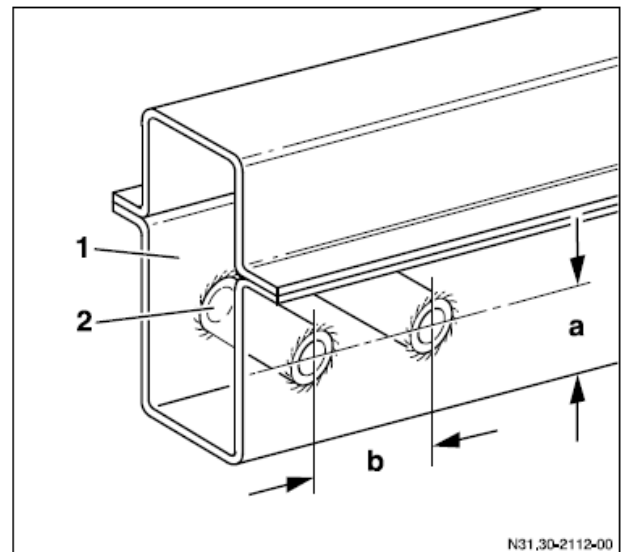
On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (→ Chapter 6.3).

Do not drill holes:

- 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.)



Drilling in the longitudinal member web is only possible in accordance with the following figure and if spacer bushings welded to the longitudinal member are used:



Drilling work on the longitudinal frame members

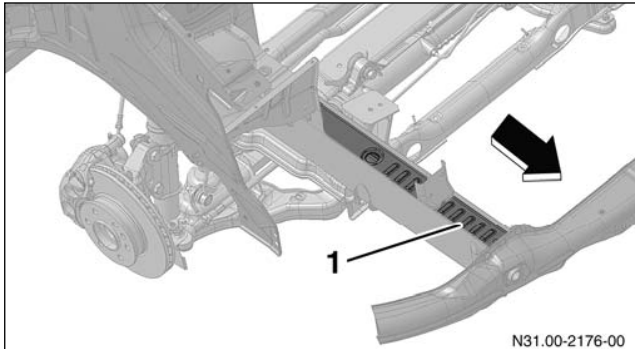
- 1 Chassis frame
- 2 Spacer bushes
- a Distance of at least 20 % of the frame height
- b Distance between drill holes at least 50 mm

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

Attachment to the frame

Attachment to the front frame section

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



Structure for passive safety

- 1 crumple zone on the sub-frame
- Arrow Front of vehicle

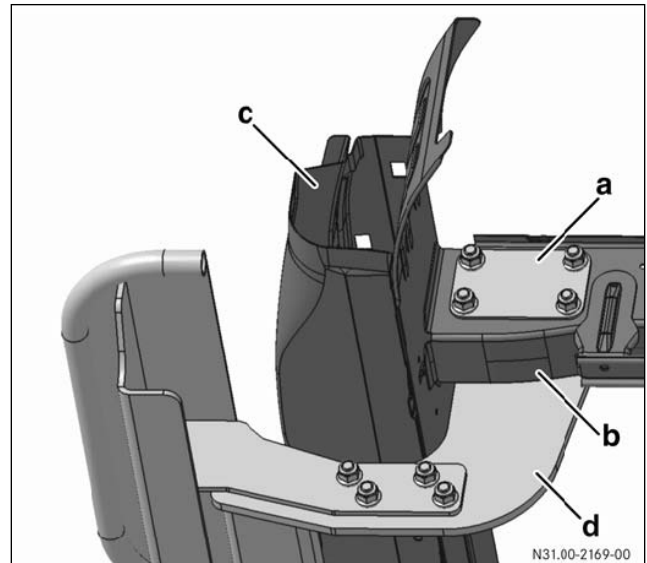
Warning

If attachments are mounted on the front frame section, the function of the forward impact structure and the airbag units may be impaired and in case of an accident and may cause serious injury or death. For the aforementioned reasons, do not install assemblies & bars to the front structure of the SPRINTER.

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

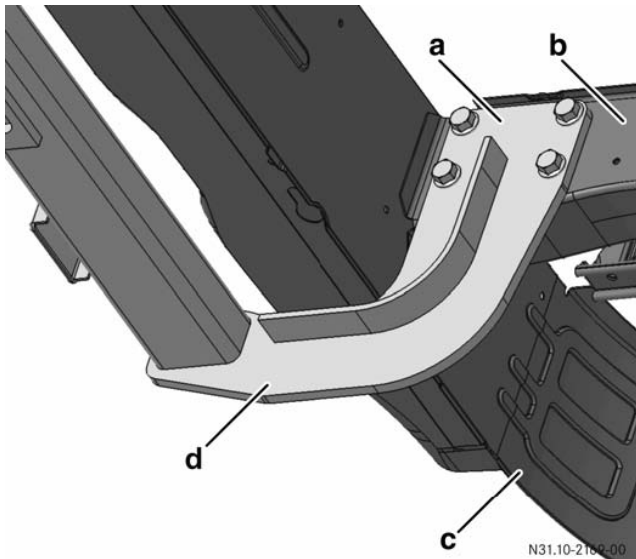
Attachment to the rear frame section

The attachment of additional equipment or bodies to the rear frame section must be equal to the attachment of the trailer hitch available as optional equipment. For the application of greater forces and moments, an additional support on the end frame cross member is required.



Outside 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 hitch



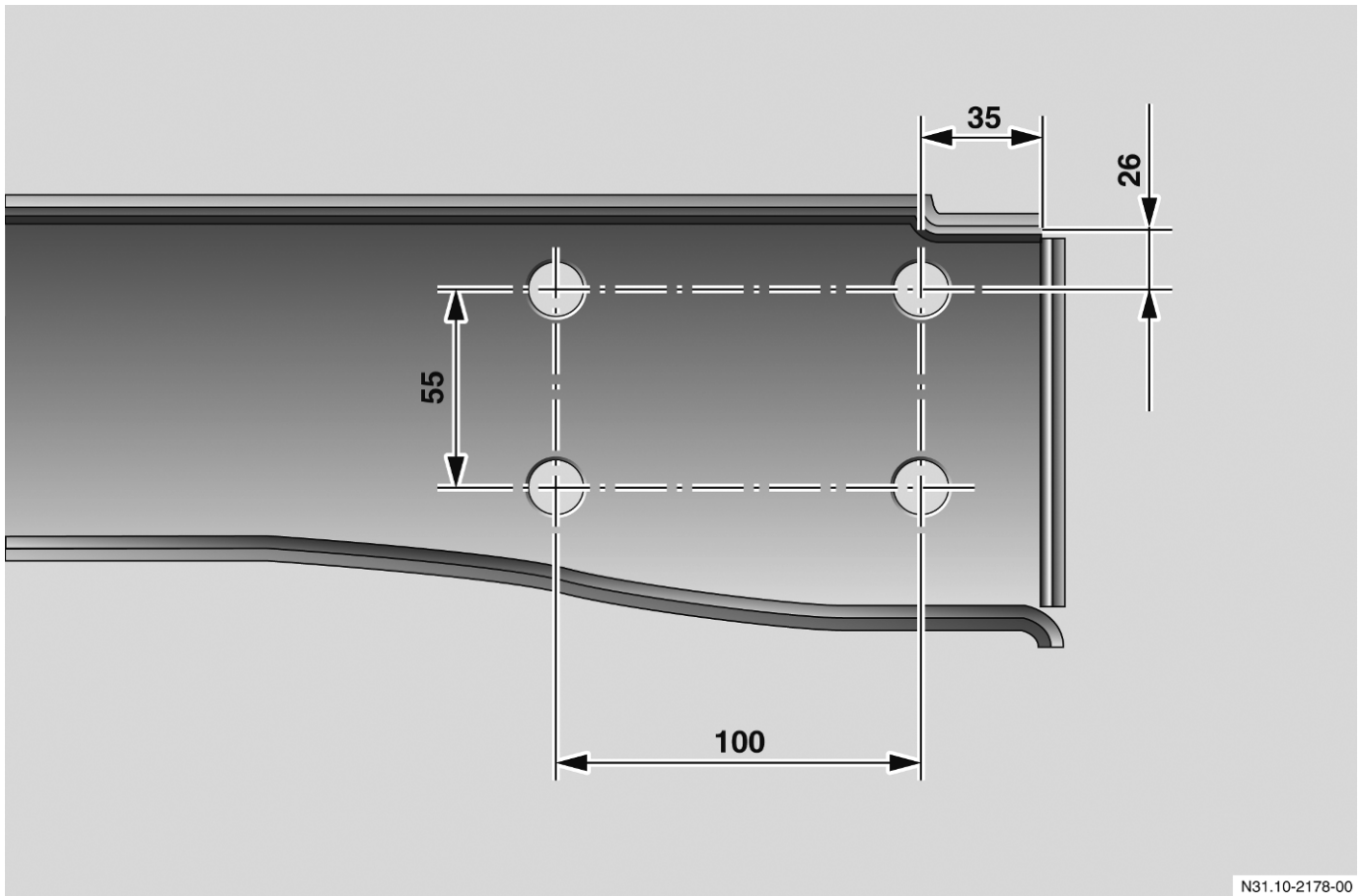
Inside view

- 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 hitch

Attachments by means of body support brackets

The body support brackets fitted at the factory must be used for attaching bodies to the vehicle frame. More information is contained in the "Attachment to the frame" section (→ Chapter 8.2.2).

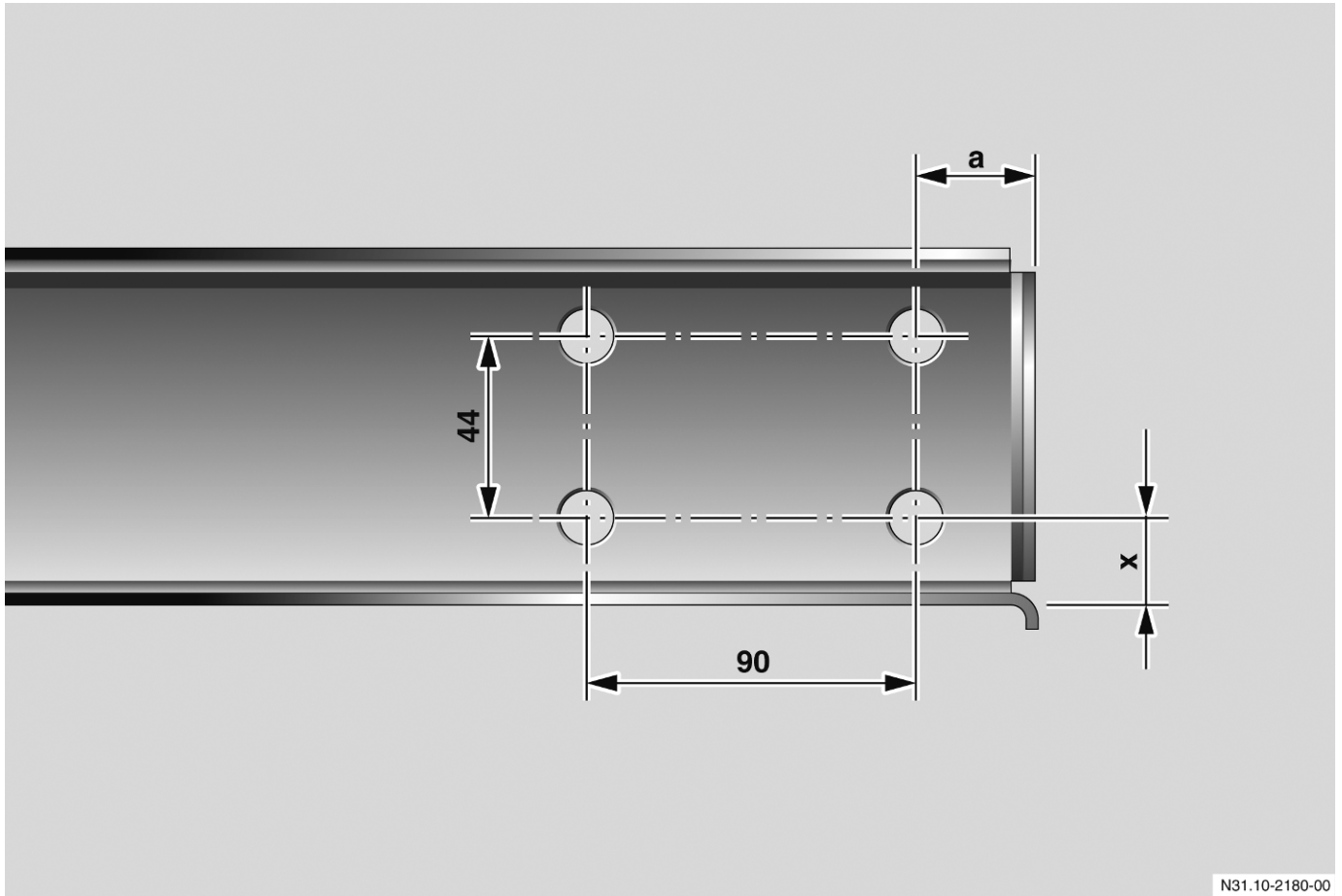
2500 and 3500 SPRINTER Cargo and Passenger Vans



N31.10-2178-00

Vehicle type	Wheelbase	Dim a	Dim x	Overhang
2500 and 3500 cargo and passenger vans	144 in	-	-	1150 mm / 45.3 in
	170 in	-	-	1250 mm / 49.2 in

3500 Chassis Cab



N31.10-2180-00

Vehicle type	Wheelbase	Dim a	Dim x	Overhang
3500 Chassis Cab	144 in	27 mm / 1.1 in	34 mm / 1.3 in	1250 mm / 49.2 in
	170 in	27 mm / 1.1 in	34 mm / 1.3 in	1350 mm / 53.2 in

8.2.2. Chassis frame material

If the frame is extended, the material of the extension element must have the same quality and dimensions as the standard chassis frame.

Material quality:	
Material	Tensile Strength (N/mm ²) Yield Strength (N/mm ²)
H240LA (DIN EN 10268-1.0480)	≥ 240 260-340
S235JRG2 (DIN EN 10025-1.0038)	340-510 >235

8.2.3. Overhang extension

Modifications to the vehicle overhang are possible for the Chassis Cab and must always take the permissible axle loads and the minimum front axle load into account. On vehicles with a closed body (Cargo van or Passenger van), an overhang extension is not allowed.

- An additional cross member must be fitted if the frame extension exceeds 350mm [13.8in].
- Any additional frame cross members must have the same functionality as standard cross members.
- The interval between the body consoles must not exceed 500mm [21.6in].
- 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 center of gravity within the permissible limits.
- The minimum front axle load must be complied under in all load conditions.

You can obtain more information from UPFITTER MANAGEMENT VANS.
(→ Chapter 1.4).

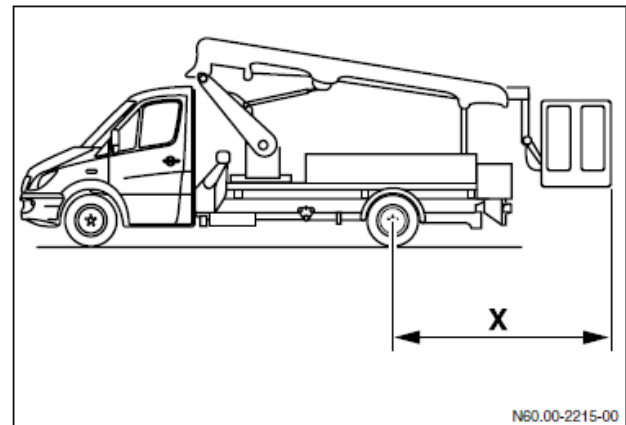
Maximum overhang lengths

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 I (in)	Max. overhang length x(mm) [in]
144	1850 [72]
170	2200 [85]

The vehicle overhang length is part of the total overhang referring to the rear axle, including the frame overhang extension and the body and attachments.

For information on the section dimensions of the longitudinal frame member see (→ Chapter 8.2.1).

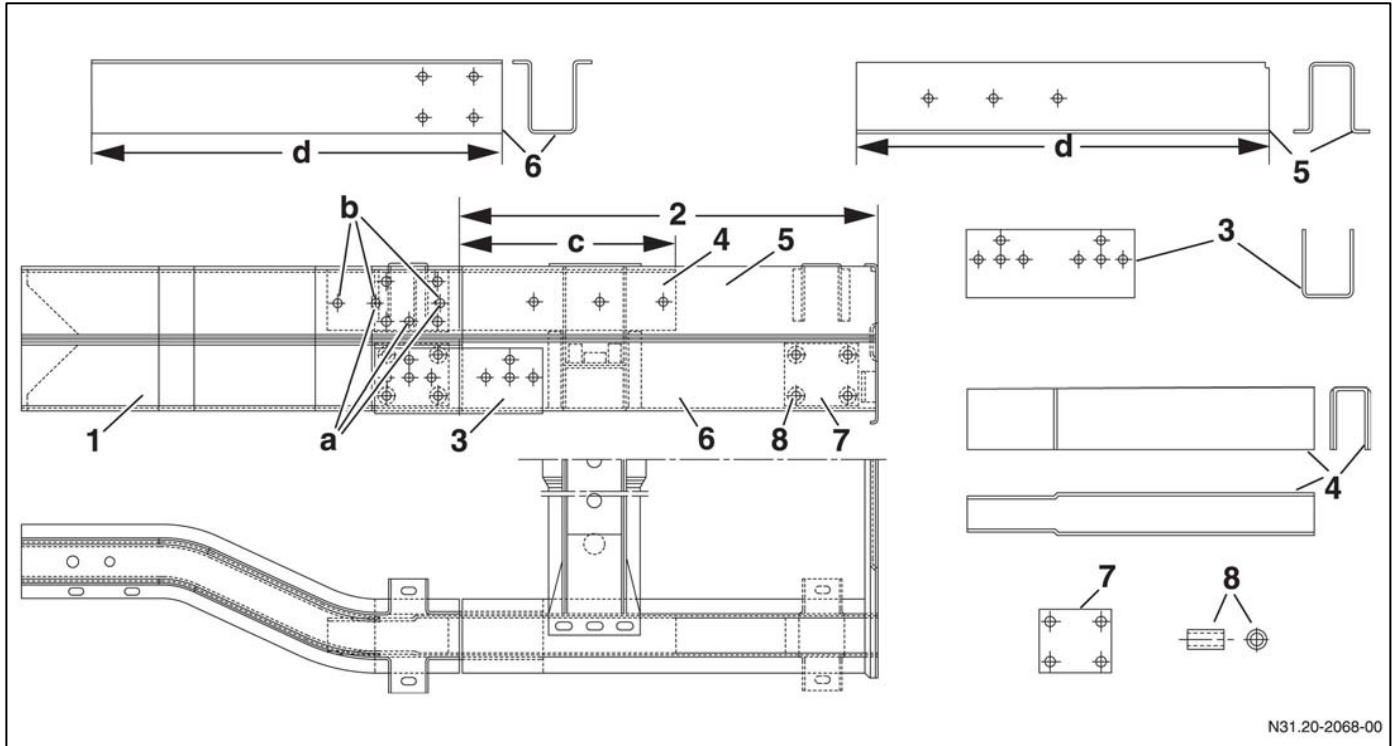


Maximum overhang lengths

X Maximum vehicle overhang

The illustration above depicts the implementation of a frame extension for an overhang extension. On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (→ Chapter 6.3).

3500 SPRINTER Chassis Cab 11,030 GVWR frame extension with overhang extension



N31.20-2068-00

Frame extension with overhang extension

- 1 Longitudinal chassis frame member
- 2 Frame extension
- 3 Outer reinforcement
- 4 Internal reinforcement (wall thickness on 3500: 3mm)
- 5 Body mounting frame extension
- 6 Chassis frame extension (wall thickness on 3500: 3mm)
- 7 Reinforcement plate minimum 2 mm
- 8 Spacer bush, tube 24x4 M steel or ST 35 NBK
- a Bore holes, 3665mm [144 in] wheelbase
- b Bore holes, 4325mm [170 in] wheelbase
- c 350mm (3665mm [144 in] wheelbase)
300mm (4325mm [170 in] wheelbase)
- d Dimension defined by body builder

Comply with all applicable FMVSS / CMVSS guidelines and regulations

On completion of all work on the vehicle, you must comply with the specified corrosion protection measures (→ Chapter 6.3).

Modifications to the cab roof

Warning

On no account should any subsequent modifications be made to the roof or the roof skin between the A-pillar and the B-pillar of the vehicle if the vehicle is equipped with window bags. Otherwise, the window bag may no longer be able to work correctly (e.g. window bag deployment is delayed or incomplete) which may lead in case of an accident to serious injury or death.

The “electric sliding sunroof”, (Option D27), is available from the factory as optional equipment (→ Chapter 8.5).

The roof load-bearing capacity is limited.

Roof arches or supporting parts may not be removed or modified.

You will find information on over cab attachments and wind deflectors in the “Attachments” section (→ Chapter 8.6).

Observe the permissible center 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. Refer also to the “Modifications to closed Cargo vans” section (→ Chapter 9.4).

Warning

Do not modify the roof lining or the roof skin between the A-pillar and the B-pillar if the vehicle is equipped with window bags. Otherwise, the window bag may no longer be able to work correctly (e.g. window bag deployment is delayed or incomplete) which may lead in case of an accident to serious injury or death.

8.2.4. Side wall, windows, doors and flaps

Sidewall

Body structure or reinforcement conversions which alter the sidewall structure of the Cargo Van or the Passenger Van need written approval from UPFITTER MANAGEMENT VANS. The Upfitter must meet all applicable FMVSS / CMVSS and warranty responsibility for those modifications. Do not modify the roof frame or structural components.

Upon completion of all work on the vehicle, Upfitters must comply with the specified corrosion protection measures (→Chapter 6.3).

Retrofitting Windows

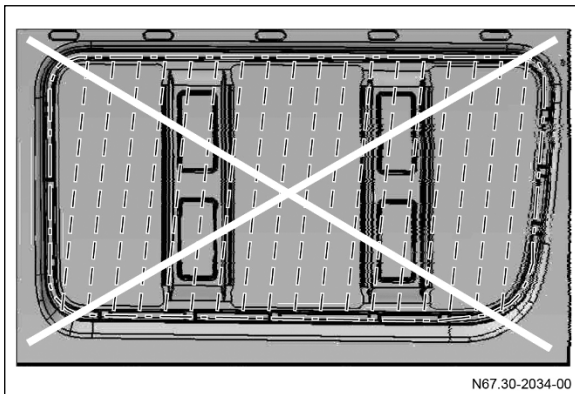
You must ensure the following when retrofitting side wall windows on Cargo vans:

- Use only approved glass manufacturer
- Use the interior structure as guidance.
- Do not cut into the interior structure.
- Use at least a 50mm (2") radius in the corners

Alternatively you can order option "Window Opening without Glass" (Option PF3 fleet only).

When installing windows in existing openings, ensure that the windows are installed with a stable frame. 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.

More information about modifications to the sidewall can be found in the "fitting shelving/installations" section.



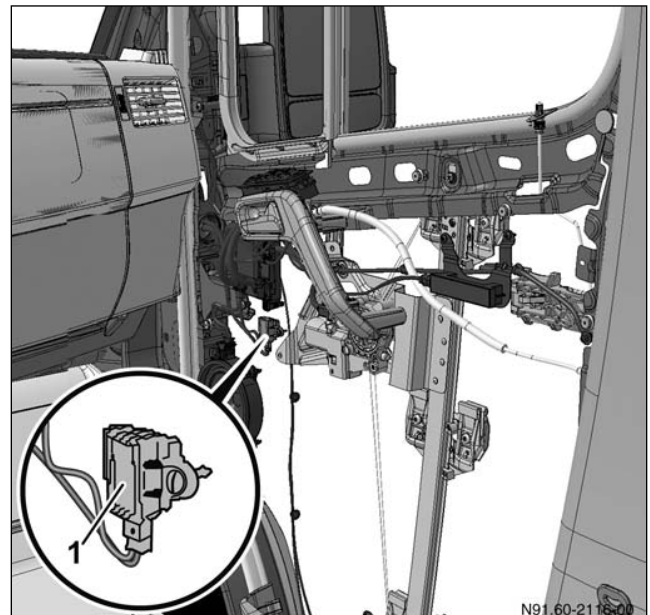
Doors and flaps

Body structure or reinforcement conversions to the supporting structure of the basic vehicle (frame cross members, pillars, reinforcements, attachment of roof arches) in order to retrofit doors, requires prior written approval from VANS ENGINEERING SUPPORT.

The Upfitter must comply with all applicable FMVSS / CMVSS and warranty responsibility for those modifications. 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.

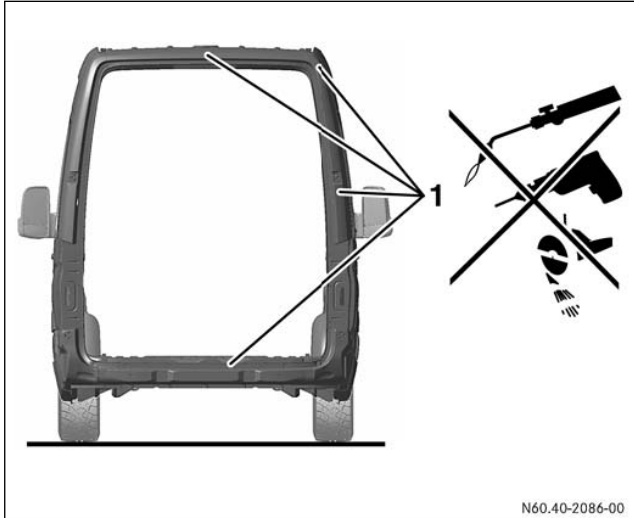
Do not modify the door body (see illustration).



Door, showing sensor system

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

Do not modify the rear door opening including the roof area.



Rear door opening and roof area

- 1 Do not modify the above mentioned areas
 - 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 400mm [15.75 in].
 - Fittings must allow sufficient clearance to the interior door handles regardless of door position (trap guard).
 - Do not modify the central locking system or the immediate area around the door or in the area of the pillars or cross members.

Upon completion of all work on the vehicle, Upfitter must comply with the specified corrosion protection measures (→ Chapter 6.3).

8.2.5. End frame cross member

If special-purpose bodies are mounted, the end panel cross member can be ordered as an option. (Option Q18).

Upon completion of all work on the vehicle, Upfitter must comply with the specified corrosion protection measures (→ Chapter 6.3).

Comply with all applicable FMVSS/CMVSS guidelines and regulations.

8.2.6. Mudguards and wheel wells

Ensure that there is sufficient space between the tires and the mudguard or wheel well 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.

Warning

On no account may seats be mounted on the wheel-well.

8.2.7. Roof structure

Warning

Do not modify the roof lining or the roof skin between the A-pillar and the B-pillar if the vehicle is equipped with window bags and thorax bags. Otherwise, the window bag and thorax bag deployment may be delayed or incomplete, in case of an accident it may lead to serious injury or death. The roof load-bearing capacity is limited (see table).

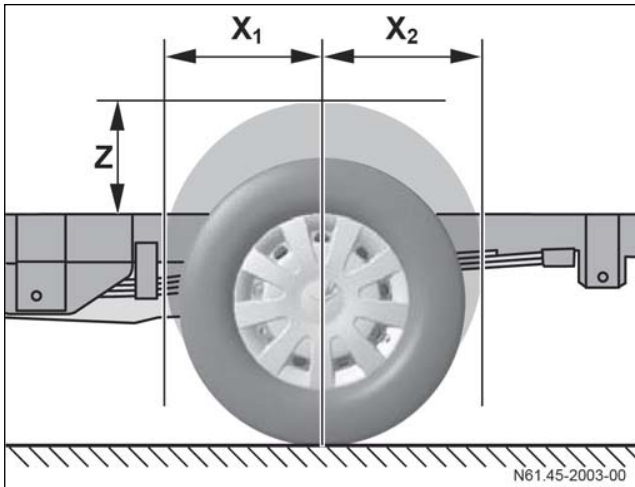
Do not remove or modify roof bows or roof structure.

Maximum roof loads			
Low Roof Cargo Van kg / [lbs]	High Roof Cargo Van kg / [lbs]	Super-High Roof Cargo Van kg / [lbs]	Chassis-Cab
300 / [660]	150 / [330]	0	100 / [220]

Do not exceed the vehicle's maximum center of gravity limits.

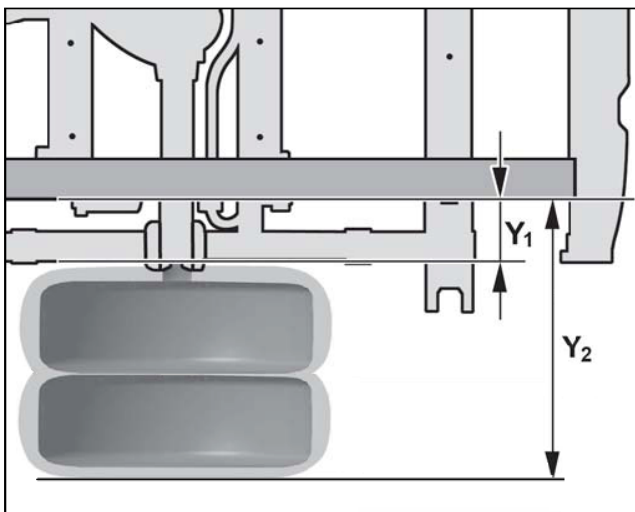
8.2.8. Tire Clearance Chassis-Cab

Ensure that there is sufficient space between the tire and the mudguard or wheel wells with snow chains fitted and the suspension completely compressed (allowing for axle twist).



Tire clearance (side view)

- X₁ clearance from center of rear axle forward
- X₂ clearance from center of rear axle backward
- Z dimension from top of frame



Tire clearance (top view)

- Y₁ clearance from frame to inner tire
- Y₂ clearance from frame to outside of outer tire

The minimum required wheel clearance is measured from the closest body member to the upper and lower chord of the longitudinal frame member on Chassis Cab vehicles including snow chain clearance on outer tire.

Rear Axle Chassis Cab 215/85 R16	Dimensions mm [in]	Dimension for snow chain mm [in]
X ₁	425 [16.75]	425 [16.75]
X ₂	425 [16.75]	425 [16.75]
Y ₁	110 [4.3]	110 [4.3]
Y ₂	640 [25.2]	640 [25.2]
Z	127 [5]	159 [6.25]

8.2.9. Wheel well Cargo-Van

Warning

Do not modify the wheel wells on Cargo and Passenger vans w/o consulting with UPFITTER MANAGEMENT VANS.

Warning

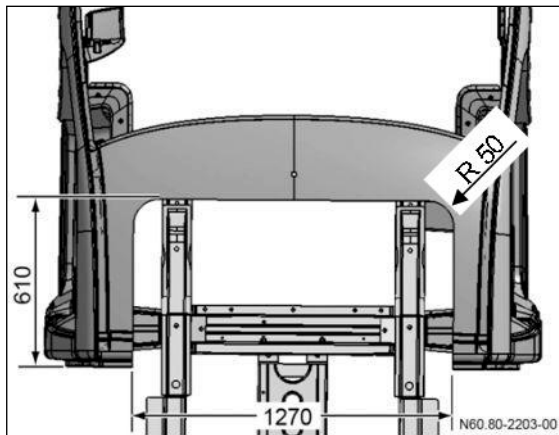
Do not install seats on the wheel wells. Otherwise, the vehicle could be damaged as a result (e.g. wheel wells and tires).

Upon completion of all work on the vehicle, Upfitter must comply with the specified corrosion protection measures (→ Chapter 6.3).

Modifications to the width of the wheel wells are not permitted.

8.2.10. 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 bow can be cut out in the indicated area (see illustration) where necessary.



Permissible Roof Cut

width	610 mm [24 in]
length	1270 mm [50 in]
radius	50 mm [2 in]

Note:

When cutting the B-pillar roof bow, 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 UPFITTER MANAGEMENT VANS is required; including but not limited to durability tests or FEA.

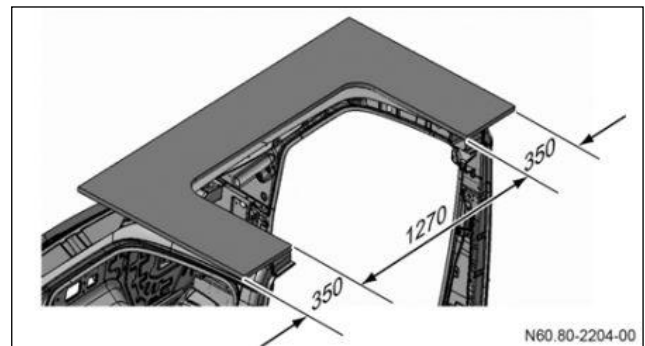
Equivalent rigidity when cutting B-pillar roof bow

Variant 1: Sandwich construction / wooden board

When the B-pillar roof bow 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 bow 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	$EI_2 = 7 \times 10^8 \text{ N} / \text{mm}^2$ [1.01 x 10 ¹¹ lb / in ²]
z-axis	$EI_1 = 2 \times 10^{11} \text{ N} / \text{mm}^2$ [2.90 x 10 ¹³ lb / in ²]



Simulating structure (sandwich construction / wooden board) bonded to cut roof structure over entire surface

width 1	350 mm [13 13/16 in]
width 2	1270 mm [50 in]

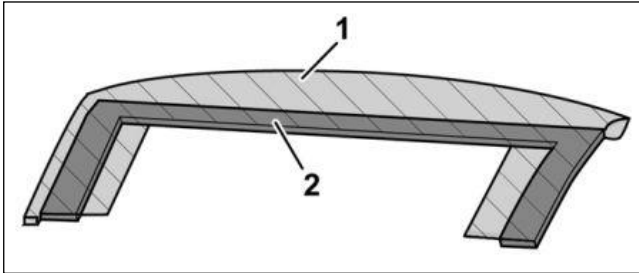
Material characteristics	
Sandwich construction	Wooden board
Structure: 2.0 mm [1/8 in] GRP 26.0 mm [1 1/16 in] foam 2.0 mm [1/8 in] GRP	Structure: 20.0 mm [13/16 in] wood
$E_{\text{GRP}} = 12,000 \text{ N} / \text{mm}^2$ [1.74 x 10 ⁶ lb / in ²]	$E_{\text{Wood}} = 3,000 \text{ N} / \text{mm}^2$ [434,656 lb / in ²]
$E_{\text{Foam}} = 80 \text{ N} / \text{mm}^2$ [11,590 lb / in ²]	

Variant 2: Welded structure under cab roof

When the B-pillar roof bow is cut, the equivalent rigidity requirements can be met by means of a welded structure installed in the basic vehicle under the cab roof.

Required bending resistance of welded structure

y-axis	$EI_2 = 8.35 \times 10^9 \text{ N} / \text{mm}^2$ [$1.21 \times 10^{12} \text{ lb} / \text{in}^2$]
z-axis	$EI_1 = 2.36 \times 10^{11} \text{ N} / \text{mm}^2$ [$3.42 \times 10^{13} \text{ lb} / \text{in}^2$]



Welded structure

- 1 Roof paneling
- 2 Rectangular profile

Material characteristics of auxiliary frame

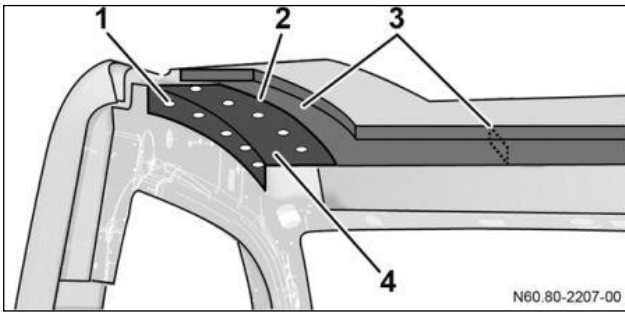
Material: at least DC0 1 or S235JRG2

Height = 20 mm [13/16 in]

Width = 100 mm [3 15/16 in]

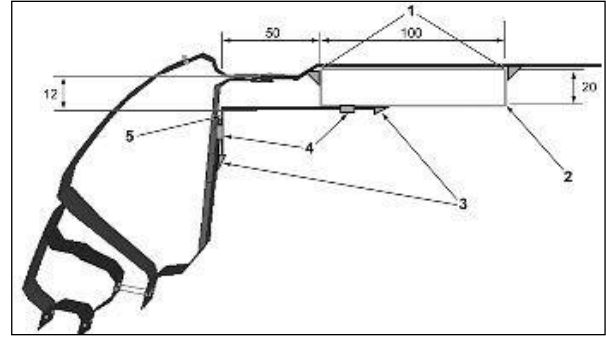
Wall thickness = 1.5 mm [1/16 in]

$E = 210,000 \text{ N} / \text{mm}^2$ [$3.04 \times 10^7 \text{ lb} / \text{in}^2$]



Welded structure

- 1 Plug welding
- 2 Overlap seam
- 3 Rectangular profile
- 4 End plate



Cross section of welded structure

height 1	12 mm [1/2 in]
height 2	50 mm [2 in]
width 1	100 mm [3 15/16 in]
width 2	20 mm [13/16 in]

- 1 Fillet weld
- 2 Rectangular profile (2mm [1/8 in] wall thickness)
- 3 Overlap seam
- 4 Plug welding
- 5 End plate

8.3. Engine peripherals / drive train

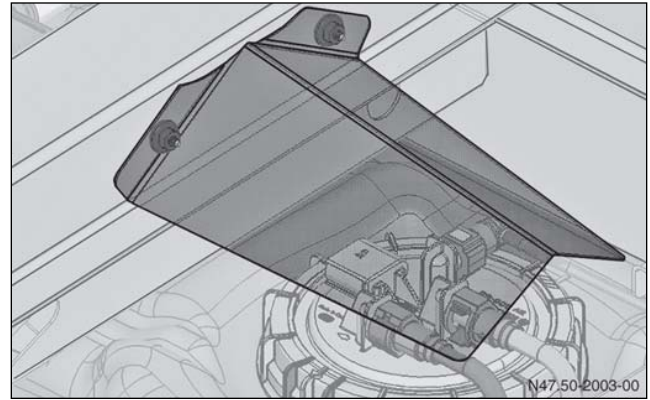
Maintenance and repair of the vehicle must not be hindered by the body.

8.3.1. Fuel system

Do not modify the fuel system

- The installation of heat conducting components, or of components that restrict the installation space, is not permitted.
- Do not modify 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.
- Modification and attachments (e.g. additional eyelets) are not permitted in the vicinity of the fuel filler neck.
- If bodies are mounted on a Chassis Cab, a fuel level sensor shield is necessary when the fuel level sensor is not protected by the body.

If bodies are mounted on a Chassis Cab, 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 unserviceable.



Fuel level sensor shield

The following must be observed if auxiliary Diesel powered generators are retrofitted:

- No sharp edges permitted
- Fuel lines must be secured
- The fuel tank must not be subjected to load in the event of an impact. Deflection plates must be fitted if necessary
- Exhaust fumes must not be directed into the vehicle interior

For connections supplying fuel to the auxiliary power generator, contact UPFITTER MANAGEMENT VANS.

A fuel tap is standard equipment on Diesel engines. A small 'pig tail' is routed to the right side of the fuel tank. This fuel tap will prevent the fuel tank from running empty.

KL1 Auxiliary Diesel Fuel Tap (standard)

The fuel gauge sensor is fitted with an additional fuel connection to facilitate retrofitting of a fuel-powered auxiliary heater and/or generator. The fuel tank can be consumed down to approx.5 gal.

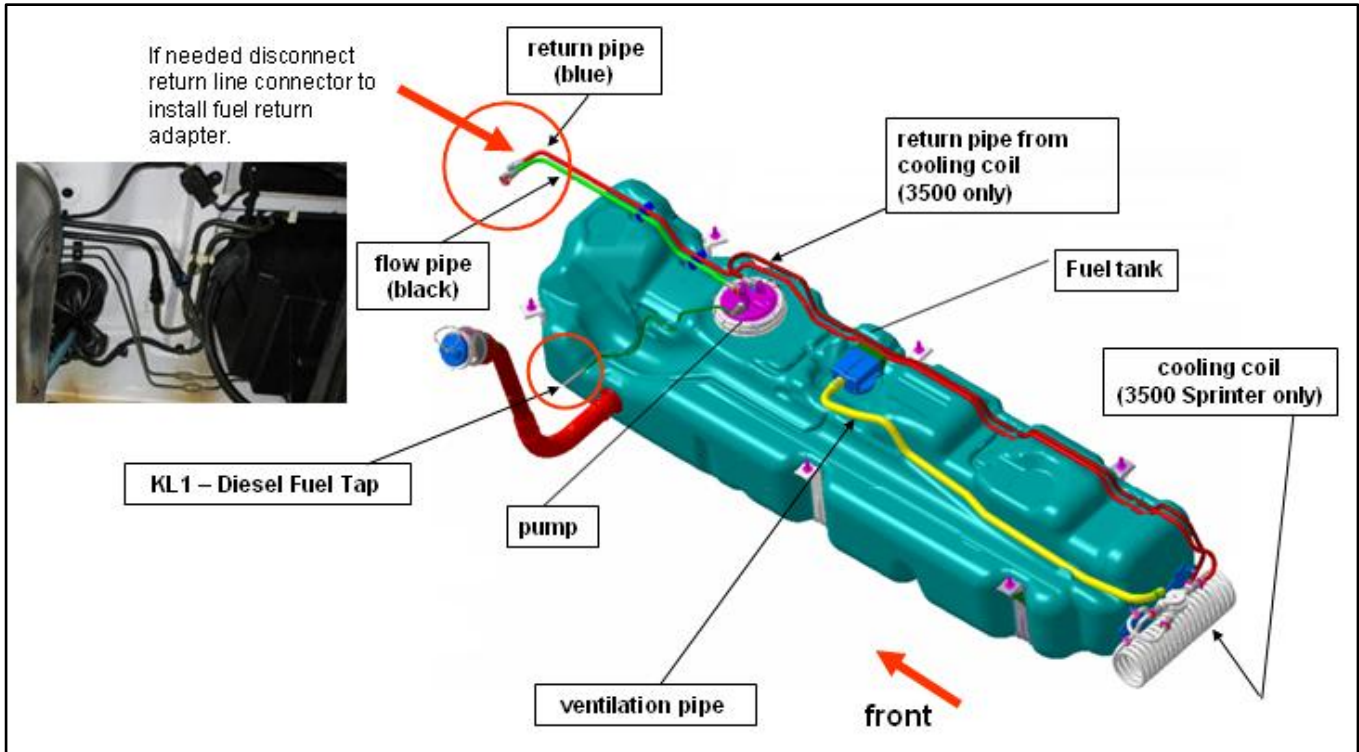
The picture shows a cap which can be removed. The connector piece is \varnothing 7.89 mm. Aftermarket quick connects have to be compatible with SAEJ2044 specified tube end forms.



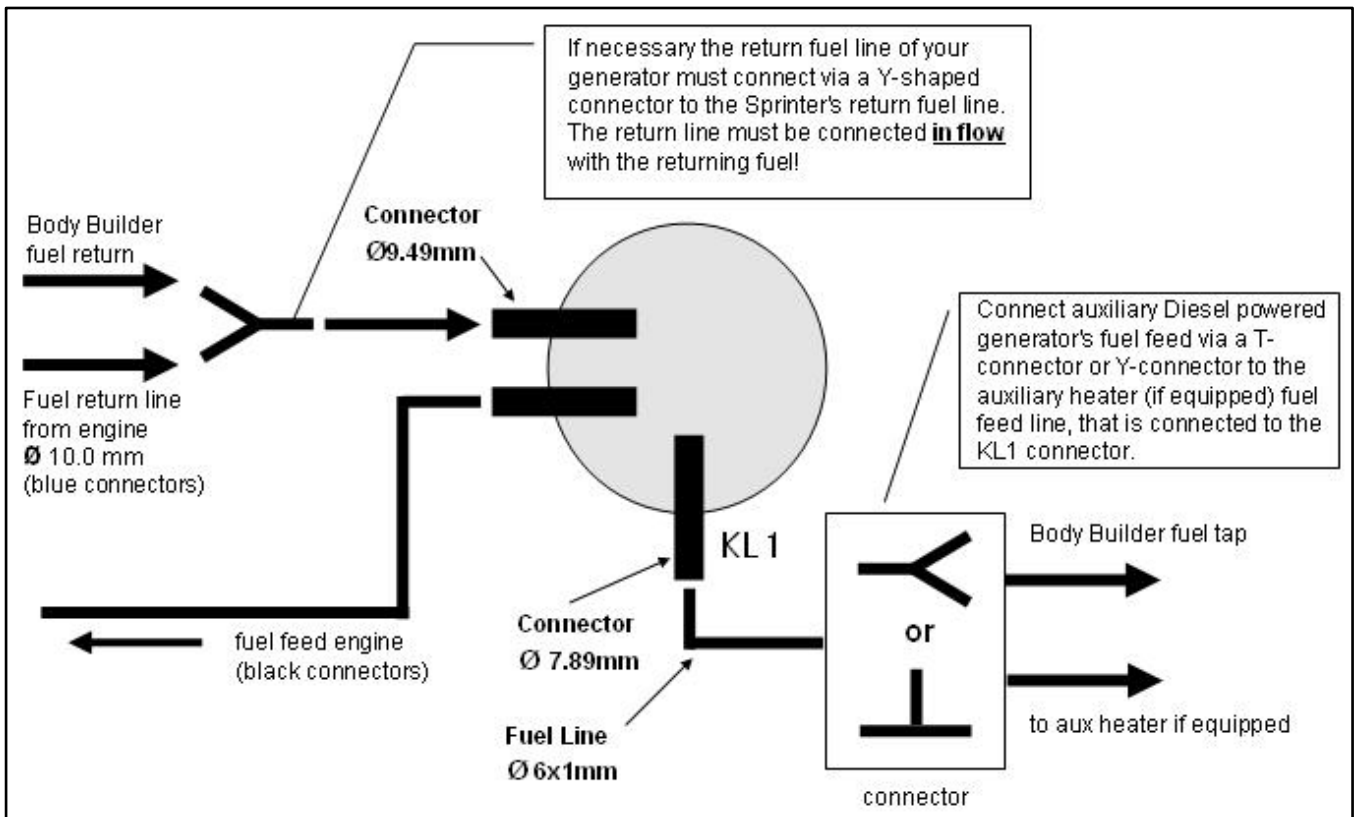
View from underneath without a fuel fired heater



Top view showing a fuel pump unit on a chassis cab



Diesel Fuel System 26.4 gal / 100 L



Fuel Tap Schematics

8.3.2. SCR system and DEF Tank location

In order to meet 2014 EPA / CARB emission standards for Diesel powered engines, model year 2015 Mercedes-Benz & Freightliner Sprinters will require the use of a SCR (Selective Catalytic Reduction) system. The SCR system is an exhaust after treatment system which aims at reducing nitrogen oxide (NOx).

Apart from electronic control units and sensors, the SCR system requires a catalytic converter and the additive AdBlue® / DEF (Diesel Exhaust Fluid).

AdBlue® / DEF

AdBlue®/DEF is a mixture of urea (33 %) and water (67 %).

AdBlue®/DEF is a non-combustible, non-toxic, colorless, odorless and water-soluble fluid.

AdBlue®/DEF has a limited shelf life, which is affected by the ambient temperature and air humidity. This must be observed when filling it in from containers.

Information on handling AdBlue®/DEF and its material characteristics can be found in ISO 22241.

See section Labels (chapter 3.3) for label information. For all additional information consult the Owner's Manual.

Warning

The SCR system is vital to comply with 2014 EPA / CARB emission certification. Do not modify or relocate individual components of the SCR system including but not limited to DEF tank, DEF lines etc.

Country-specific laws and regulations for proper and correct disposal must be observed.

Modifying or changing the location of components of the SCR system is not permitted. This includes the SCR tank, SCR lines and all other SCR system components.

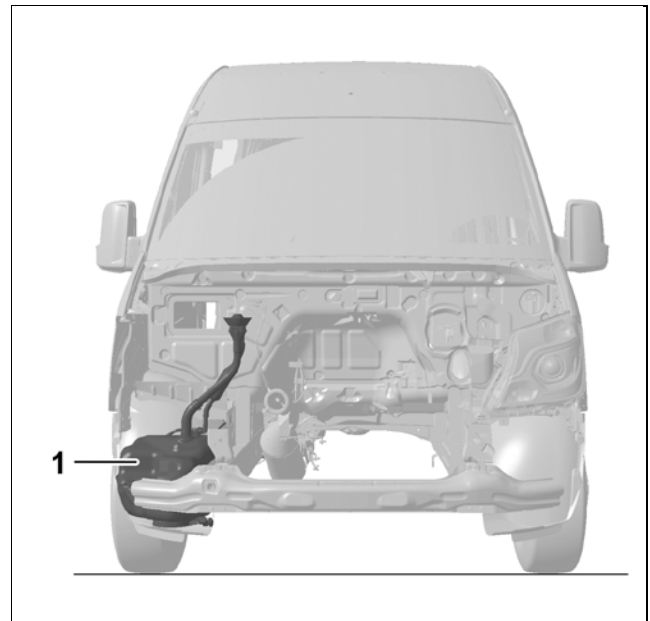
If AdBlue® comes into contact with painted surfaces or aluminum the affected area must immediately be cleaned with water.

Any AdBlue® pumped out of the SCR tank may not be reused. AdBlue® that is pumped out may be contaminated thus not suited for re-use.

Ensure always that DEF / AdBlue® is disposed properly.

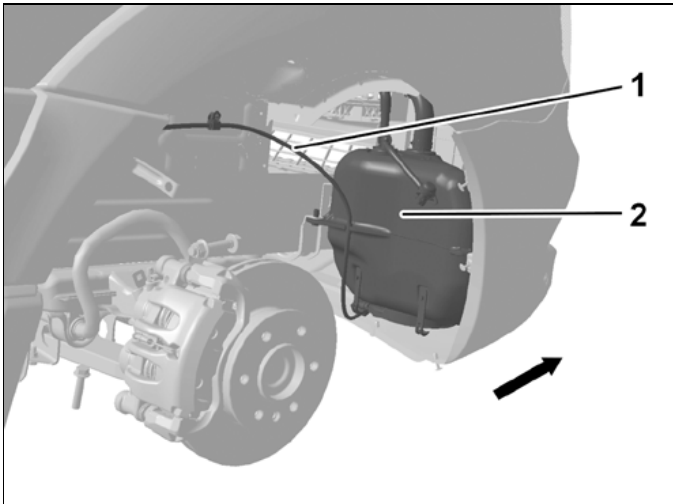
SCR tank

The tank flange module with pumps, heater and sensors which is part of the SCR system, is sealed together with the SCR tank. The SCR tank is located at the front end on the right side in front of the front axle and is connected to front cross member. The filler neck is installed on the upper right hand side of the engine compartment.



Front view of engine compartment

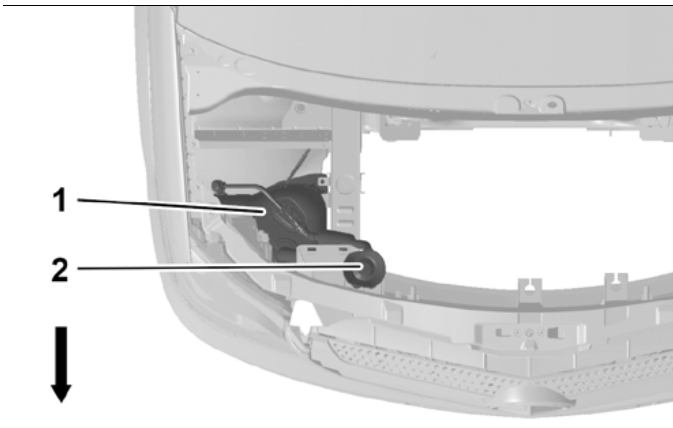
1. SCR tank



Front wheel well on the right side

- 1 SCR line
- 2 SCR tank

Arrow Direction of travel



Top view of engine compartment

- 1 SCR tank
- 2 AdBlue® filler neck with cap

Arrow Direction of travel

8.3.3. Exhaust system

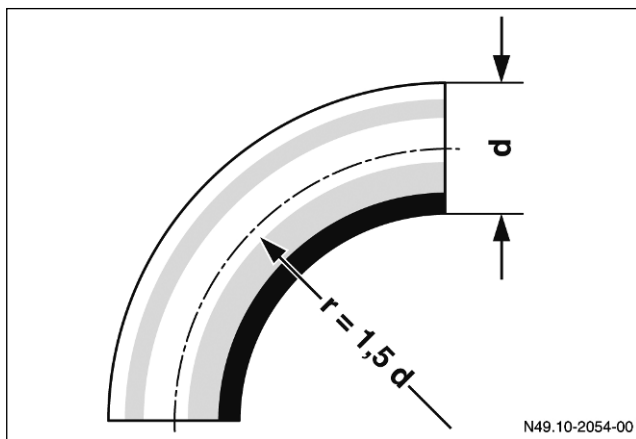
Comply with all applicable FMVSS / CMVSS guidelines and regulations.

Warning

Modifications to the exhaust system can only be made at 2 ft after the last muffler. Do not reduce the cross-sectional area of the exhaust pipe behind the muffler.

General

The following dimensions must be observed when carrying out modifications on the exhaust system:



Examples of a pipe bend design

- Pipe bend, maximum 90°
- Avoid the use of additional pipe bends
- Bending radii $>1.5 d$

When the vehicle is in operation, the temperature between the exhaust system (diesel particle filter, catalytic converter or main silencer) and the floor panel may rise above 80°C [180°F]. For this reason, shields or insulation must be mounted on the substructure to reduce the effects of radiated heat.

Minimum distance to plastic lines, electrical cables and spare wheels:

- 200mm [8 in] for exhaust systems without shielding
- 80mm [3.5 in] with sheet metal shielding
- 40 mm [1.75 in] with sheet metal shielding and additional insulation

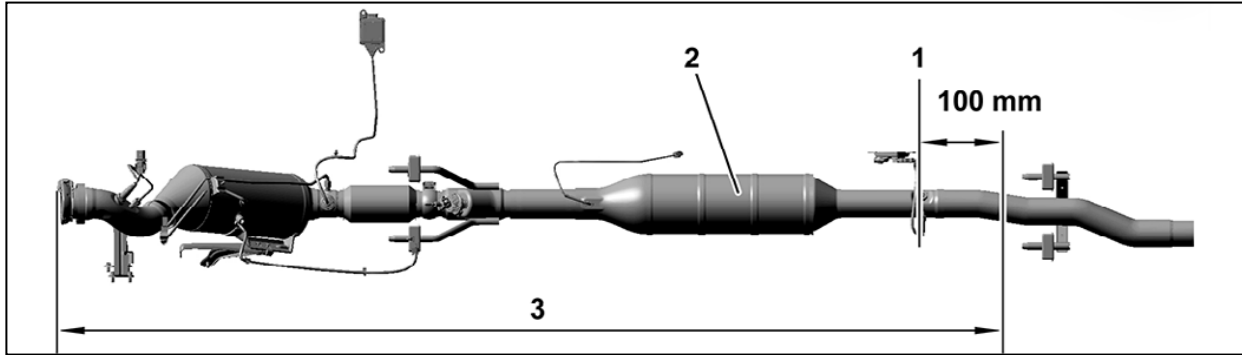
Upon completion of all work on the vehicle, Upfitter must comply with the specified corrosion protection measures (→ Chapter 6.3).

Additional shielding is required

- Near control panels
- Near assemblies, attachments and equipment, unless they are made of heat-resistant material

Exhaust system with SCR system

Modifications to the SCR system are only allowed from a distance of 100 mm behind the last sensor (NOx sensor). Neither the positions of the sensors, nor the system, nor any other components may be changed.



2 SCR catalytic converter

3 Area in which modifications are not permitted

NOTE: If components carrying AdBlue® are opened, a Hermetic seal against the ambient air must be made subsequently. Otherwise, AdBlue® can crystallize and clog the system components.

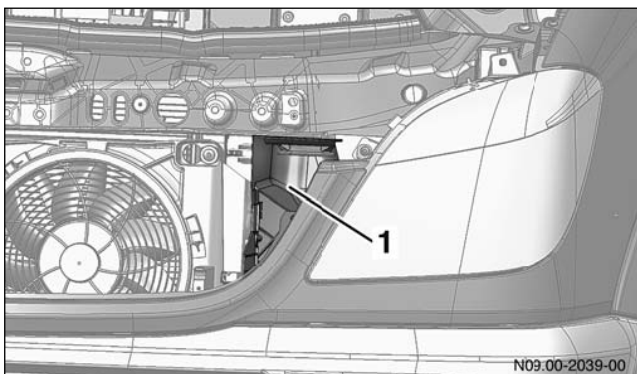
8.3.4. Engine cooling system

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 171 in² [11 dm²] for the front grille (radiator and condenser)
- at least 109 in² [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.

8.3.5. Engine air intake



Engine air intake opening

1 Area of engine air intake

NOTE: Do not modify the area of engine air intake (See illustration)

The air filter is secured by two rubber mounted brackets in the front module.

The securing design of the air cleaner 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 [50 °F].

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.

8.3.6. 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 2D drawings must be observed.

The distance between the cab and the body must be at least 50mm [2 inches].

8.3.7. Engine speed regulation

The engine must be able to run at a specific speed in order to drive auxiliary equipment (e.g. pumps, compressors, etc.).

The “constant engine speed – constant rpm control” optional extra, option M53 and MT4 (variable), is available for diesel engines only.

The speed is freely adjustable across a speed range from 1100 to 3,800 rpm, independently of the load.

Constant engine is not suitable for driving a generator if a constant frequency is required, as in the 220-V electricity supply network.

NOTE: Retrofit solutions for regulating the engine speed are only possible with the ‘Programmable Special Module’ (PSM) optional equipment (apart from those retrofit solutions available as optional equipment (OPTION M53). This special equipment makes it possible to have the working engine speed regulation controlled externally.

8.4. Interior

8.4.1. General Information

The driver's and co-driver's airbag units, the window bags and thorax bags and the belt tensions are pyrotechnic components.

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 comply with the head impact tests specified in CMVSS/FMVSS 201.

This applies in particular to the deployment areas of the airbags (wooden trim, additional fittings, mobile phone holders, bottle holders, etc.).

Paint or surface treatment is not permissible on the instrument panel, steering wheel impact absorber or air bag tear seams.

Warning

Do not paint or surface treatment 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.

See the illustrations of the airbag deployment areas for more information (→ Chapter 8.4.2).

You will find information on RV conversions in the RV section (→ Chapter 9.11).

The interior must be designated with soft edges and surfaces.

Fittings must be made of flame-resistant materials per FMVSS/CMVSS standards. Free access to the seats must be ensured. Avoid 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.

Warning

Do not modify airbag or the belt tensions system. Modifications to or work incorrectly carried out on a restraint system (seat belt and seat belt anchorages, belt tensions or airbag) or its wiring, could cause the restraint systems to stop functioning correctly, e.g. the airbags or belt tensions could be triggered inadvertently or could fail in accidents in which the deceleration force is sufficient to trigger the airbag and may lead to serious injury or death.

Warning

Reliable operation of the front airbag, window bag and thorax bag and belt tensions can no longer be guaranteed if modifications are made to the vehicle structure by the body builder, 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 OEM seats
- Modifications to the A-pillar and B-pillar, the roof frame and its lining
- Modifications to the doors

This could otherwise result in serious injury or death.

8.4.2. Safety equipment

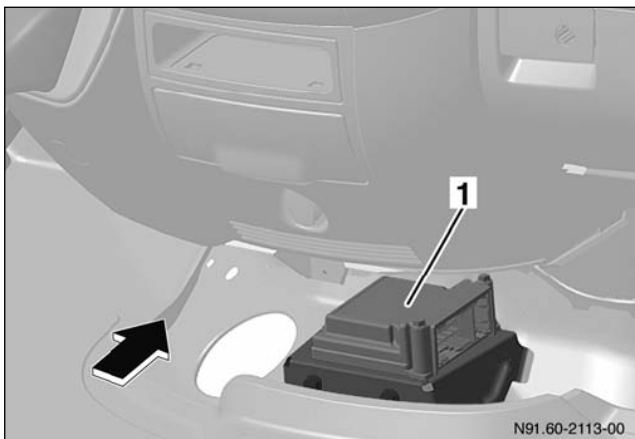
Airbag control unit and sensors

Do not 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 window bags and thorax bags. Never secure other vehicle components to the airbag control unit, the satellite sensors or the securing points.

Warning

Never secure parts that create vibrations in the proximity of the airbag control unit or sensor installation locations and do not modify the floor structure in the proximity of the airbag control unit or the satellite sensors, otherwise operation of the front airbag, window bag and thorax bag and belt tensions may be jeopardized and there is consequently a risk of serious injury or death.

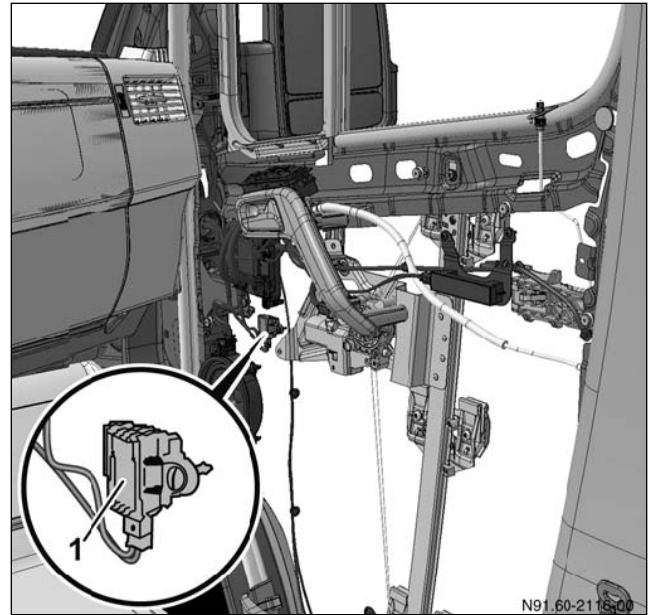
The airbag control unit is located on the transmission tunnel under the center console.



Location of airbag control unit

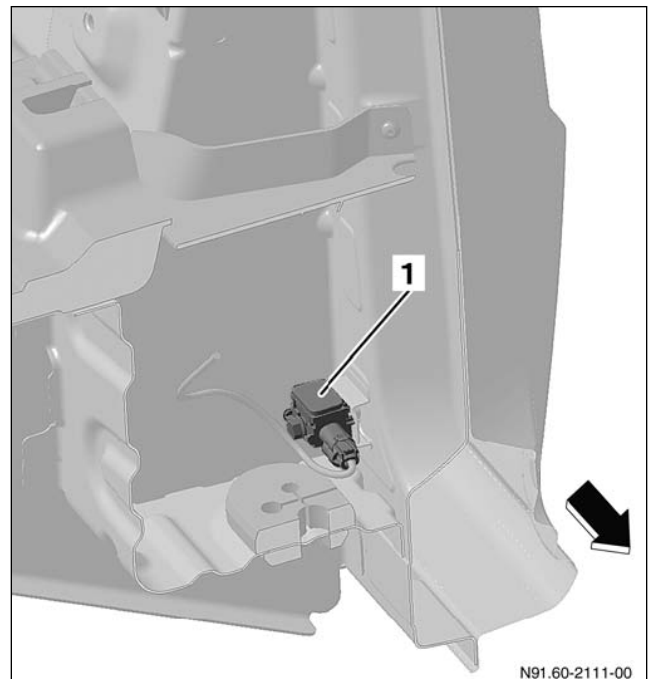
- 1 Airbag control unit
- Arrow Front of vehicle

The satellite sensors are located towards the bottom of the B-pillar behind the entrance trim in the driver's and co-driver's doorway compartment. The additional pressure sensors for vehicles equipped with window bags 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 Sensor (triggering sensor of the occupant protection systems)
 Arrow Front of vehicle

Seat belts and belt pretensioner

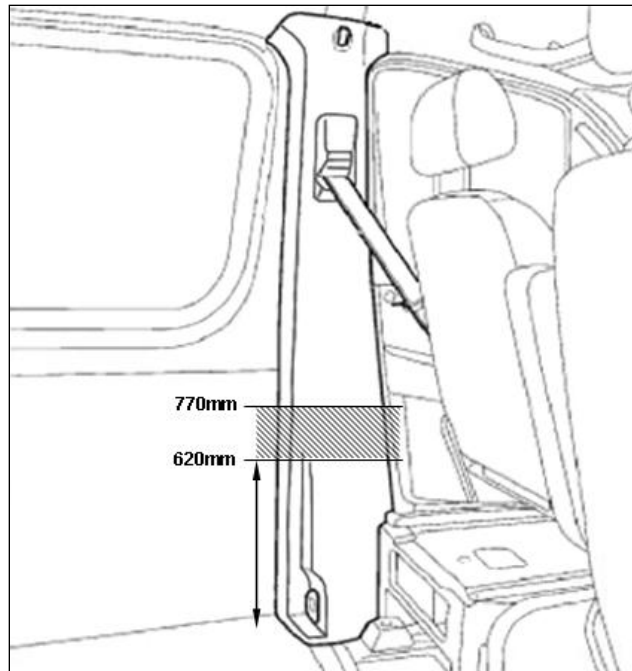
Warning

Never damage or soil parts relevant to safety such as seat belts or belt anchorages and pretensioner 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 leading to serious injury or death.

NOTE: Use only the original seat belts otherwise the certification of the vehicle would be out of compliance.

Seat belt anchorages must be tested in accordance with FMVSS/CMVSS standards.

All vehicles are equipped with pyrotechnic belt tensions 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 co-driver's bench seat.



Location of seat belt retractor between 620-770mm [24.25 – 30.5 in] above floor.

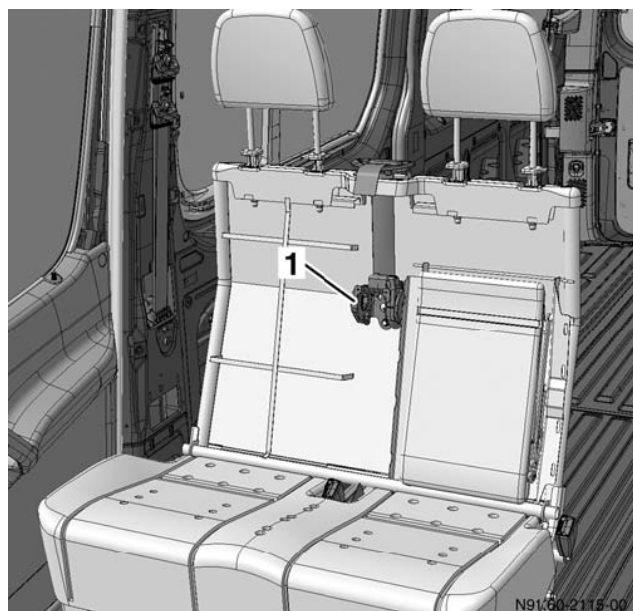


Retractor with pyrotechnic belt tensioner

1 Connector

Warning

When installing aftermarket partition do not drill or attach any fasteners in the area around the seat belt retractor.



Co-driver's bench seat with retractors

1 Retractor

NOTE: The legal requirements detailed in this section relate to current legislation. The relevant FMVSS/CMVSS legislation must be observed.

Warning

Never retrofit or replace front bench seats with individual seats. Otherwise, the restraint systems may no longer function properly and may not provide adequate protection in the event of an accident leading to serious injury or death.

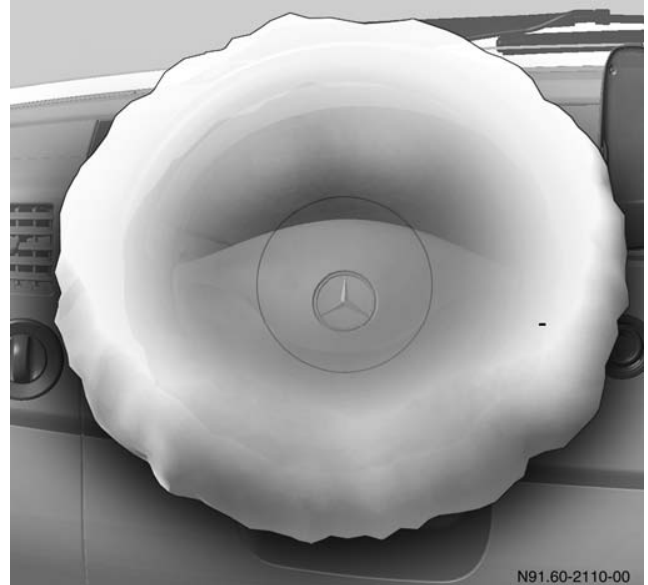
Front airbag

All airbag units are labeled “Airbag”

- The driver’s airbag unit is identified by the “Airbag” inscription on the steering wheel cover.
- The vehicle is equipped with a co-driver’s airbag. This unit is also identified by the “Airbag” inscription.
- If the vehicle is equipped with window bags, 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 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 window bag 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



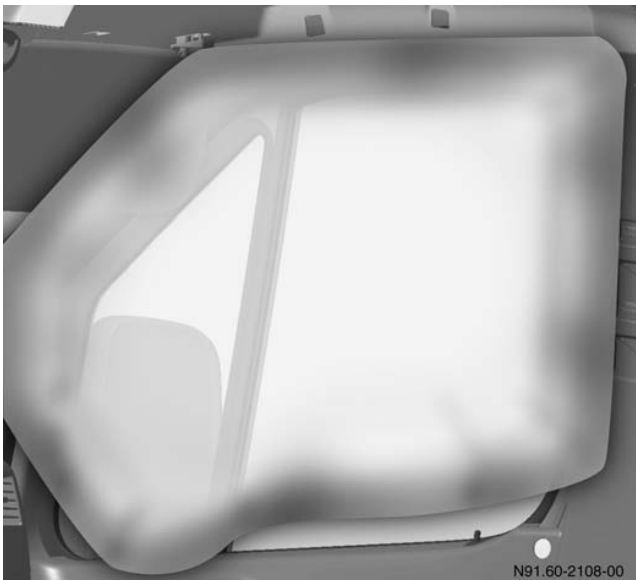
Deployment area of front passenger’s airbag

Side-impact airbags

Do not modify the B-pillar, door bodies, trim and seat upholstery.



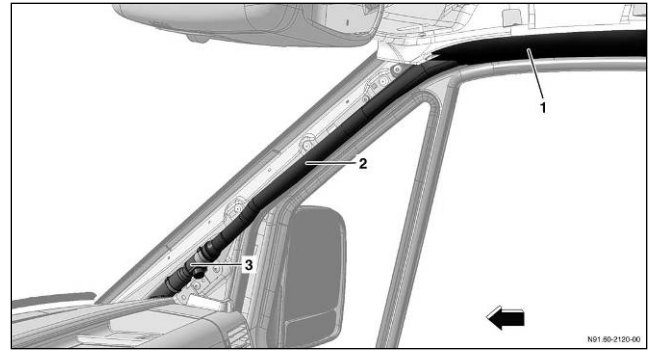
Deployment area of left-hand side thorax bag



Deployment area of right-hand window bag

Warning

Work on the A-pillar may cause damage to the window bag, which could cause the window bag to no longer function properly.



Window bag installation location

- 1 Cover
- 2 Window bag in protective sleeve
- 3 Gas generator in window bag

Arrow Front of vehicle

Working with airbag and emergency tensioning retractor units

Warning

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 and may lead to serious injury or death. The airbag units fitted to the SPRINTER include the driver's and co-driver's airbags as well as the window bag and thorax bag.

- Work involving removed airbag and belt tensioner units, and testing and installation work, may only be carried out by trained personnel.
- The airbag and emergency tensioning retractor 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 air bag and belt tensioner units must be locked away again.
- The airbag and emergency tensioning retractor units may not be treated with grease, cleaning agents or other similar products.
- The airbag and emergency tensioning retractor units may not be exposed to temperatures above 100°C [212°F] even for a short period of time.

Airbag and emergency tensioning retractor units, the sensors and control units, must be replaced if they are dropped from a height of more than 0.5 m [20 inches]. Airbag and belt pre-tensioner units may only be subjected to electrical tests using the specified testers when the airbag and pre-tensioner units have been fitted. We recommend that tests be carried out at an authorized SPRINTER Service Center.

Disconnect the main battery by disconnecting the negative terminal covered and the test coupling / connection disconnected before the airbag and belt pre-tensioner unit are removed.

Transporting and storing airbag units and belt pre-tensioner units

Internal transport should always be carried out using the spare parts packaging and utilizing the vehicle luggage compartment or load compartment.

Never transport airbag in the passenger compartment. The airbag units fitted to the SPRINTER include the driver's and co-driver's airbags as well as the optional window bag and thorax bag.

Warning

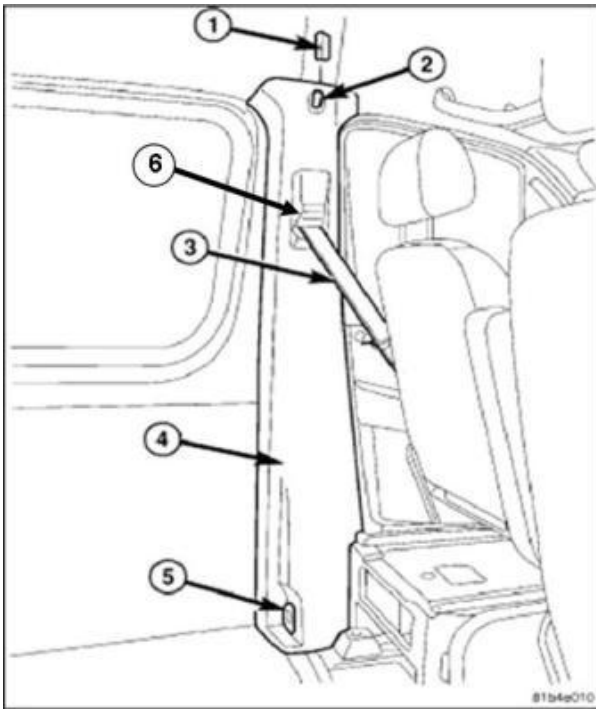
Airbag and belt pre-tensioner units must be disposed of by personnel who have undergone special training for this task. Accident prevention regulations must be observed otherwise it may lead to serious injury or death.

You will find information on retrofitting seats in the "Implementation of bodies" section.

Warning

On no account may seats be mounted on the wheel wells. Otherwise, in an accident the seats may become loose and may lead to serious injury or death.

8.4.3. B-Pillar cover removal & reinstallation



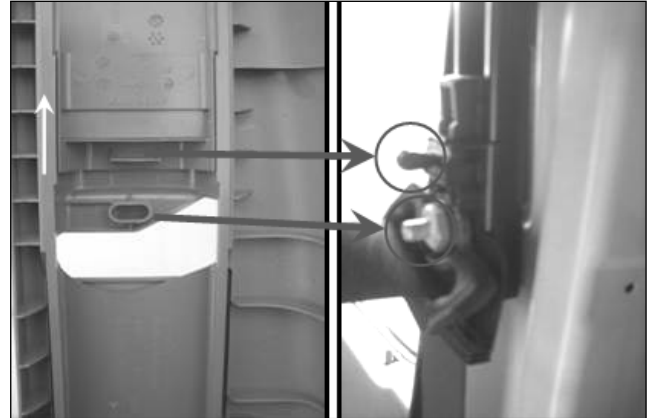
1. Trim coat hook
2. Coat hook
3. Seat belt
4. Trim B-pillar
5. Cargo tie-down
6. Seat belt height adjustment mechanism

Removal of B-Pillar Cover

1. Pull coat hook trim 1 upwards and remove coat hook 2.
2. Remove the cargo tie down 5 or cover.
3. Remove the seat belt 3 from the seat (if needed).
4. Remove the assist handle covers and remove the screws (optional equipment). Remove the assist handle from the passenger side B-pillar.
5. Pull the trim 4 on the B-pillar out of clip connections starting at top and remove downward.
6. Remove the seat belt 3 from the trim 4 (if needed).

Reinstallation of B-Pillar Cover

1. Pull the seat belt through the B-pillar cover.
2. **IMPORTANT:** Slide adjustment part of B-pillar cover to top position before reinstallation. Insure that the seat belt height adjustment fits correctly into guide. Make sure that the door rubber seals are seated correctly.



Correct Alignment of B-Pillar Cover

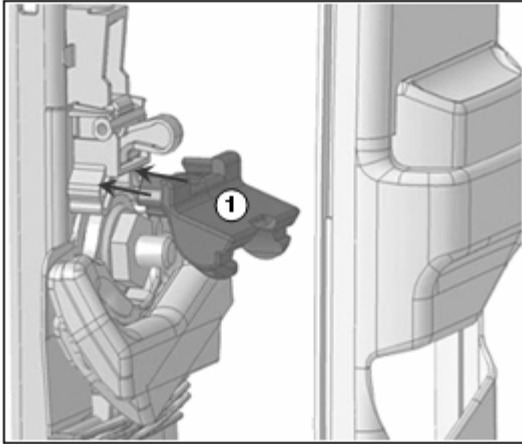
3. Install the trim onto B-pillar and seat clips starting from bottom moving upwards. Install the seat belt to the seat. Install the cargo tie down or cover. Torque cargo tie down with 18 Nm [13.3 ft-lbs]. Install the coat hook and seat trim fully. Bolt the end fitting to seat. Torque belt end with 37 Nm [27.3 ft-lbs].
4. Check seat belt and its height adjustment for proper functionality otherwise check step 2 again.

NOTE: If entire seat was removed torque seat bolts (4x) with 37 Nm [27.3 ft-lbs].

Dampening Device on Height Adjustment (Partition Wall Only)

Sprinter Cargo Vans with partition walls (D50, D51, D53, D62 and D64) come with a 1 dampening device (left and right side) on top of the height adjustment mechanism. Make sure dampening device is fitted properly into height adjustment before reassembly.

NOTE: Dampening devices are not used on Sprinter Chassis Cab and Passenger Vans.



Dampening Device B-Pillar Cover
Interior Exterior

8.4.4. 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 recommended for insulation and soundproofing. An additional covering with heavy-duty insulating foil may be provided in the area of the wheel wells.

NOTE: 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 (12mm - .5in plywood)
- 3 Heavy-duty insulation material (8 to 10kg/m² / 1.6 to 2lbs/ft²)
- 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).

Apart from providing insulation, the materials used for insulation should exhibit the following properties:

- Not hygroscopic
- Not water-retaining
- Not water-absorbing
- Not water-attracting
- Water-repellent

Arrangements are to be made for the rapid and unhindered drainage of accumulated moisture or condensation in order to avoid conditions that promote corrosion.

The standard drain holes must be preserved intact. If necessary, additional drain holes must be created

Warning

Do not modify the roof lining or the roof skin between the A-pillar and the B-pillar if the vehicle is equipped with window bags. Otherwise, the window bag may no longer work correctly (e.g. window bag deployment is delayed or incomplete). In case of an accident it may lead to severe injury or death.

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 elastic material following treatment. Air vents must not be fitted in the immediate vicinity of sources of noise or exhaust fumes.

In addition, manufacturers or suppliers of sound proofing materials should be consulted.

They will be able to provide you with suggestions on how to design optimum noise insulation for your particular body.

8.4.5. 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 optional equipment "Controlled air conditioning/in addition in rear compartment" under options H08.

When retrofitting assemblies, please refer to the "additional Equipment" section (→ Chapter 8.5).

8.5. Additional equipment

If additional equipment is fitted, factory-fitted power take-offs must be used.

8.5.1. Retrofitting an air-conditioning system

All electrical equipment fitted must be tested in accordance with FMVSS/CMVSS standards.

When retrofitting air-conditioning systems, we recommend the "Rear-compartment air-conditioning system" option H08 which can be obtained from the factory as optional equipment.

The requirements of the equipment manufacturer 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:

- Do not tie in the OEM A/C system
- 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 must generate sufficient power.
- Additional fuse protections for the air-conditioning power circuit
- Air-conditioning compressors must be attached using the equipment carrier provided.
- The additional equipment for driving air-conditioning compressors is available from the factory as optional equipment under Option N63 (maximum output 8kW).

Ensure that wires and electrical lines (→ Chapter 8.3.5) 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 (→ Chapter 8.3.4)

8.5.2. Auxiliary heating

The floor of the vehicle must be air-tight 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 system is available from the factory as optional equipment:

Description	Option
auxiliary heater front	H12
auxiliary heater rear	H13

More options and information is contained in the Special Equipment Book from your authorized SPRINTER dealer.

8.5.3. Power take-offs

General – Front engine power take-off

Additional assemblies (e.g. an A/C compressor or an auxiliary alternator) can be driven by an additional pulley on the front of the crankshaft.
Engine power take-off at front of engine only.

Power take-off versions available from the factory.
These power take-offs can be obtained from the factory as optional equipment.

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 optional equipment.

The maximum power output is:

Code N62	8.5 kW (11.4 hp)
Code N63	8.0 kW (10.7 hp)

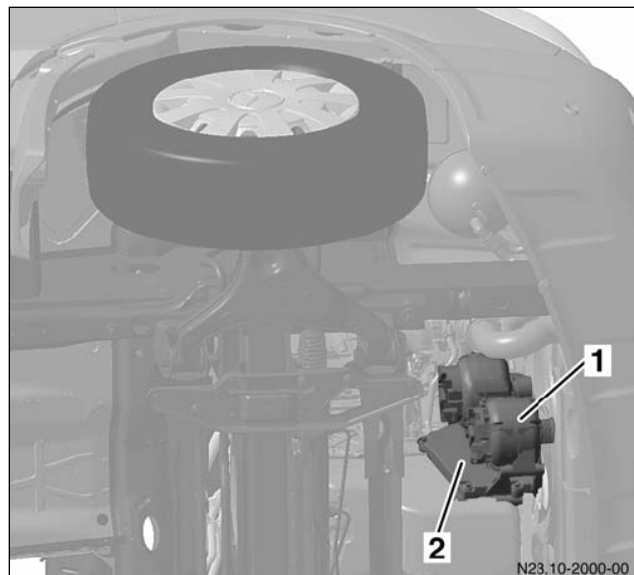
The additional pulley is located in the second belt plane (belt width 12.7mm, effective diameter 128.2mm).

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 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 DAG SPRINTER belts

OM 642	
Code N62	A001 993 47 96
Code N63	A001 993 37 96
OM 651	
Code N62	A001 993 95 96 Stretchfit
Code N63	A002 993 28 96 Stretchfit

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 651	
Code N62	7.3 kg (16.1 lbs)
Code N63	6.5 kg (14.3 lbs)

8.6. Attachments

Make sure that you adhere to the permissible axle loads in all cases.

Attachments must not impair the function of vehicle parts.

Comply with all applicable FMVSS/CMVSS requirements.

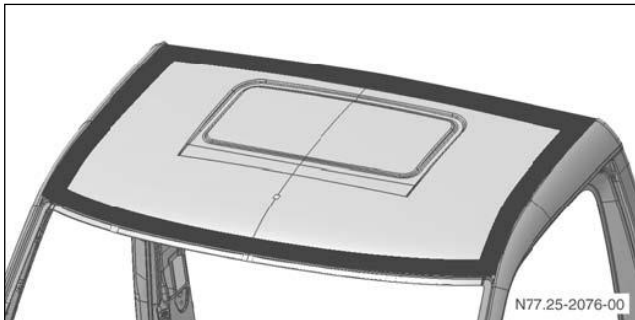
Do not attach a winch to the front section of the frame.

Winches

If winches are attached behind the cab, they must be mounted on a mounting frame of sufficient size and strength.

8.6.1. Wind deflectors

Wind deflectors may only be fitted onto the cab roof by applying high-strength adhesive to the whole 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, please consult with UPFITTER MANAGEMENT VANS.

8.6.2. Attachment above cab

- The permissible center of gravity location and the front axle load must be observed (→ Chapter 5).
- The attachment to the roof must be designed as described in the “Bodyshell” section (panel van roof) (→ Chapter 8.2).

Note that this may interfere with driving assistance systems!

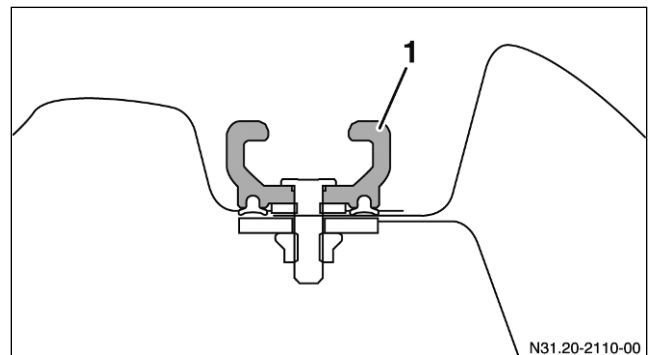
8.6.3. Roof racks

New Sprinter – BM 906 Cargo 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. 110 lbs (50kg) 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 / lbs]	Minimum number of support feet pairs
Low roof	300 / 660	6
High roof	150 / 330	3
Cab	100 / 220	2

To make it possible to fit roof racks, the new Sprinter – Bm 906 must be equipped with C-rails (Option D13, for Cargo Vans only).



Roof rack mounting

- C-rail (roof rack)

Note that there may be interference with driving assistance systems due to large objects on the

roof rack!

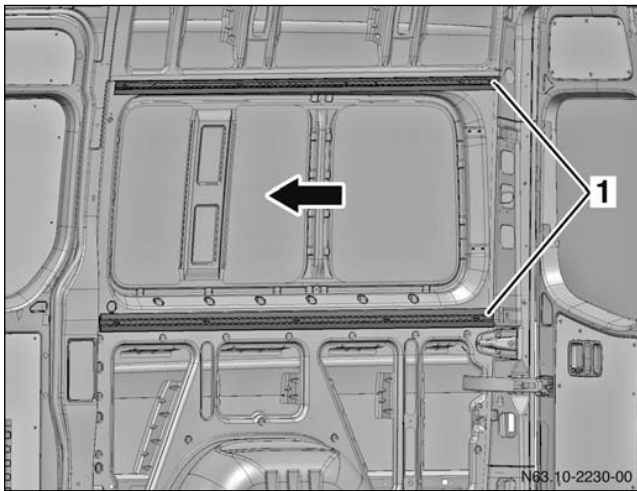
8.6.4. Fitted shelving/installations

Fitted shelving must:

- be sufficient strong and self-supporting
- rest on the cross and longitudinal members of the vehicle floor
- distribute forces evenly
- it is preferable to make attachments at the points of the load rails and lashing eyelets.

Do not transfer loads only to the vehicle side walls. For a favorable force transfer, we recommend the use of load rails available as optional equipment or their entire contact area in the body shell:

	Max rated tensile force
Code VC4 on roof frame	150 daN [33 lbf]
Code V42 on waist rail	250 daN [56 lbf]



Load rails in the panel van

- Load rails

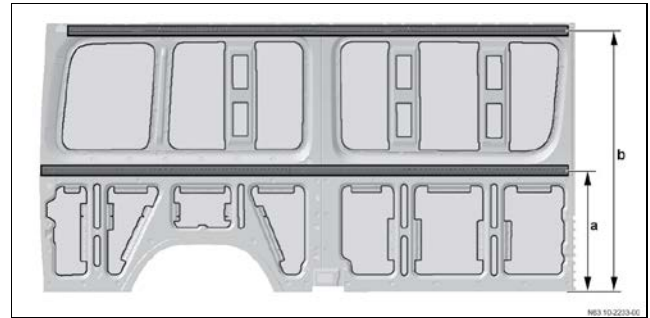
Arrow Front of vehicle

For further information about the side wall
(→ Chapter 8.2.4)

Retrofitting load rails/tie-downs rails

NOTE: Load rails or tie-down rails may only be retrofitted in the areas of the vehicle sidewall 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 sidewall.



Position for retrofitting tie-down rails to vehicle sidewall

Centre load rail	Dimension in [mm]	
Based on standard wooden floor	a = 718	b = 1552
Based on vehicle floor (upper ribbing)	a = 729	b = 1563

The following points must be observed with respect to retrofitting load rails to the vehicle sidewall:

- 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 operator's manual in the vehicle in suitable form.

Connection to vehicle sidewall 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 belt rail)	200

Connection to vehicle sidewall through riveting

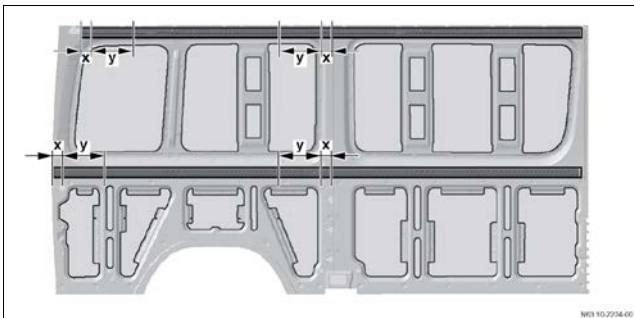
	Permissible rated tensile force [daN]
Upper load rail (in area of roof frame)	60
Lower load rail (in area of belt rail)	100

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

Rivet distances for load rails retrofitted to vehicle sidewall

NOTE: The maximum rivet distances (see table) must be complied with in all driving conditions. Otherwise, excessive forces may result, causing damage to the sidewall.

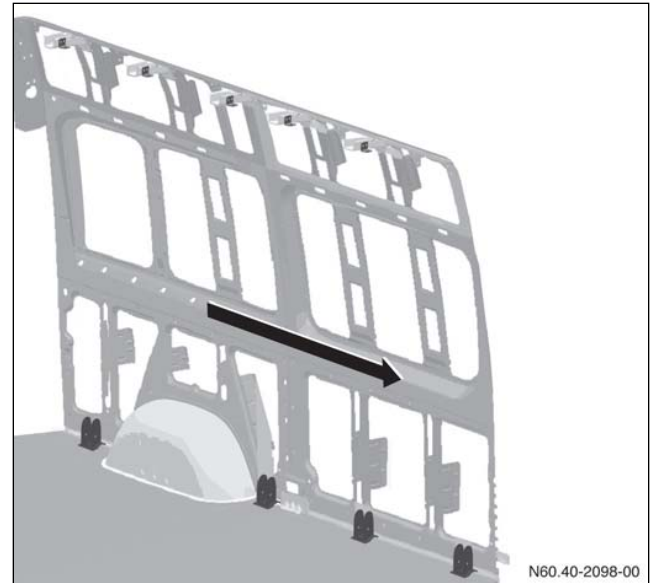


Rivet distances for load rails retrofitted to vehicle sidewall

Rivet distance	Dimension X max. in [mm]	Dimension Y max. in [mm]
Riveting plus adhesive bonding	75	450
Riveting (without adhesive bonding)	25	225

Fittings for fitted shelving

Code ZE6 "Shelving Prep" 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 floor.

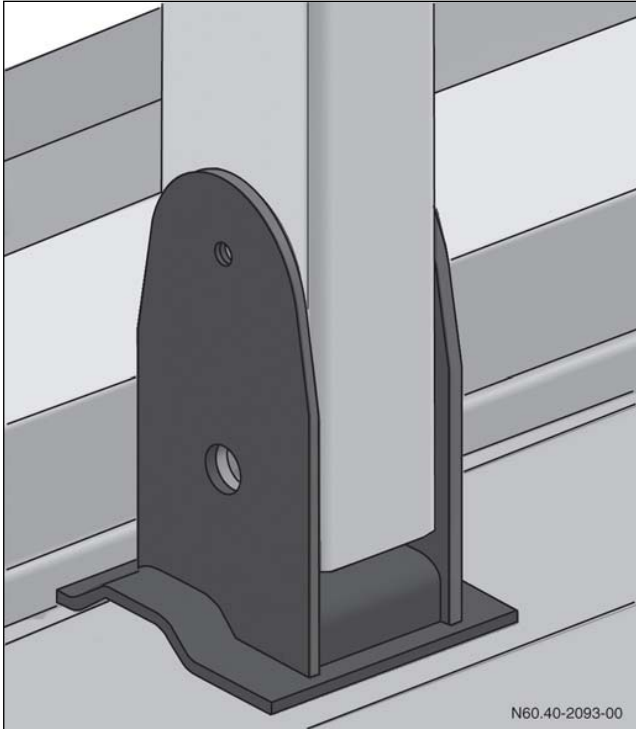


ZE6 package contents in shaded areas

Arrow front of vehicle

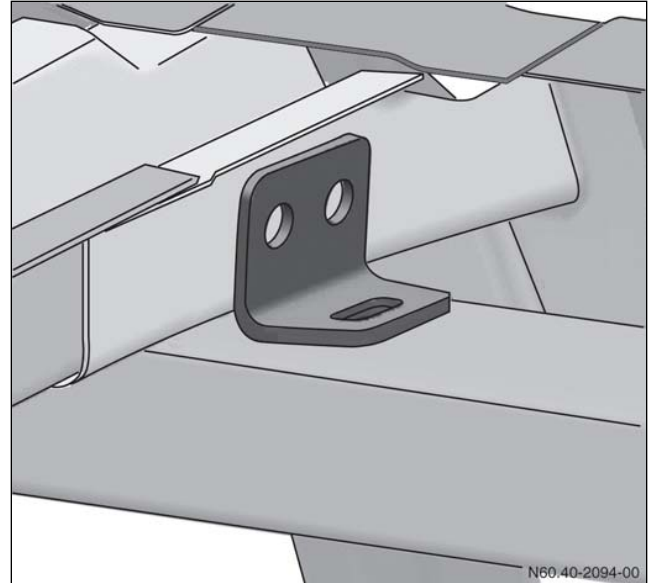
The following must be observed when using the shelf fittings:

- Shelves must not be wider than 450 mm [17.5inch]
- The max load-bearing capacity is 80 kg/m [50 lbs/ft]
- The shelf support must be made of steel with a minimum cross section of 60mm x 40mm x 3mm [2.25"x1.5"x1/8"] (length x width x thickness).
- The shelf supports are bolted to the floor bracket.

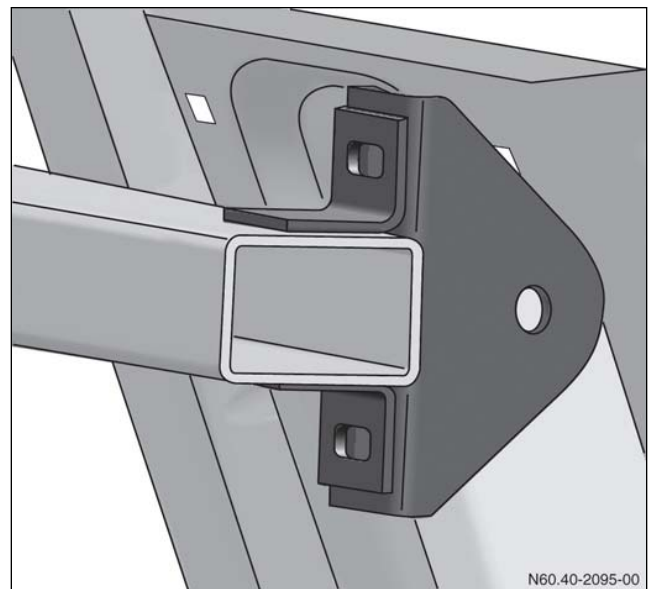


Bolting the support to the floor bracket

1. 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 1,200mm² [186 in²], dimension 60mm x 20mm [2.5in x 0.8in])
2. A steel tube with a rectangular profile measuring 60mm x 40mm x 3mm [2.25"x1.5"x1/8"] is bolted onto the brackets on the roof arches. The shelf supports are bolted to the rectangular profile at the top.

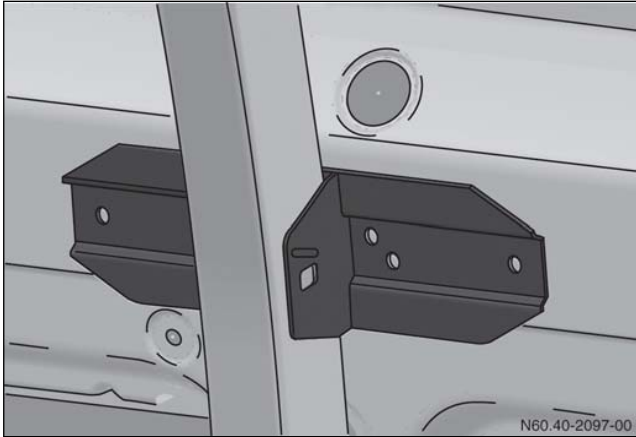


Bolting the longitudinal tube to the roof arch



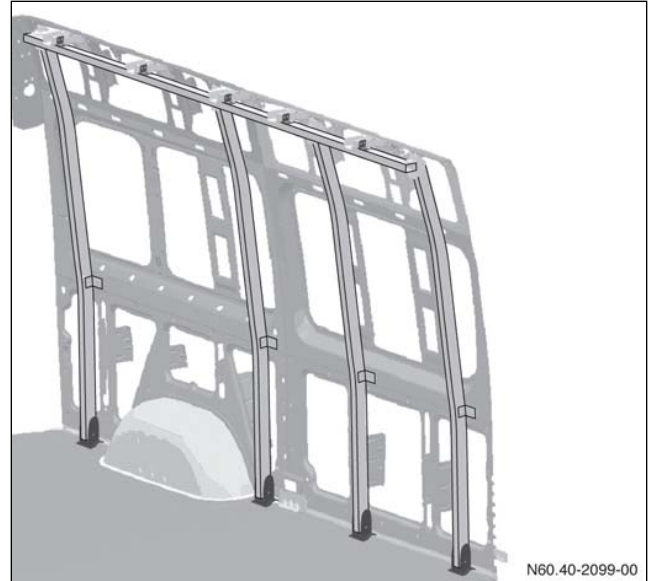
Connecting the longitudinal tube to the support

- The longitudinal tube must not be connected with the partition or the rear door.

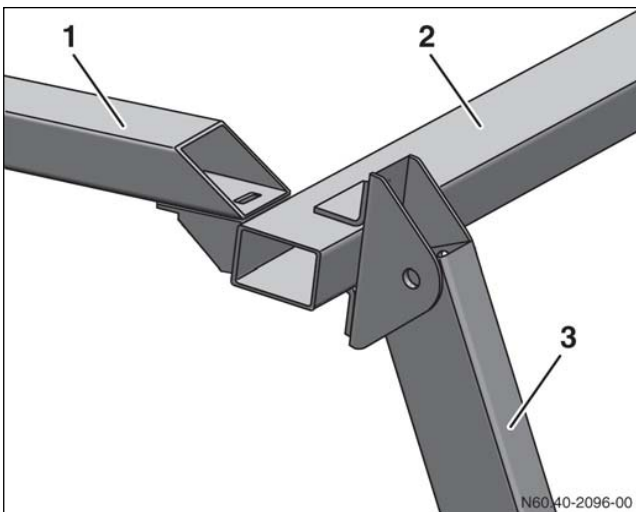


Suggestion for bracket on waist rail

In addition to attaching the vertical supports to the floor and to the roof arches, it is necessary to attach them to the waist rail using a bracket. The connection must be made by bonding and riveting. A minimum bonding surface of 7,000 mm² [10.0 in²] is required.



Suggested attachment with ZE6



Additional connecting of the longitudinal tubes

- connecting rail
- longitudinal tube
- support

if the first or last support is more than 300mm [12 in] away from each roof arch, the longitudinal tubes must be connected together.

8.6.5. 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 on the frame (→ Chapter 8.1) The permissible axle loads must be verified by calculating a weight balance. The vehicle's stability must be ensured by the body builder. The slewing range of the crane must be limited accordingly.

Loading cranes mounted on vehicles must comply with all applicable accident prevention regulations.

Comply with all legal requirements.

The mounting instructions of the crane manufacturer must be observed.

If additional platform or tipper bodies are mounted, the dimensions of the longitudinal mounting frame member must be taken from the table for platform bodies (→ Chapter 9.5) or tipper bodies.

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

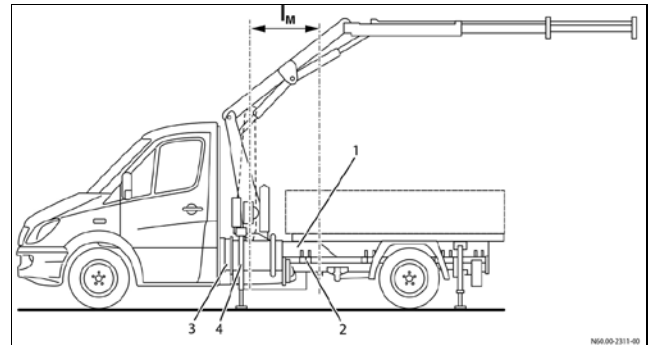
Loading cranes and outriggers must not impair the function of other equipment.

Mounting frame

- Maximum crane load moment (kN x l) / 25 kNm
- Moment of resistance (W_x) for longitudinal mounting frame members: $45\text{cm}^3 / [2.75\text{in}^3]$
- Section dimensions of mounting frame longitudinal members (→ Chapter 8.2).
- 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 colors, 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.

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 $L_M > 35\%$ of the wheel base.
- This attachment required approval from VANS ENGINEERING SUPPORT.



Loading crane

- | | |
|-------|--|
| 1 | Loading crane mounting frame |
| 2 | Body support brackets |
| 3 | Loading crane attachment |
| 4 | Outrigger |
| l_M | Length of loading crane mounting frame |

Loading crane mounted at end of frame

Warning

The minimum front axle load (→ Chapter 5) 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 18,439ftlbs
- Moment of resistance (W_x) for longitudinal mounting frame members: $45\text{cm}^3 [2.75\text{in}^3]$
- Section dimensions of mounting frame longitudinal members (→ Chapter 8.2).
- While the crane is in operation, vehicle stability must be ensured by using extending outriggers.

8.6.6. Loading tailgate (lifting platform or cargo lift)

General

Before installing a cargo lift, the available installation space must be checked by the body manufacturer. Note the limitations in the installation space due to the installed exhaust system and tank system.

Please consult UPFITTER MANAGEMENT VANS if you intend to retrofit a lifting platform to SPRINTER models. If a lifting platform is being fitted, observe the following:

An auxiliary battery (Option E28) must be fitted if an electro-hydraulic lifting platform is fitted. The deep discharge battery with higher capacity (Option ED4) is highly recommended.

- Lifting platforms must comply with all applicable legal requirements
- The permissible rear axle load must not be exceeded
- The minimum front axle load must be complied with in all loading conditions.
- Vehicle stability must be ensured by the Upfitter 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 (Chassis Cab series).
- We recommend the use of only hydraulic supports fixtures.
- Maximum load distance 600mm [24 inches] relative to the standard rear portal / standard rear cross member.

- Vehicle stability when loading and unloading the vehicle must be ensured by the user.
 - The maximum lifting force must not be exceeded.
- Lifting platform attachment

The attachment of a lifting platform must be designed as described in the "Attachment to the rear frame section" (→ Chapter 8.2.2).

Additional torque support must be provided by means of at least two bolted connections fitted with spacer bushings (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 Cargo van body.

If modifications are required to the under ride guard due to the attachment of a lifting platform, the strength and bending strength of the under ride guard must not be changed. The vehicle must not be raised using the outriggers, as this would damage the frame.

Model	Wheel base [in]	Maximum lifting force (kN)/[lbs]		Minimum dimension of mounting frame longitudinal member (mm)/[in]
		Chassis Cab	Cargo	
SPRINTER 2500 8550 GVWR	144	-	5 / [1124]	80x45x3 / [3.1 x 1.8 x 1/8]
	170	-	5 / [1124]	80x45x3 / [3.1 x 1.8 x 1/8]
	144	-	5 / [1124]	80x45x3 / [3.1 x 1.8 x 1/8]
	170	-	5 / [1124]	80x45x3 / [3.1x 1.8 x 1/8]
SPRINTER 3500 9990 & 11030 GVWR	144	10 / [2248]	5 / [1124]	120x50x4 / [4.75 x 2 x 5/32]
	170	10 / [2248]	5 / [1124]	120x50x4 / [4.75 x 2 x 5/32]

8.6.7. Trailer hitch

- We recommend the use of trailer hitches that have been approved by MB and attached to the special mounting points on the body shell (rear longitudinal member)
- Access to the spare wheel must be guaranteed if a trailer hitch with non-detachable ball neck is fitted (especially with a fully laden vehicle).
- Fitting the trailer hitch must comply with all applicable regulations.

NOTE: Never attach a trailer hitch to the end cross member of the frame.

NOTE: If you retrofit a trailer coupling, a fuel tank shield will be needed for the following vehicles:

- 4-cylinder Diesel engine on 3500 Sprinters
- 6-cylinder Diesel engine

Information is available from your authorized SPRINTER dealer.

Clearance dimensions, trailer hitch

The height of the trailer hitch above the ground must be between 300mm [11.75 in] and 450mm [18 in] when the vehicle is laden to the permissible gross vehicle weight.

The reliable operation of the hitch must not be impaired.

Do not install an open-jaw hitch fitted to the front of the vehicle.

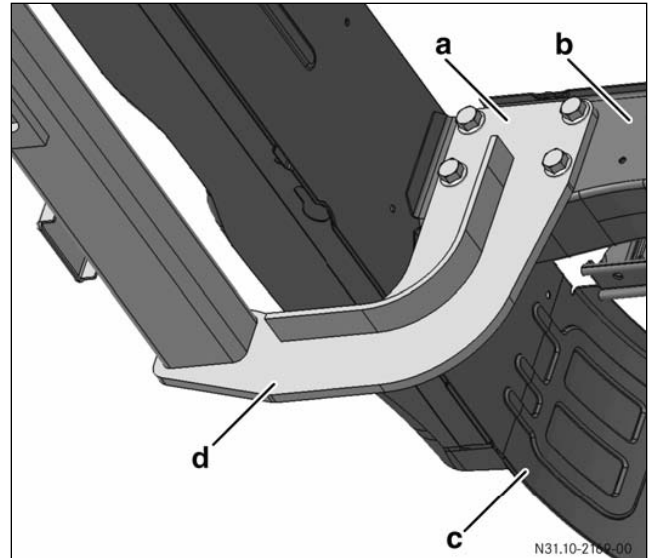
The specified clearances must be maintained.

Warning

If the towing vehicle is not loaded, only an unloaded trailer may be towed. If the trailer hitches have removable ball hitches, the operating instructions must be supplied in the vehicle and they must refer to the special features and operation of the hitch.

Attachment of the trailer hitch

Only secure trailer hitches and mounting plates to the special mounting points on the body shell (rear longitudinal member). In addition, Cargo vans require an additional attachment as support on the rear cross member of the vehicle frame.



Inside 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 hitch

On no account should any attachment be made to the underride guard.

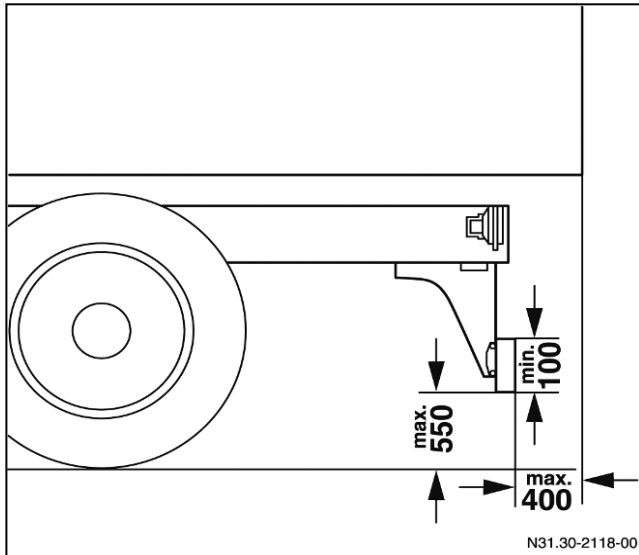
If the frame needs extending, spacer bushings must be fitted to the frame to attach the mounting plate or the rear cross member. They may lead to a reduction in the towing weight or the tongue weight.

You will find whole patterns with dimensions for securing the trailer hitch in the "Technical details" section.

Depending on the model series, the different optional equipment is available as an option from the factory to retrofit trailer hitches.

8.6.8. Underride guard

If an under ride guard is required, it must comply with applicable legal requirements and its design drawings submitted by the body builder. The under ride guard must be mounted as far back as possible.



Side view Dimensions

- Maximum height of under ride guard (unloaded vehicle) above road surface: 550mm [22 in]
- Width:
 - Maximum = width of rear axle (outer tire edge)
 - Minimum = width of rear axle less 100mm [4 in] on each side. The decisive factor is the widest axle
- The cross member must have a section height of at least 4 in.
- Edge radius at least 2.5mm [0.1 in].

Modification to the underride guard

If the under ride 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 under ride guard (e.g. due to the attachment of a lifting platform), the strength and bending strength of the under ride guard must not be modified. Any modifications to the under ride guard must comply with all applicable regulations.

9. Design of Bodies

This section contains information concerning the body to be produced by the body manufacturer.

9.1. Mounting frame

All bodies require a mounting frame or a substructure that assumes the function of a mounting frame to ensure a reliable connection between the chassis and the body (except for self-supporting bodies and mounting frames acting as floor assemblies)

Attachment to the frame must run along the frame using the body support brackets attached to the frame at the factory (→ Chapter 8.1.4).

NOTE: All available body mounts and there attachment points must be used.

9.1.1. Material quality

Required moment of resistance¹ of mounting frame:

Up to maximum standard Wheelbase	30 cm ³ / 1.8 in ³
Over maximum standard Wheelbase	> 34.5 cm ³ / 2.1 in ³

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

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/ASTMJ403/J412/J413 standards.

Material quality of specified frame made of steel	
Material	Tensile Strength (N/mm ²) Yield Strength (N/mm ²)
H240LA (DIN EN 10268-1.0480)	350-45 260-340
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 steel mounting frames
- If aluminum mounting frames are used, their strength must be equivalent to steel mounting frames. Observe the specifications of the aluminum manufacturer.

9.1.2. 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.

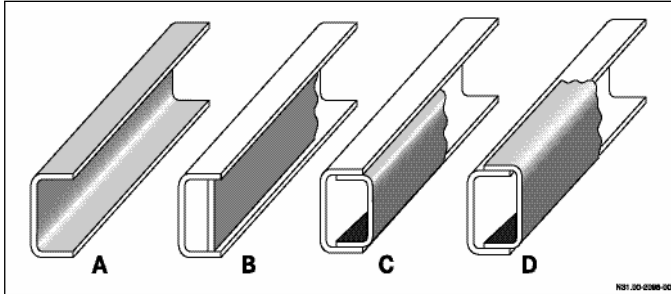
The body must have a torsion-free attachment to the body support brackets on the longitudinal frame member.

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 a pinched frame (permissible gross vehicle weight 11,030 lbs), the longitudinal mounting frame members can run continuously in a straight line.

9.1.3. Section dimensions / dimensioning

For the longitudinal members, use flanged U-sections or commercially available U-sections for vehicle design (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.

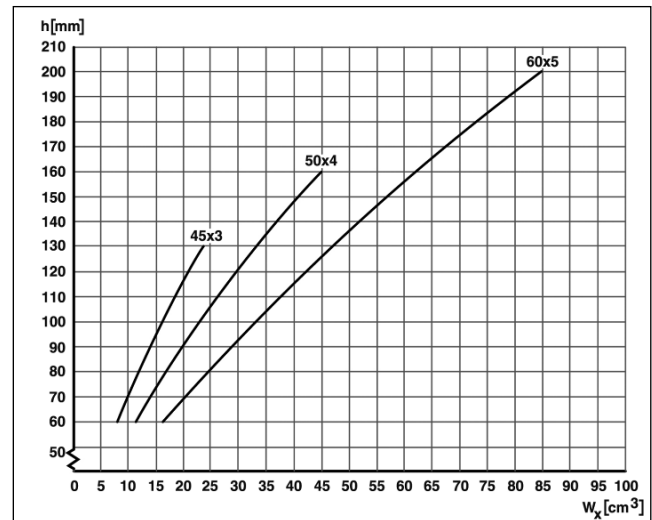
If more than one body is mounted on the same chassis (e.g. platform and lifting platform), the larger

of the specified moments of resistance must be taken to determine the mounting frame.

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 with.



Longitudinal member dimensioning

h: Section height in mm
 W_x : Moment of resistance in cm^3

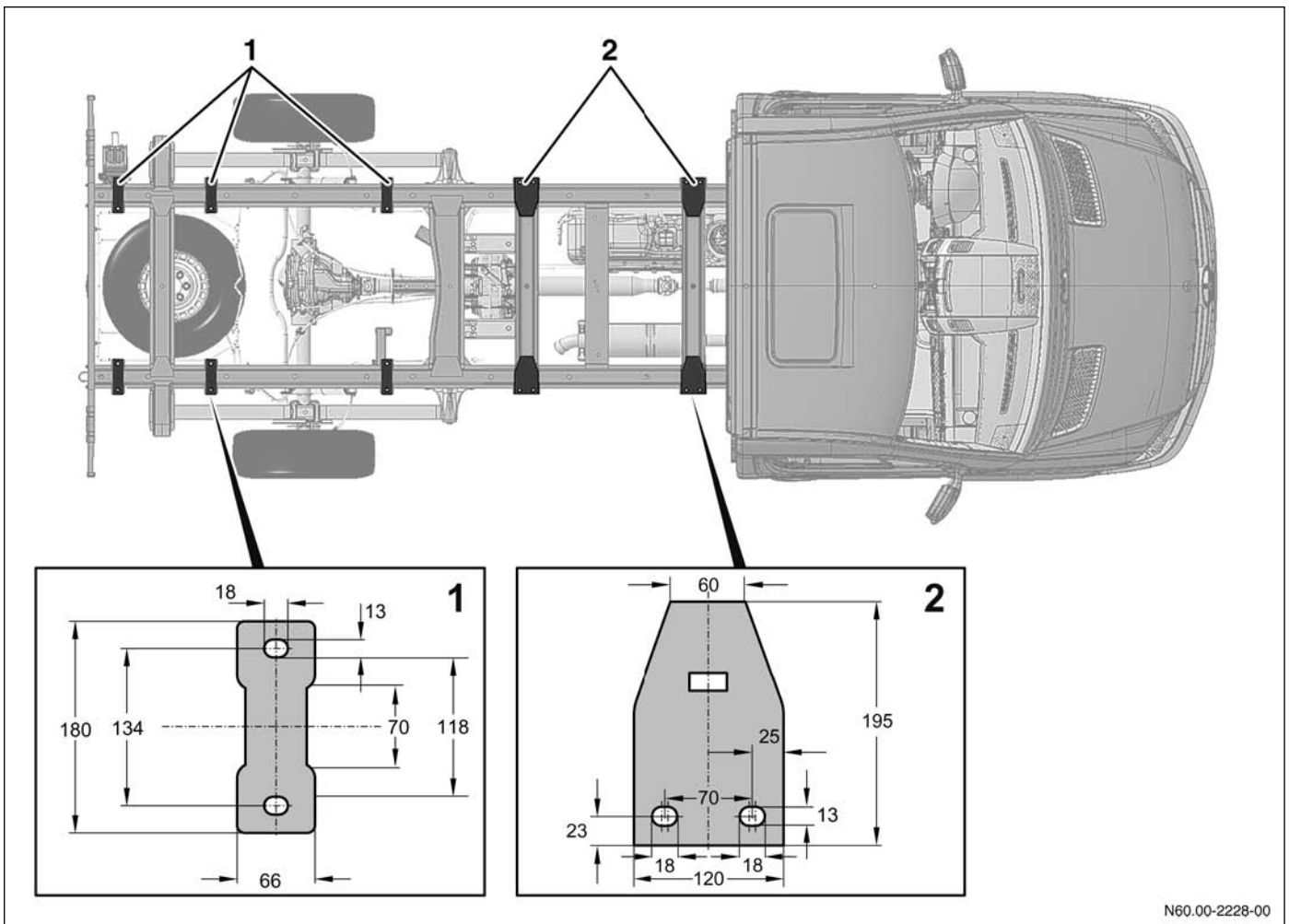
9.1.4. Attachment to the frame

All 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.

NOTE: The minimum distance between the body and the cab must be >50mm [2 inches].

Single rear wheel SPRINTER Chassis Cab is not available in the U.S or Canada and is for illustration purposes only. If prefabricated mounting frames are used, the production tolerances of the chassis frame with (maximum +6/-3mm) [+0.24/-0.12 in] must be taken into consideration.

The positions for the body support brackets are indicated in the 2D drawings depending on the model series.



N60.00-2228-00

Types of frame fastening points (mm)

Note:

All available body mounts and there attachment points must be used.

Additional body support brackets

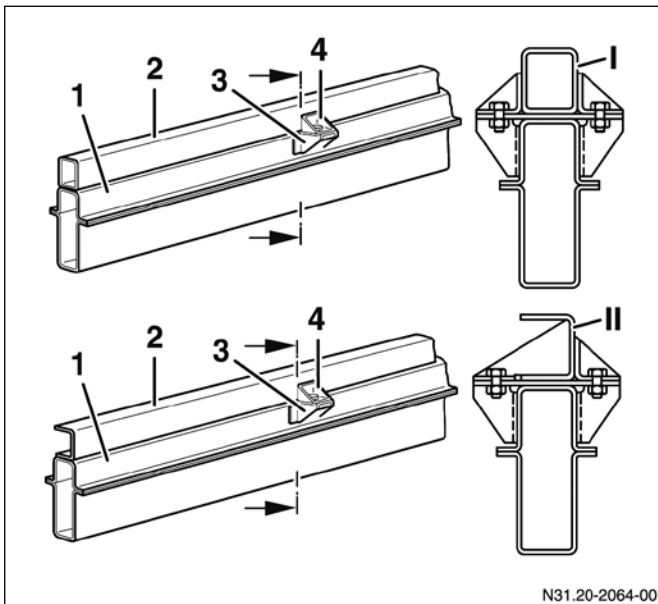
If it is necessary to fit additional body support brackets, contact UPFITTER MANAGEMENT VANS for guidelines.
(→ Chapter 1.4).

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

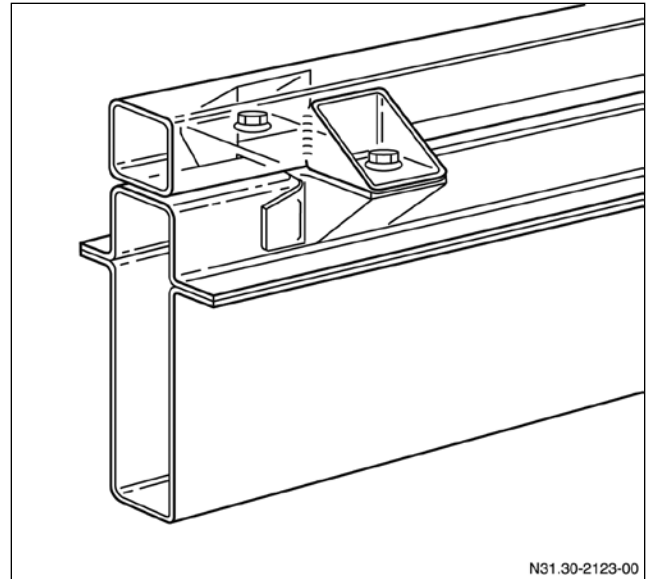
II U-section

1 Chassis frame

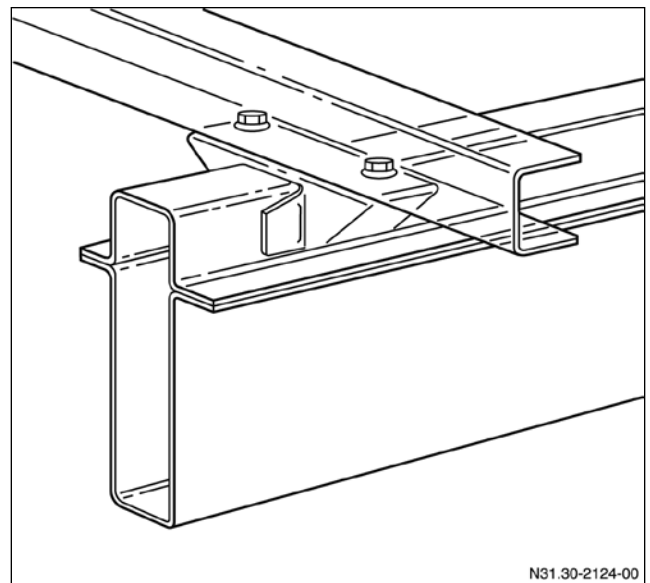
2 Mounting frame

3 Standard mounting bracket

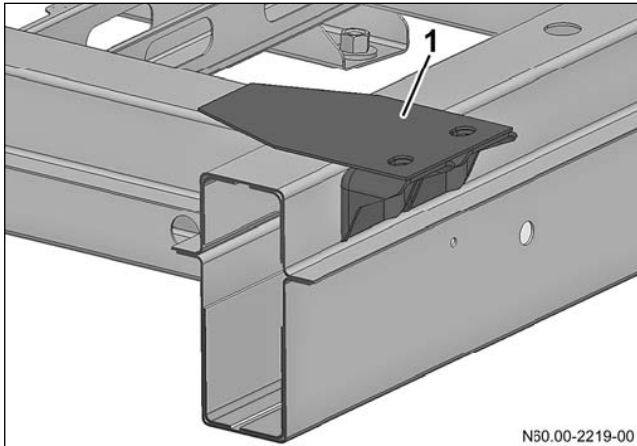
4 Bracket



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 sufficient transfer of all longitudinal and lateral forces.

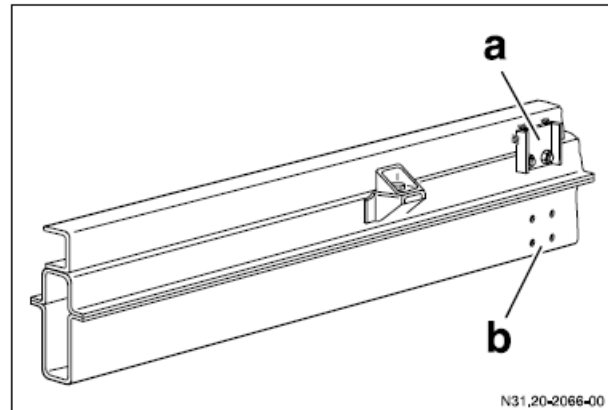
Correct attachment is a decisive factor for:

- vehicle handling and operating safety
- the service life of the chassis frame and the body

Rigid attachment

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 longitudinal mounting frame member only under specific conditions. 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.

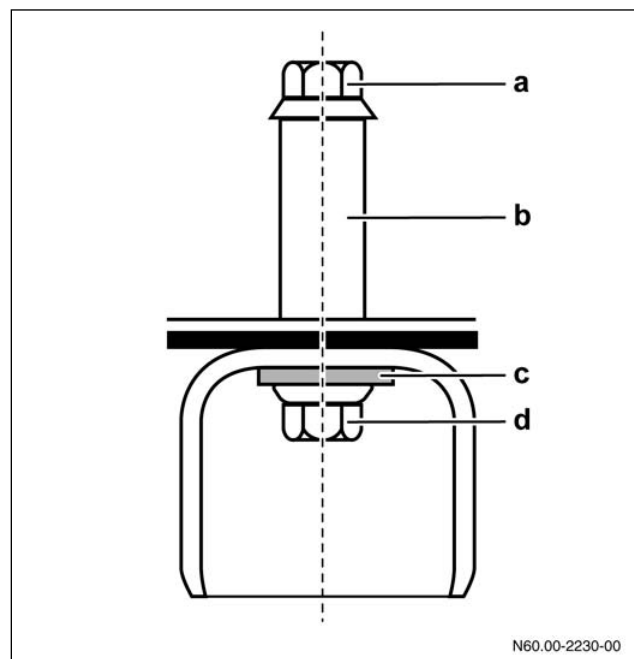


Deal support (rigid connection)

- a Rigid attachment at frame end
- b Standard holes at frame end

Elastic connection

On rigid bodies (e.g. stiff cargo box, cargo box with cargo lift, refrigeration body etc.), 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 deform.

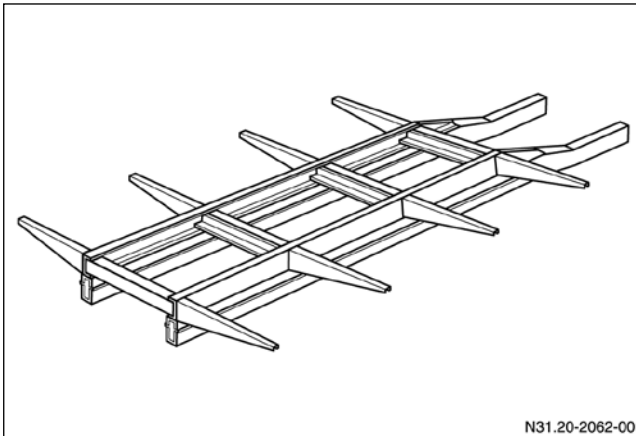


Suggested method for producing a bolted connection, locked to prevent loosening

- a bolt with flange M12 x 90, strength Grade A
- b spacer sleeve 22-13 x 50
- c washer DIN 7349-13-ST
- d Nut with flange M12, strength Grade A

9.1.5. 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.

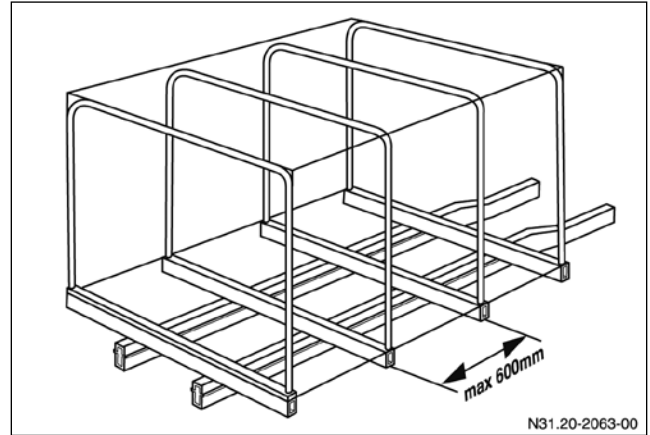


Example of a floor assembly

9.2. 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

Spacing max 600mm [24inch]

9.3. Modifications to the interior

9.3.1. Retrofitting additional rear seats

When retrofitting rear seats, it is absolutely essential to keep to the H-point (hip point). You can obtain up-to-date documentation from VANS ENGINEERING SUPPORT.

All applicable FMVSS/CMVSS regulations must be observed.

When re-installing seat belts, the specified bolts must be tightened to the original torque.

Warning

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 in the event of an accident occupants may suffer severe injury or death.

Only the components of MB may be used for the installation of safety belts and seat belt buckles.

All applicable 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.

Warning

Never mount seats on the rear wheel wells. In the event of an accident, if the seats become detached from their anchorages may lead to severe injury or death.

9.4. Modifications to Cargo vans

Floor assembly/side panels

On Cargo 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). Refer also to the "Modifications to cab" section.

Partitions

Partitions in Cargo vans may be totally or partially removed. The following partitions are available as optional equipment from the factory:

Option	Description
D50	Partition, continuous
D51	Partition, continuous with window
D53	Partition, continuous with a sliding window
D62	Provision for retrofitting partition
D64	Partition with sliding door
D93	Omission of partition

You can obtain more information about optional equipment from your authorized SPRINTER dealer, UPFITTER MANAGEMENT VANS or in the "Optional equipment" section) (→ Chapter 4.10).

Vehicle roof

More information about the roof is contained in the "Cargo van / Passenger van roof" section.

9.5. 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). 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.
- Reflectors and lights must be mounted on the body to comply with legal requirements per FMVSS/CMVSS regulations.

GVWR	Moment of resistance W_x for each longitudinal member in $\text{cm}^3/[\text{in}^3]$
11,030 lbs	30 / [1.83]

For the section dimensions of the longitudinal mounting frame member, see the section 8.1.3.

When 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.

9.6. Cargo 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).

On rigid bodies such as Cargo vans, the attachments behind the cab must be an elastic connection.

GVWR	Moment of resistance W_x for each longitudinal member in $\text{cm}^3 / [\text{in}^3]$
11,030 lbs	40 / 2.44

9.7. Refrigerated vehicles

Refer also to the following sections;

- “Retrofitting an air-conditioning system” (→ Chapter 8.5.1)
- “Power take-offs” (→ Chapter 8.5.3)
- “Attachment to the roof”
- “Retrofitting electrical equipment” (→ Chapter 7.4.5)

On Cargo vans, easy access to the components of the door mechanism (e.g. guide rails and hinges) must be ensured so as not to hinder possible repair work.

On Cargo vans, the insulation increases the weight of the doors and therefore the load on the hinges, carriages and locking systems.

9.8. Dump bodies

Vehicles and dump bodies must comply with all applicable regulations and laws.

Make sure that you do not exceed the permissible axle loads.

Pivots

- The rear pivot on three-way and rear-end dump 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 hitch.
- The front pivot must be provided with guide brackets so that the pivots can be guided when the dump body is lowered.

Restraining facilities

- Comply with all applicable laws and regulations
- Fit a support (folding support) to prevent the dump body from lowering
- Secure operating devices against accidental operation
- Connect a “dump body” indicator lamp to provide a visual warning that the dump 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 forward.
- On three-way dump bodies, the application point of the lifting press must be in front of the center of gravity of the body and the payload.

Mounting frame

If chassis are provided with dump 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 the mounting frame to the body support brackets as described in the “Attachment to the frame” (→ Chapter 8.2.2).
- Make sure that the steel longitudinal and cross members have the correct dimensions.
- Close off the rear area of the mounting frame towards the Cargo van and, if necessary, reinforce the mounting frame by installing a diagonal cross or by taking other appropriate measures.

Vehicles with dump 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 VANS ENGINEERING SUPPORT (→ Chapter 1.4).

GVWR	Moment of resistance W_x for each longitudinal member in $\text{cm}^3/[\text{in}^3]$
11,030 lbs	40 / [2.44]

9.9. Rescue vehicles

Vehicles with bodies for rescue or recovery equipment must be attached with mounting frames of adequate dimensions. In addition, the bodies must be fitted with two rigid connections on each longitudinal frame member.

Refer to the “Winches” section for information on attaching winches.

Also observe the “Side under ride guards”

9.10. Torsional rigidity of body types

The bodies and mounting frames for torsional rigid bodies (e.g. municipal vehicles, fire-brigade Cargo vans or street-cleaning vehicles) must be attached by means of elastic elements at the front of the frame. 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.

Refer also to the “Retrofitting electrical equipment” section (→ Chapter 7.4.5).

9.11. RV Conversion

Prior to conversion in an RV, please ensure the following important requirements:

- All applicable legal requirements are observed
- All applicable requirements for interior design and RV equipment are fulfilled
- 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.

Particular attention must be paid to the following sections of the body / equipment mounting directives:

- Dimensions and weights (→ Chapter 5)
- Instructions on modifications to the basic vehicle
- Electrics/electronics (→ Chapter 7)
- Mudguards and wheel wells (→ Chapter 8.2.6)

Modifications of conversions to standard vehicles (e.g. the installation of a raised roof) may invalidate the certificate and warranty. Prior to converting a SPRINTER into an RV consult with UPFITTER MANAGEMENT VANS (→ Chapter 1.4).

Never exceed the center of gravity limits.

We recommend fitting and additional anti-roll bar on the rear axle. This is available from the factory as optional equipment under Option V50. (→ Chapter 4.9).

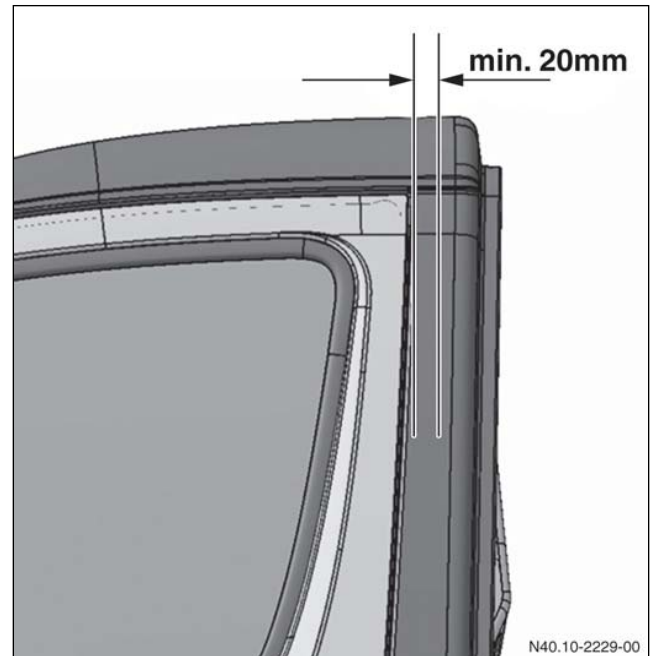
More information on electrics and additional equipment is contained in the “electrics/electronics” (→ Chapter 7) and “Additional equipment” sections (→ Chapter 8.5).

Warning

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 and B-pillar be covered with aftermarket paneling.

Attachment to the frame

- The body must be secured by using support brackets (→ Chapter 8.12)



Minimum distance between rear door and integrated body

9.12. Lifting work platform

General

NOTE: 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.

NOTE: The lifting work platform may only be used when the vehicle is fully raised on its outriggers. When the platform is raised, there must be no additional loads in or on the cab. There is otherwise a risk of damage to the frame. The vehicle must not be moved with the lifting work platform extended. The frame may be damaged if the vehicle is moved with the lifting work platform extended. The body manufacturer must implement a safety system 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 programmable special module (PSM).

If chassis are equipped with lifting work platforms, the following points must be observed due to high loads:

- 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.
- Only body consoles fitted at the factory must be fastened to the mounting frame.
- An additional body console must be installed for each longitudinal frame member in the area 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.
- The introduction of force in the supports must be exactly halfway between the two standard double

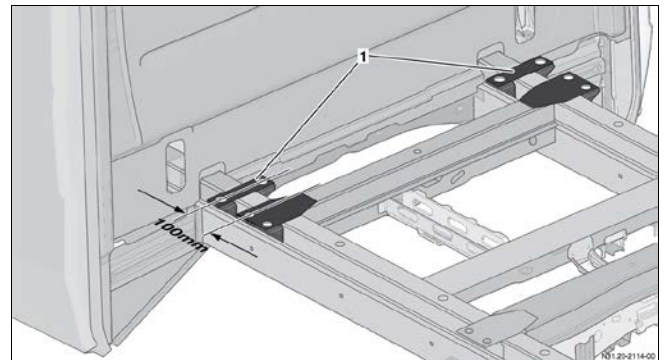
bracket pairs behind the cab on the mounting frame. In addition, the mounting frame must be sufficiently protected against torsion in the area of force introduction by means of a cross member

Required additional body console

To ensure a uniform introduction of force in the chassis frame, one additional body console is required for each longitudinal frame member in the area behind the cab.

The body consoles 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 console to the next adjacent hole in the existing body console must measure 100 mm.



Body consoles

1 Additional body consoles

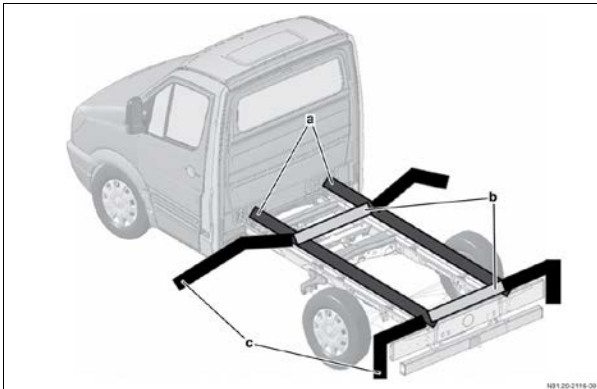
When installing additional body consoles, we recommend the use of genuine Mercedes-Benz parts.

Mounting frame

The installation of lifting work platforms on a chassis requires a mounting frame of sufficient size.

The mounting frame must be attached in the same way to all body consoles. The attachment of the mounting frame at the first and additional brackets must be with bolted connections locked to prevent loosening and spacer sleeves. The introduction of force into the mounting frame by the outriggers must take place exactly halfway between the two double bracket pairs installed behind the cab as standard.

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 consoles

- a Area of additional brackets
- b Required cross members for mounting frame in area of force introduction from outriggers
- c Outriggers

9.13. Integrated Bodies

A non-positive connection between cab and body is required on vehicles with integrated bodies, e.g. RV's, integrated box bodies etc.

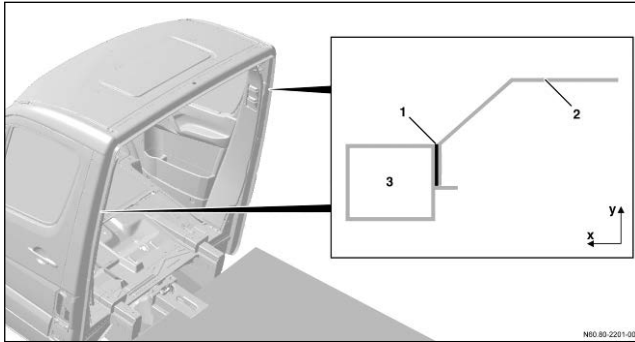
Attachment of cab rear panel to B-pillar (z-axis)

The body side wall must always be connected to the B-pillar. The connection between body and cab must be non-positive.

It must be assured that forces are transmitted between the body and B-pillar. This can be achieved by e.g.:

Variant 1

Attachment of body to B-pillar by means of a plate with $t=2\text{mm}$ [3/32 in] angled at approx. $2 \times 45^\circ$. The plate must be bonded across the entire surface area.

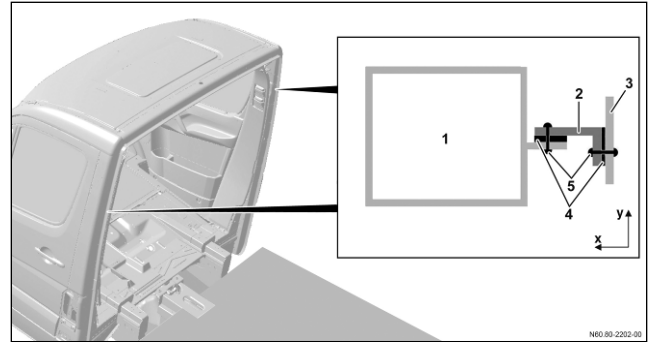


Variant 1: Attachment of body to B-pillar with plate. Picture shows passenger side.

- 1 Bonding flange
- 2 Plate / Bracket
- 3 B-pillar

Variant 2

Attaching the body to the welding flanges of the B-pillar with angle pieces.



Variant 2: Attachment of body to B-pillar welding flanges with angle pieces. Picture shows passenger side.

- 1 B-pillar
- 2 Angle piece
- 3 Front wall of upfitter body
- 4 Bonding flange
- 5 Rivet

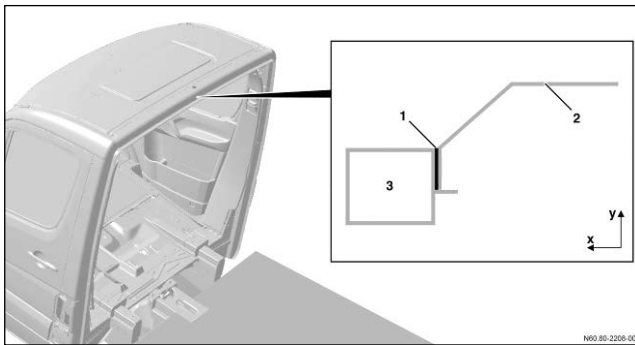
Attachment of cab rear panel to roof bow (B-pillar) (y-axis)

In addition to the connection between body sidewalls and vehicle, it is necessary to form a non-positive connection between body and vehicle in the area of the B-pillar roof bow on vehicle with integrated bodies.

This can be achieved by e.g.

Variant 1

Attachment of body to B-pillar roof bow by means of a plate with $t=2\text{mm}$ [3/32 inch] angled at approx. $2 \times 45^\circ$. The plate must be bonded across its entire surface area.

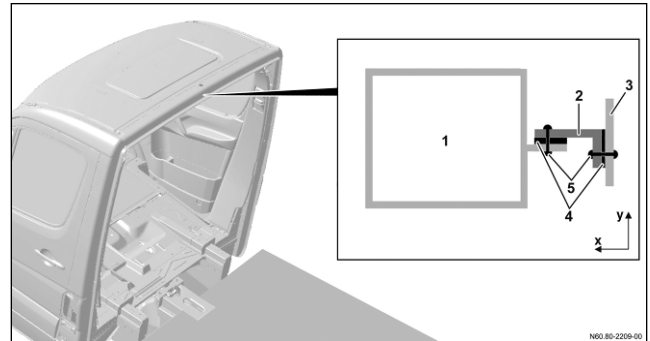


Variant 1: Attachment of body to B-pillar with plate.

- 1 Bonding flange
- 2 Plate / Bracket
- 3 Roof bow (B-pillar)

Variant 2

Attaching the body to weld flange on roof bow with angle pieces



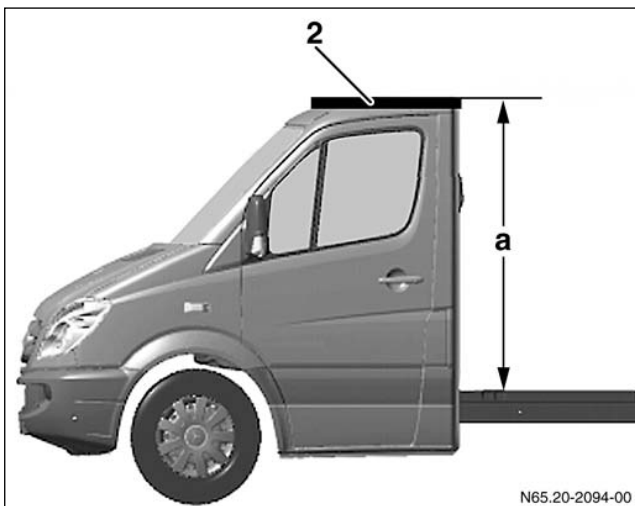
Variant 2: Attachment of body to roof bow welding flanges via angle pieces.

- 1 B-pillar
- 2 Angle piece
- 3 Front wall of upfitter body
- 4 Bonding flanges
- 5 Rivets

9.14. 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 roofs is reduced by approx. 70mm.
- The vehicle has a cutout in the area of the roof / door portal, reinforced with body modifications and 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 installed or added it is necessary for the upfitter 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.
- Body limits for camera-based support systems must be observed



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:

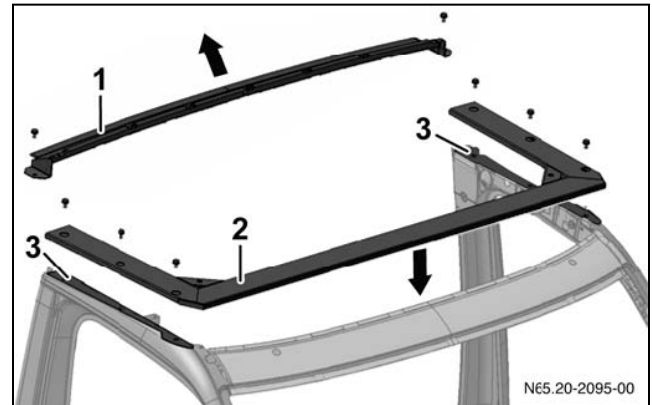
3500 lbs.

a = 1,536 mm

9.14.1. 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 bolts (tightening torque 40 Nm +/- 2 Nm).



Mounting of auxiliary roof frame

- Transport roof arch
- Auxiliary roof frame
- Cutting area with reinforcements (bodyshell modifications)

9.14.2. Mounting the body on the auxiliary roof frame

The body can be attached to the auxiliary roof frame by

- Bolts
- Rivets
- Adhesive bonding
- Welding

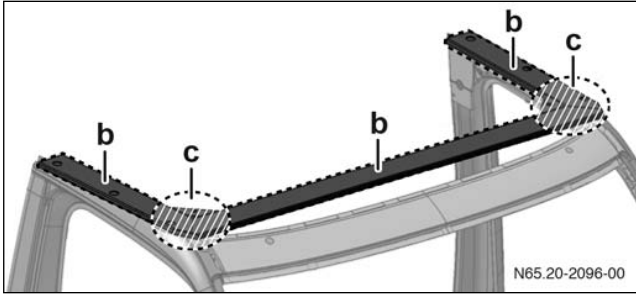
Warning

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”.
The department responsible will be happy to answer any questions.

10. Calculations

10.1. Center of gravity

The overall height of the center of gravity (vehicle with equipment/complete body but without load) must be kept as low as possible.

The position of the center of gravity in the longitudinal direction of the vehicle is specified with reference to a vehicle axle.

The center of gravity height is specified with reference to the center of the wheel hub or the road surface.

Mercedes-Benz recommends that you have the position of the center of gravity checked by a recognized and experienced testing institution.

UPFITTER MANAGEMENT VANS can provide the support you may need.

If the center of gravity is determined by the body manufacturer, the procedures described under chapter 10.1.1 "Determination of the center of gravity in the x-direction" and chapter 10.1.2 "Determination of the center of gravity in the z-direction" must be followed and services of qualified persons must be used so as to achieve realistic and useful results.

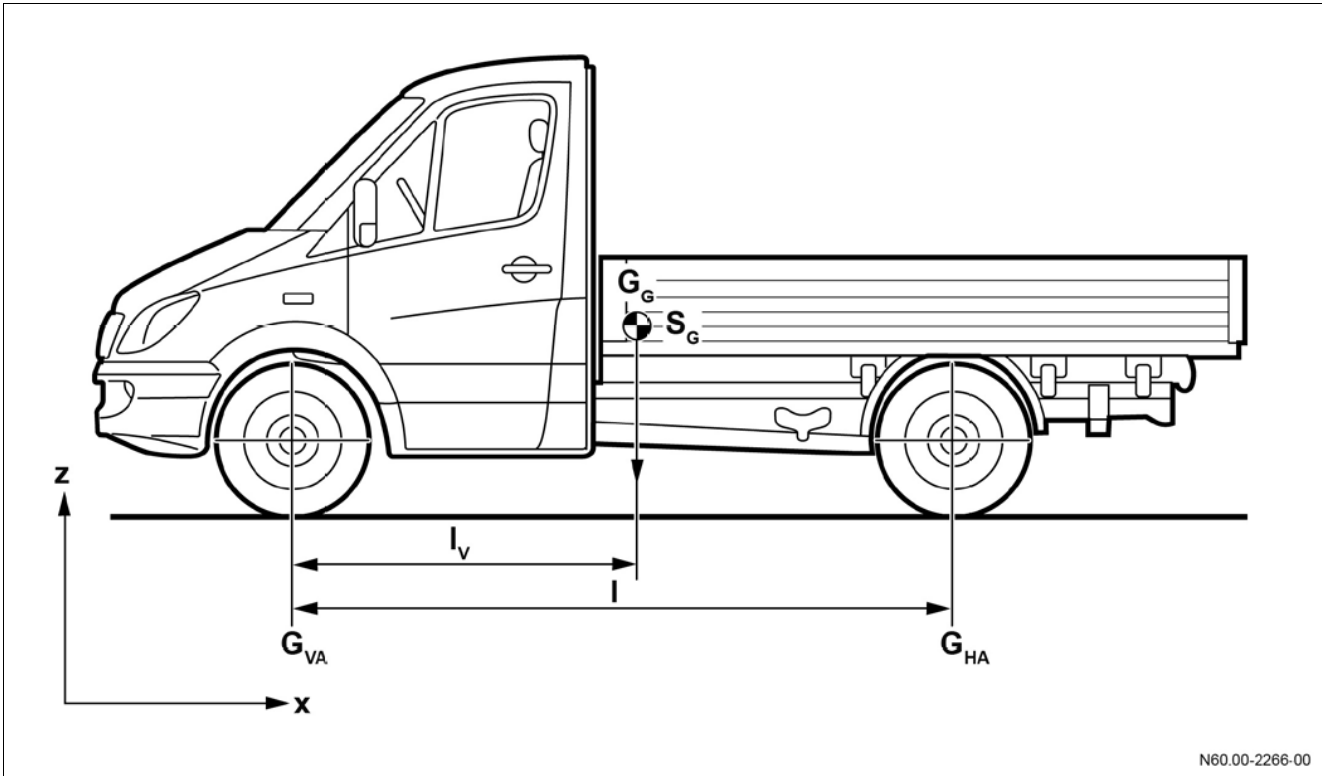
10.1.1. Determination of the center of gravity in the x-direction

CG coordinates in x-direction
(Front / rear axle load distribution)

Procedure:

- The vehicle should be weighed with its complete equipment/body but without load.
- Inflate the tires to the tire pressure specified for the maximum permissible axle load on each axle.
- Completely fill all fluid reservoirs (fuel tank, washer fluid reservoir and, if installed, hydraulic tank, water tank etc.).
- Shut off the engine on the scales, shift the transmission to neutral and release the brakes.
- The vehicle must be parked horizontally on level ground for weighing.
- First weigh the individual axle loads (front and rear axle loads) and then the gross vehicle weight.

- Using these measurements, the position of the center of gravity in the longitudinal direction of the vehicle can be calculated using equations (3) and (4).
- Use (2) to check the results from (3) and (4).



N60.00-2266-00

Figure: Axle load calculation

$$G_G = G_{HA} + G_{VA} \quad (1)$$

$$l = l_V + l_H \quad (2)$$

Calculation of center of gravity in the x-direction

$$l_V = \frac{G_{HA} * l}{G_G} \quad (3)$$

$$l_H = \frac{G_{VA} * l}{G_G} \quad (4)$$

Weights:

G_G Gross weight of the vehicle

G_{VA} Front axle load on empty vehicle (specification or weighting of the chassis in question)

G_{HA} Rear axle load of the empty vehicle (Specification or weighting of the respective chassis)

Dimensions:

l_V Distance of overall center of gravity of empty vehicle from front axle

l_H Distance of overall center of gravity of empty vehicle from rear axle

l Wheelbase

S_G Overall vehicle center of gravity

NOTE: Practical determination of the center of gravity height may only be carried out by appropriately qualified staff using suitable and calibrated scales. In order to reduce measurement errors, each measurement value should be determined at least three times and the average should be calculated from these three values. This value is then used to perform the calculation as per equations (3) and (4).

10.1.2. Determination of the center of gravity in the z-direction

Center coordinates in z-direction (height of center of gravity h_S for the overall vehicle)

For determination of the overall center of gravity height of the vehicle h_S by the body manufacturer, Mercedes-Benz recommends the following procedure after completion of the vehicle:

After conversion, the vehicle should be weighed on a plate-type scale or suitable wheel load scale in two different chassis positions in succession. Here, the axle loads measured when the vehicle stands horizontal and level (GVA and GHA, see 9.1.1 „Determination of the center of gravity in the x-direction“) and the axle loads for an axle raised by h' (QHA or QVA) must be determined. The lift height h' should be as large as possible in accordance with the front and rear overhang angle of the vehicle (also known as the angle of approach/departure). The target value is $h' > 600$ mm.

In order to reduce measurement errors, at least six individual measurements must be performed for each vehicle axle when measuring the axle load: three per axle when the vehicle is in a level state and three when an axle is raised. Based on the three measurements in each condition, an average should be calculated for each axle. The mean value must be calculated from these three values and this mean value must then be used when calculating with equations (5) to (7). In order to improve the accuracy of the final result, the axle load change should be determined both with a raised rear axle and with a raised front axle.

NOTE: In order to avoid erroneous measurements, please note:

When weighing with the vehicle level, the vehicle must be exactly horizontal. Any height differences between the axles caused by the scales must be compensated for accordingly.

The axle to be weighed must be blocked to prevent suspension jounce and rebound when rising to the required lift height.

No part of the vehicle may bottom out when rising to the required lift height.

All vehicle wheels must be able to roll: shift mechanism in neutral position, all brakes including parking brake released, chocks placed at a sufficient distance from the wheels, if necessary.

For turning (in order to weigh the other axle), move the vehicle under its own power so that any stresses in the vehicle are relaxed.

Make sure that no objects inside the vehicle can move during the measurements.

If the vehicle suspension cannot be blocked owing to its design or space restrictions, further axle load measurements must be taken at different raised positions (e.g. 600 mm, 700 mm and 800 mm). Here, errors can again be limited by averaging. The center of gravity height is equal to the arithmetic mean of the individual center of gravity heights for each raised position.

Example of procedure

- 1 The vehicle must be weighed with complete attachments and body, and without load.
- 2 Inflate tires up to the interior tire pressure that is specified for the relevant maximum permissible axle load.
- 3 Fill up all fluid reservoirs (fuel tank, window washing fluid reservoir, or if necessary, hydraulic reservoir, water tank etc.) completely.
- 4 On the scales, switch off the engine, shift the transmission to neutral and release the brakes.
- 5 Position the vehicle with the rear axle at a horizontal and level position on the scales and determine the axle load.
- 6 Raise the front axle (VA) by the value h' , at least 600 mm. Increasing the height h' while taking the other boundary conditions of the vehicle into account improves the final result. The value h' must be determined for all individual measurements with raised axle and should be identical wherever possible. As an alternative to measuring the raised height h' , the angle α between the wheel hubs can be determined.
- 7 Determine the resulting axle load shift QHA at the rear axle on the scales.
- 8 Lower the vehicle, turn it around and repeat the corresponding measurement on the front axle (initially GVA with the vehicle level, and then QVA with the rear axle raised).
- 9 Perform steps 4 to 7 three times in total (with blocked suspension).
- 10 Using the calculated values, the height of center of gravity can be calculated using equations (5) to (7).
- 11 When calculating using the equations (3) to (9), all length measurements must be used in millimeters (mm) and all weights

must be used in deca Newton (1 daN = 10 N).

- $G = 1 \text{ daN} = 10 \text{ N}$ is the weight force corresponding to the mass $m = 1 \text{ kg}$
- 12 Lift the raised axle further (by 100 mm, for example) and measure the height of center of gravity again so as to confirm the measurement result.

NOTE: Practical determination of the center of gravity height may only be carried out by appropriately qualified staff using suitable and calibrated measuring equipment and measurement tools.

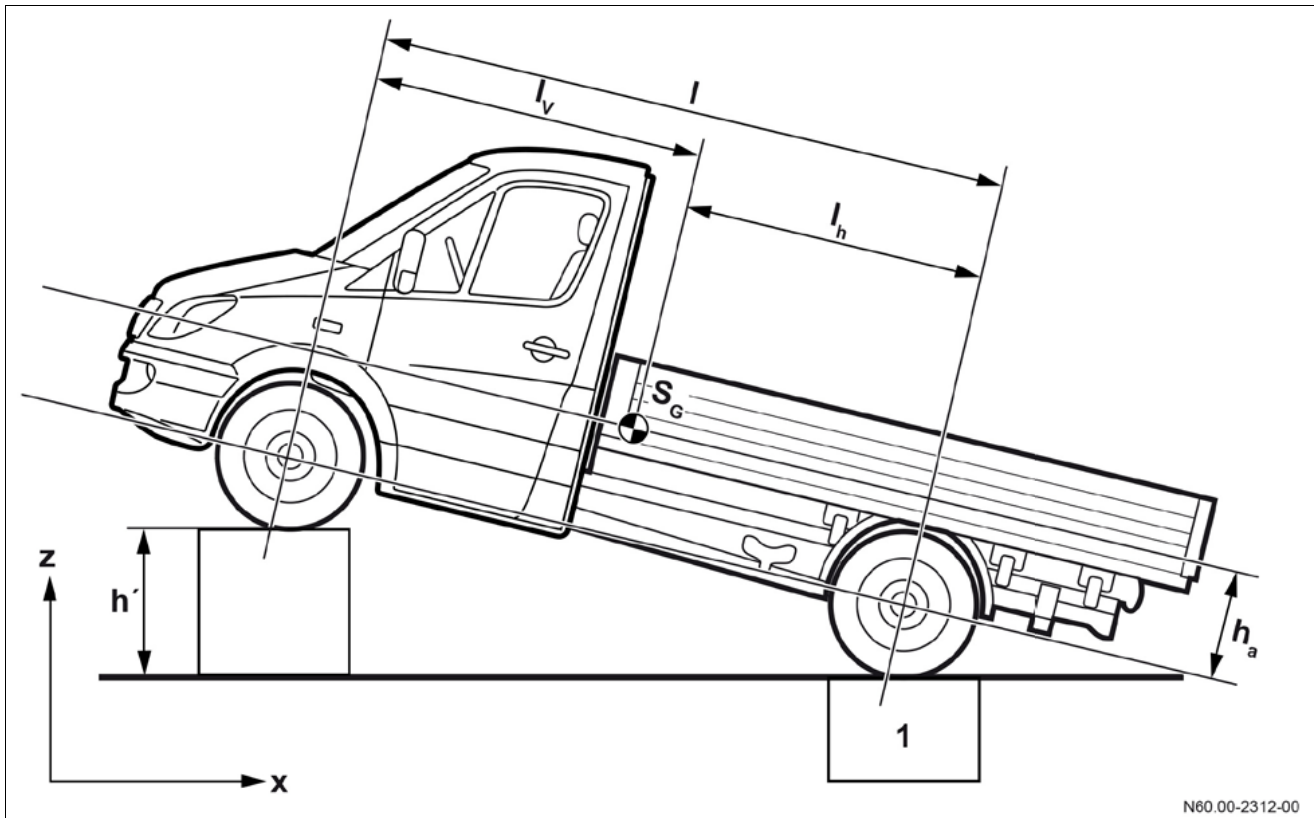


Figure: Determining the height of the center of gravity

$$h_s = h_a + r_{stat} \quad (5)$$

- r_{stat} Static tire radius
- Q_{VA} Front axle load with vehicle raised at rear
- Q_{HA} Rear axle load with vehicle raised at front
- h_s Height of center of gravity above road surface
- h_a Height of center of gravity above wheel center
- h' Height by which the vehicle was raised
- S_G Overall vehicle center of gravity
- 1 Weighing device

Formulae for raised rear axle:

$$h_s = \left(\frac{l}{h'} * \frac{Q_{VA} - G_{VA}}{G_G} * \sqrt{l^2 - h'^2} \right) + r_{stat} \quad (7)$$

NOTE: The wheelbase "l" is defined by the vehicle model designation

NOTE: The determined center of gravity must not exceed the specified threshold values given in "Maximum permissible position of the center of gravity"

Formulae for raised front axle:

$$h_s = \left(\frac{l}{h'} * \frac{Q_{HA} - G_{HA}}{G_G} * \sqrt{l^2 - h'^2} \right) + r_{stat} \quad (6)$$

11. Technical details

11.1. Bulb ratings of exterior lights

Function	Type	Load [W]	Remarks
High beams	H7	2x55	
	Xenon D3	2x35	for bi-xenon
Front fog lights	H11	2x55	integrated in bumper
Low beams	H7	2x55	
	Xenon D3	2x35	for bi-xenon
Daytime running lamps	W21 W	2x21	
	LED	2x12	for bi-xenon
Standing lights	W5 W	2x5	
	LED	-	dimmed daytime running lamps with bi-xenon
Cornering / static curve lights	H7	2x55	for bi-xenon
Turn signal	PY21 W	Front 2x21	
	P21 W	2x21 W	
	PY21 W	Rear 2x21	
	HPV	Outside mirror 2x16	13.5 V
	PY21 W	Roof 2x21	
	PY21 W	Mudguard 2x21	
Taillight	R5 W	2x5	for panel van/passenger van
	R5 W	4x5	for chassis, 2 lamps in parallel
Backup lamp	P21 W	2x21	
Rear fog lamp	P21 W	21	
Brake lights	P21 W	2x21	
Centre high-mounted brake lamp	LED	12x2.2	
End-outline marker lamps	R5 W	2x5	Chassis
	LED	2x1	Chassis
Side marker lamps	LED	6x1	
Rotating beacon	H1	2x55	
License plate lamp	LED	2x1	for panel van/passenger van
	R5 W	5	Identical chassis with taillights